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# The Role of Partner Support and Relationship Satisfaction in Health Behavior Change: A Self-Determination Theory Framework

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**The Role of Partner Support and Relationship Satisfaction in Health Behavior Change: A  
Self-Determination Theory Framework**

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B.A. College of the Holy Cross

A Thesis Submitted in Partial  
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PARTNER SUPPORT AND HEALTH BEHAVIOR CHANGE

APPROVAL PAGE

Master of Arts Thesis

The Role of Partner Support and Relationship Satisfaction in Health Behavior Change:  
A Self-Determination Theory Framework

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ii



## PARTNER SUPPORT AND HEALTH BEHAVIOR CHANGE

### Abstract

Weight-related health behavior change can be difficult to initiate, and perhaps even more challenging to sustain long-term. Self-Determination Theory (SDT) allows for a more nuanced exploration of the role that motivation and existing support systems play in weight management. Recently, studies have focused on coequal support relationships rather than hierarchical relationships in health behavior change. The present study used a longitudinal design to assess support style (needs support vs. directive), relationship satisfaction, motivation (autonomous versus controlled), and weight loss over a 6-week period in college students with overweight or obesity, using a SDT framework. Students enrolled in Introduction to Psychology who endorsed a desire to pursue a weight-related health behavior change goal and availability of a support partner, completed baseline anthropometrics and SDT-based questionnaires (N = 50, 25% male, 67.3% Caucasian,  $18.8 \pm 1.2$  years,  $28.6 \pm 4.2$  kg/m<sup>2</sup>). Average weight change in the program was small but significantly less than published population weight gain estimates (M = -0.01 lbs.  $\pm$  4.1;  $t(49) = 13.4$ ,  $p < .001$ ). Participants reported high levels of needs support (M = 6.3,  $\pm 1.0$ ;  $t(48) = 4.6$ ,  $p < .001$ ) and higher autonomous motivation than controlled motivation at study entry and study completion (M = 6.0,  $\pm 0.9$ ;  $t(48) = 7.2$ ,  $p < .001$ ). A series of hierarchical regression analyses revealed that relationship satisfaction significantly predicted autonomous motivation at study completion ( $\beta = 0.41$ , SE = 0.18,  $t(49) = 2.8$ ,  $p < .05$ ) and that needs support significantly mediated this association ( $b = .18$ , 95 % BCa CI [0.02, 0.4]). Further examination of the role of relationship satisfaction and needs support on motivation development and weight-related health outcomes is warranted. Intervention studies targeting support training among coequal relationship partners should consider needs support as an important active ingredient in successful and sustained weight-related outcomes.

## PARTNER SUPPORT AND HEALTH BEHAVIOR CHANGE

### **Introduction**

Overweight and obesity remain among the top medical and healthcare concerns in the United States (Finklestein, Brown, Wraage, Allaire & Hoerger, 2010; Ogden, Carroll & Flegal, 2014). The economic, medical, and social costs of overweight and obesity are well documented and projected to increase by \$48-66 billion per year by 2030 (Finklestein, Khavjou, Thompson, Trogon, Pan, Sherry & Dietz, 2012; Wang, McPherson, Marsh, Gortmaker & Brown, 2011). Recent reports indicate that currently more than two-thirds of adults and 17% of youth are living with overweight or obesity (Ogden et al., 2014). There are no states within the U.S. with obesity prevalence rates less than 20%, and eighteen states are within the 30%- 35% prevalence range. At this rate, estimates project obesity prevalence will exceed 44% in every state in the United States by the year 2030 (BRFS CDC, 2014).

The most commonly used and empirically supported treatment approach for individuals with overweight or moderate obesity is behavioral weight control, consisting of education in nutrition and physical activity, and implementation of behavioral strategies such as daily self-monitoring and self-weighing (Wing, 1998; Wing, Gorin & Tate, 2006). Despite frequent use and a range of well-documented health benefits (Look AHEAD Research Group, 2007; 2010), the behavioral weight control approach has received much criticism centering primarily on rates of weight regain and an inability to produce long-term weight loss maintenance (Wadden, Butryn & Byrne, 2004). For this reason, new approaches to improving long-term weight loss maintenance are critical to understanding and treating the obesity epidemic and have been a focus of recent obesity research (MacLean, Wing, Davidson, Epstein, Goodpaster, Hall, Levin, Perri, Rolls, Rosenbaum, Rothman, & Ryan, 2015).

## PARTNER SUPPORT AND HEALTH BEHAVIOR CHANGE

Motivation and support for health behavior change may play key roles in understanding weight loss maintenance and successful long-term behavior change. Much research indicates that motivation and interpersonal support are essential for optimizing growth, self-directed meaningful behavior, and overall personal wellbeing (Baumeister & Leary, 1995; Deci & Ryan, 2000; Elfag & Rossner, 2004; LaGuardia, Ryan, Couchman & Deci, 2000; Williams, Grow, Freedman, Ryan & Deci, 1996; Wing, 1998 ). While several theories reference the importance of motivation or social support, Self Determination Theory (SDT) is unique in providing a strong theoretical basis on which to explore the association between motivation and social support in successful goal progress and weight-related behavior change outcomes in a single framework (Deci, Eghrari, Patrick, & Leone, 1994; Deci & Ryan, 2000; Deci & Ryan, 2008). SDT posits that there are three central and universal human psychological needs: competence, autonomy, and relatedness. These core needs are crucial to the development of self-determined motivation for health-behavior change as well as increased and maintained wellbeing over time.

Prior research on health-behavior change has frequently defined motivation and support as either high or low, with high levels of each leading to better goal progress and outcomes, and low levels leading to poorer progress and outcomes (Elfag & Rossner, 2004). The SDT framework offers a more in-depth approach to understanding motivation and support for health behavior change. SDT asserts that these factors are comprised of different dimensions, and distinguishes between autonomous (self-determined) and controlled motivation, as well as defining “needs support” as a specific type of support that allows for competence, autonomy, and relatedness to thrive. A person is considered autonomously motivated to the extent that he or she experiences goals and decisions to be self-generated and freely chosen, as opposed to motivation that is controlled by external or internal pressures (Deci & Ryan, 2000). Needs

## PARTNER SUPPORT AND HEALTH BEHAVIOR CHANGE

support is defined as an interpersonal support pattern that fosters autonomous motivation.

Needs support provides the environment in which personally meaningful choice, autonomy, and any external motives can be integrated into the developing self in a healthy, adaptive manner (Deci & Ryan, 2000). Needs supportive behaviors include acknowledging an individual's unique perspective, using neutral language, curtailing criticism and pressure, providing choices, options, and positive feedback (Reeve, Bolt & Cai, 1999; Silva, Vieira, Coutinho, Minderico, Matos, Sardinha & Teixeira, 2010). Viewing and measuring support and motivation in these more nuanced ways, rather than simply high or low, may provide important insight into participants' support needs (e.g. what support behaviors are seen as helpful or unhelpful) for goal progress, and may inform interventions that seek to promote and engender greater autonomous motivation for long term weight maintenance.

SDT process models have been tested in the context of several health behavior change studies (Williams, McGregor, Zeldman, Freedman, & Deci, 2004) including smoking cessation (Williams, 2002), diabetes, and weight control (Gorin, Powers, Koestner, Wing & Raynor, 2014; Powers, Koestner & Gorin, 2008; Williams et al., 1996). The importance of larger contextual factors on goal progress and sustained regulation of health and weight loss behaviors has been well-documented (Christakis & Fowler, 2007; Gorin, Phelan, Tate, Sherwood, Jeffrey & Wing, 2005; Kiernan, N., Moore, Schoffman, Lee, King, Taylor, Kiernan, M., & Perri, 2012) therefore, recent studies have begun to focus on the impact of social influences on health behavior change and weight loss outcomes specifically. Several findings from these studies suggest that needs support provided by healthcare professionals and physicians predicts patients' level of autonomous motivation and sustained health behavior change over time (Deci & Ryan, 2000; Williams, Lynch, McGregor, Ryan, Sharp & Deci, 2006a). However, more

## PARTNER SUPPORT AND HEALTH BEHAVIOR CHANGE

recent research has revealed that receiving needs support from “important others” (e.g., close friends and family members) is a stronger and more consistent predictor of dietary change outcomes than needs support from healthcare providers (Williams, et al., 2006a).

Given recent findings indicating the importance of “close others” in health-behavior change and goal progress, surprisingly few studies have explored Self-Determination Theory models within natural, coequal support contexts (Gorin et al., 2014; Koestner, Powers, Carbonneau, Milyavskaya, & Chua, 2012; Powers et al., 2008). Earlier studies have found that involving significant others in the weight loss treatment process can be marginally beneficial (McLean, Griffin, Toney & Hardeman, 2003), however partners were provided little instruction or guidance on how to provide needs support as a means of motivating their partner (Black & Threlfall, 1989; Gorin et al., 2005). Powers and colleagues (2008) demonstrated that needs support from family and friends was a significant predictor of short-term weight loss, and significantly moderated the effect of minimal intervention (Powers et al., 2008). They also found that needs support could be distinguished from more directive or controlling support styles, examples of which include “having a spouse provide financial incentives for weight loss” or “being constantly reminded to exercise.” Results from this study indicated that participants reported greater weight loss when they perceived their family members and friends to be needs supportive of weight loss goals; however, no such association was found for more directive forms of support (Powers et al., 2008).

The LEAP trial, conducted by Gorin and colleagues (2013), demonstrated similar findings in a home environment-focused weight loss intervention for adults (Gorin, Raynor, Fava, Maguire, Robichaud, Trautvetter, Crane & Wing, 2013). Results from the LEAP trial suggest that directive support behaviors (e.g. providing rewards or reinforcement for health

## PARTNER SUPPORT AND HEALTH BEHAVIOR CHANGE

behaviors or participation in exercise) had no association with weight loss outcomes at 6 and 18-months, and that the directive support behavior of “encouragement of healthy eating” was, in fact, negatively associated with weight loss outcomes. In contrast, the only support behaviors significantly positively associated with weight loss at 6 and 18-months were behaviors characterized as needs supportive (e.g. limiting criticism, providing options, and promoting autonomy) (Gorin et al., 2014). These results, paired with a shift in focus from needs support in hierarchical relationships (e.g. doctor-patient, teacher-student, manager-employee) to needs support in coequal, existing relationships (e.g. friends, romantic partners, siblings), indicate a clear need to assess relationship satisfaction in the context of weight-related goal progress and health-behavior change.

Finally, some research has suggested that needs support and relationship satisfaction may jointly be associated with personal well-being and goal success. However, the direction and specifics of this association are not well delineated. Although Gorin and colleagues (2014) did not explicitly measure relationship satisfaction in the LEAP trial, research by La Guardia and Patrick (2008) suggests that close friends and romantic partners are essential support figures, and, furthermore, that needs fulfillment from these important figures can lead to improved wellbeing (La Guardia & Patrick, 2008). However, this study did not specifically consider personal health behavior change goals or weight-related goals. Recent research by Koestner and colleagues (2012) found that across three short-term prospective studies, needs support was significantly related to goal progress, including health and weight-related goals, regardless of the support relationship type (e.g. romantic versus friendship). Additionally, they found that needs support was associated with the secondary benefit of better relationship quality (Koestner et al., 2012). Koestner and colleagues noted that, “what remains to be established is

## PARTNER SUPPORT AND HEALTH BEHAVIOR CHANGE

the possible differential effect of support in different types of close relationships” (Koestner et al., 2012).

Given the current body of research on SDT and health behavior change, additional evidence is needed to establish whether there is a meaningful distinction between efforts to provide needs support versus directive support, and whether these differing support styles are predictive of weight loss outcomes. Thus, an important next step is to further establish whether needs supportive behaviors from partners, rather than healthcare providers, are associated with increased autonomous motivation and goal progress in individuals attempting weight management. Additionally, the recent shift to focusing on needs support from “important others” and coequal relationships presents the need to establish whether the quality of these existing support networks plays a role in motivation development and sustained behavior change. What remains to be understood is if, and how, the interplay of relationship satisfaction and needs support may impact the development of autonomous motivation and weight-related health behavior change outcomes. This information will inform interventions designed to maximize support behaviors among partners, increase autonomous motivation, and ultimately improve long-term weight management.

The current study will build on previous research by examining social support and motivational factors associated with self-guided health behavior change in a college sample using the Self-Determination Theory framework. Our study will focus specifically on a college student sample as the transition to young adulthood presents a particularly critical and sensitive period for targeted health behavior intervention. Many young adults gain an average of one to two pounds per year throughout their twenties (Lewis, Jacobs, McCreath, Kiefe, Schreiner, Smith & Williams, 2000; Truesdale, Stevens, Lewis, Schreiner, Loria, & Cai, 2006). A recent

## PARTNER SUPPORT AND HEALTH BEHAVIOR CHANGE

meta-analysis conducted by Fedewa and colleagues (2014) found that college students' body weight increased 1.6 kg and body fat increased by 1.2% during the 4-year course of college (Fedewa, Das, Evans & Dishman, 2014). The transition to college not only represents a crossroads for diet and exercise choices, but also a shift in social support systems, as many students may be leaving home for the first time and transitioning to more independent lifestyles. Together, these factors may contribute to a particularly difficult timeframe for young adults to manage their autonomy and health behavior choices.

We first examined the relationships between different types of social support (needs support versus directive) and autonomous motivation to determine whether support style and motivation are related to each other and to weight-related health behavior change, similar to findings previously reported in the literature (Gorin et al., 2013; Koestner et al., 2012; Powers et al., 2008; Williams et al., 2006 b, c). We also sought to better understand the specific role of relationship satisfaction in personal goal progress and health behavior change by examining whether the level of self-reported relationship satisfaction between participant and identified support partner was related to support style, development of autonomous motivation, and weight-related health behavior change.

We hypothesized that the SDT model would predict greater goal progress, in this case, weight loss, over time. More specifically, we hypothesized that participants who endorsed receiving greater needs support from partners at baseline would exhibit increased autonomous motivation over the 6-week program, and ultimately better outcomes (e.g., weight loss) than those reporting other support styles. Additionally, we hypothesized that greater relationship satisfaction at baseline would predict greater needs support, autonomous motivation, and goal progress over time. Finally, as delineated by SDT theory, we hypothesized that the association

## PARTNER SUPPORT AND HEALTH BEHAVIOR CHANGE

between needs support and weight loss at study completion would be mediated by autonomous motivation.

### **Methods**

#### **Participants**

Participants ( $n = 50$ , 25% male, 67.3% Caucasian,  $18.8 \pm 1.2$  years,  $28.6 \pm 4.2$  kg/m<sup>2</sup>) were undergraduate college students recruited through the Introduction to Psychology Participant Pool screener at the University of Connecticut (UConn). To be eligible for the study, participants had to be at least 17 years old when the participant pool screener was administered, have a desire to set a weight-related health behavior change goal, and report availability of a support partner (e.g., parent, significant other, roommate, best friend, etc). The Centers for Disease Control and Prevention has suggested that a body mass index (BMI) above 25kg/m<sup>2</sup> may indicate that a person is overweight; therefore all participants included in study analyses had a BMI  $\geq 25$  kg/m<sup>2</sup> (CDC, 2012). Additionally, participants were excluded if they did not speak or read English, or endorsed a current or prior history of eating disorder.

#### **Procedure**

Potentially eligible participants completed an online Participant Pool screener during the first three weeks of the semester from Fall 2013 through Fall 2014. The screener assessed age, self-reported height and weight, interest in making a change in eating or exercise habits, and whether the student had a partner who would support their behavior change efforts. Data regarding demographics was also collected. All students were given the opportunity to earn credit for Introduction to Psychology through study participation. Both eligible and ineligible

## PARTNER SUPPORT AND HEALTH BEHAVIOR CHANGE

students who participated in the Participant Pool screening received 1 experimental credit. The investigation was approved by the Institutional Review Board at UConn. Students who self-reported a BMI of at least 25 kg/m<sup>2</sup>, were interested in making a weight-related behavior change (i.e., a change in their diet or physical activity habits), and identified someone who would support them in their behavior change efforts were deemed potentially eligible to participate in the study. An advertisement was then posted on the participant pool website accessible only to students who met initial eligibility criteria, allowing them to sign up for baseline face-to-face visits. Eligible students also received an e-mail advertising the study.

Students who responded to study advertisements were invited to attend a face-to-face baseline visit. Potentially eligible participants had their self-reported height and weight objectively verified by study staff and were asked if they had a current or prior history of an eating disorder. Students who continued to meet BMI cutoff criteria and did not endorse current or prior history of an eating disorder completed the written consent process and continued with a full baseline visit. Full baseline visits took approximately 45-50 minutes. After completing baseline anthropometrics, participants began a 20-30 minute online questionnaires. All questionnaires were conducted via Qualtrics ([www.qualtrics.com](http://www.qualtrics.com)), a secure online questionnaire service that is committed to keeping all participant data secure and confidential. All data were stored in a password-protected database at a web-hosting site that provides top of the line virtual and physical security. Baseline questionnaire measures included demographic information, perceived level and type of support, motivation style, and relationship satisfaction. Participants received 1 experimental credit for this visit.

The 6-week self-guided program consisted of several components. First, participants were asked to set a weight loss goal that was safe and realistic (i.e., no more than 1-2 pounds

## PARTNER SUPPORT AND HEALTH BEHAVIOR CHANGE

per week for a 6 week period). Participants also completed an implementation intentions worksheet with study staff immediately following completion of their baseline questionnaires. The implementation intentions worksheet asked participants to identify and outline two specific behavioral changes they would make to reach their weight loss goal during the course of the semester. These behavioral changes could be nutrition-based (e.g., count calories, decrease snacking), physical activity-based (e.g., walk 30 minutes a day, go to Zumba classes) or one of each. Participants then engaged in a problem-solving activity by identifying two potential barriers that may prevent them from successfully achieving their identified goals (e.g. “it might be too cold to exercise outside”). Participants were asked to indicate two specific strategies they would use to overcome the identified barriers.

Finally, participants were provided with a brief resource sheet. The resource sheet referenced a short list of online citations to empirically supported health behavior change strategies such as daily self-weighing and diet monitoring (e.g. [www.cdc.gov/healthyweight](http://www.cdc.gov/healthyweight)). The resource sheet was the only reference to behavioral strategies for weight management provided to students during this study. Use of these resources was by students’ choice only and was not formally tracked within study measures.

Participants were followed prospectively for the 6-week period. During this time, participants were asked to complete a brief weekly online survey regarding support they were receiving from their chosen support partner, specifically towards their weight loss goals. The questions were open ended. For example, “What are things your support partner says/does that you perceive as most helpful to your weight loss goal?” These questions were used to assist in identifying specific support behaviors that individuals perceived as needs supportive, behaviors that were perceived as helpful or unhelpful, as well as behaviors that partners may believe are

## PARTNER SUPPORT AND HEALTH BEHAVIOR CHANGE

supportive, but could, in fact, be interfering with participants' goal progress (data not included in this study). Participants received 1 experimental credit if they completed at least 4 of the 6 weekly surveys.

Halfway through the program (3 weeks), participants were emailed a link to a Qualtrics survey. A subset of the baseline assessment measures was administered, including ratings of perceived support and motivation. The 3-week survey took approximately 30 minutes to complete. Participants received 1 experimental credit for completing this survey.

At 6-weeks, participants completed a final follow-up face-to-face visit at the clinic. The visit lasted approximately 30-45 minutes, at which time height and weight were objectively measured by study staff. A final assessment survey was completed via Qualtrics and assessed participants' perceived support and motivation at study completion. Participants received 1 credit for completing the final visit.

### Measures

**Anthropometrics.** At baseline and 6-weeks, body weight was objectively measured by study staff. Weight was measured in light clothing with shoes removed on a calibrated digital scaled (Tanita BWB 800) and recorded to the nearest 0.1kg. Height was measured at baseline and 6-weeks to the nearest centimeter using a calibrated, transportable stadiometer.

**BMI.** BMI takes into account an individual's height and weight and uses the formula:  $[\text{weight}(\text{lb.})/\text{height}(\text{in.})^2] \times 703$ . A BMI of 25 kg/m<sup>2</sup> to 29.9 kg/m<sup>2</sup> is considered overweight, and a BMI of 30 kg/m<sup>2</sup> or above is considered obese (CDC, 2012). BMI was calculated based on participant's objective measures of height and weight at baseline and 6-weeks.

## PARTNER SUPPORT AND HEALTH BEHAVIOR CHANGE

**Demographics.** Demographic information was obtained by self-report questionnaires at baseline and included age, gender, race and ethnicity. Participants were also asked to identify whether they lived in on-campus or off-campus housing and to indicate whether the chosen support partner was a family-member, friend, or “other” acquaintance.

**Needs support.** Needs support for health-behavior change was measured with a 15-item questionnaire at baseline and at 6-week follow up. The scale was adapted from the Important Other Climate Questionnaire (IOCQ; Williams, et al., 2006) and used by Koestner et al. (2012). Participants answered questions in regards to the specific support partner identified during the screening process. The measure assesses the perceptions of needs support that partners experience from one another (e.g., “My partner conveys confidence in my ability to control my own weight”). Items assessing more directive or controlling forms of support were also included (e.g., “My partner has been reminding me of what I need to be doing”). At baseline, the support question was worded as follows: “Other people often support us in our goal pursuit. Please think of the person most likely to provide you with support as you pursue your weight loss goal. Answer the questions below in reference to your support partner.” At 6-week follow up, participants were asked to assess the support they received from their selected partner in reference to the specific health behavior change goals identified at baseline. Participants rated each item on a 7-point Likert scale ranging from 1 “not true at all” to 7 “very true”. Versions of the scale have been used in several studies of support from significant others in the context of weight loss (Gorin et al., 2014, Powers et al., 2008). An extensive analysis of the validity of the IOCQ as reported by Williams et al., (2006) revealed that the IOCQ demonstrated good internal consistency in studies of smoking cessation ( $\alpha = .87$ ) and diet ( $\alpha = .95$ ). Gorin and colleagues (2014) obtained excellent reliability of the scale ( $\alpha = .88$ ).

## PARTNER SUPPORT AND HEALTH BEHAVIOR CHANGE

**Autonomous motivation.** Autonomous motivation was measured using the 12-item Treatment Self-Regulation Questionnaire (TSRQ; Ryan & Connell, 1998) and was adapted from Levesque and colleagues (Levesque, Williams, Elliot, Pickering, Bodenhamer, & Finley, 2007). The measure was administered at baseline and 6-weeks. The questionnaire asks participants to report their reasons for losing weight. The items asked why participants would try to control their weight and offered 12 possible reasons. Half of the items reflect autonomous motivation (e.g. “Because I feel that I want to take responsibility for my own health”) and half reflect controlled motivation (e.g., “Because I would feel guilty of ashamed of myself if I did not try to control my weight”). Participants rated each item using a 7-point Likert scale ranging from 1 “not true at all” to 7 “very true”. The range of possible scores was from 6 to 42 for both scales. All items were stated in the positive direction. The TSRQ scales have good reliability and validity, and have been utilized in previous weight loss and health care studies (Williams et al., 2006; Williams et al., 2004, Gorin et al., 2014). Chronbach  $\alpha$  for the measure range from .80 to .86 (Gorin et al., 2014; Powers et al., 2008) with the autonomous motivation scale  $\alpha = .82$  and controlled motivation scale  $\alpha = .83$  (Gorin et al., 2014).

**Relationship scale.** Relationship satisfaction was measured using a 12-item relationship scale, with 5 items adapted from the Quality of Relationships Index (QRI) (Norton, 1983) and 7 items adapted from the Needs Satisfaction measure developed by LaGuardia and colleagues (La Guardia et al., 2000). The relationship scale measures the extent to which participants feel their support partner fulfills basic needs in the relationship and how happy participants are in the identified support relationship. Participants rated each item using a 7-point Likert scale ranging from 1 “not true at all” to 7 “very true”. Example items included, “My relationship with my support partner is stable” and “My support partner and I have a good relationship”. Three items

## PARTNER SUPPORT AND HEALTH BEHAVIOR CHANGE

on the scale were reverse scored, for example: “When I am with my support partner I often feel inadequate or incompetent.” The QRI and Needs Satisfaction scales have demonstrated excellent reliability, with Chronbach’s  $\alpha$  for the QRI ranging from .94 to .96 and Needs Satisfaction scale ranging from .90 to .92 (LaGuardia et al., 2000; Koestner et al., 2012).

Data were analyzed using IBM Statistical Package for Social Sciences (IBM Corp. Released 2013. IBM SPSS Statistics for Windows, Version 22.0. Armonk, NY: IBM Corp.). Scores for support, motivation, and relationship satisfaction were calculated as the mean of each respective subscale. Demographic differences between retention and exclusion samples were conducted using chi-square and independent samples t-tests. Differences in weight, autonomous motivation, controlled motivation, needs support, and directive support over the 6-week program were conducted using paired-samples t-tests. Correlations between variables at baseline and 6-weeks were conducted using bivariate Pearson correlations. Hierarchical regression and mediation analyses were conducted, adjusting for gender and baseline weight, using bootstrapped resampling methods with the PROCESS macro for SPSS (Hayes, 2012).

## Results

### Participants

A total of 5547 students completed the Participant Pool screening assessment between the Fall 2013 and Fall 2014 semesters. Of the original 5547 screened, 310 self-reported a BMI in the overweight or obese range ( $\geq 25 \text{ kg/m}^2$ ), expressed a desire to set a weight-related health behavior change goal within the semester, and endorsed the availability of a support partner. Of the 310 potentially eligible participants, 69 responded to ads on the Participant Pool experiment website to participate in our study. Of the 69 participants initially recruited, 8 did not attend the

## PARTNER SUPPORT AND HEALTH BEHAVIOR CHANGE

baseline visit and 5 were ineligible due to BMI status below the overweight range ( $< 25 \text{ kg/m}^2$ ) as measured objectively by study staff at baseline, and 1 was excluded for endorsement of a history of eating disorder. The remaining 55 participants provided informed consent at baseline. Of the 55 consented participants, 5 did not complete follow-up visits at the 6-week time point (attrition = 9.1%), and therefore 50 participants were retained for analyses (Table 1). At baseline, 78% of participants were categorized in the overweight BMI range, 22% in the obese BMI range (Table 2).

**Support partners.** Participants were asked to identify a partner who would be able to provide support in some capacity (e.g. in person, via email, phone, etc.) over the course of the semester. Half of participants selected a friend, 26% selected a mother or father, 12% a brother or sister, 8% boyfriend or girlfriend, 4% a spouse or “other” family member.

### Preliminary Analyses

**Weight Outcomes.** The average weight change over the 6-week program was - 0.01 lbs. ( $\pm 4.1$ ,  $p = 0.9$ ). Overall weight loss in the sample was not statistically significant and when compared to published estimates of average weight change in the first semester of college, the weight change in this sample was significantly less than population estimates ( $t(49) = 13.4$ ,  $p < .001$ ) (Fedewa et al., 2014). In total 56% (28/50) of participants lost weight or maintained their weight status over the course of the 6-week program, while 44% (22/50) of participants gained weight (Figure 2). Average weight loss among the 56% who lost or maintained weight status in the program was - 2.7 lbs. ( $\pm 3.1$ ), while the average weight change among the 44% who gained in the program was 3.4 lbs. ( $\pm 2.3$ ) ( $t(48) = 7.5$ ,  $p < .001$ ). Chi-square and independent samples t-tests revealed that these groups did not differ on any demographic

## PARTNER SUPPORT AND HEALTH BEHAVIOR CHANGE

variables at baseline, including place of residence (on-campus versus off-campus), type of support partner (i.e. spouse, friend, sibling), or baseline weight (Table 3).

**Correlations among baseline variables.** Several correlations between SDT variables were noteworthy; needs support was most highly correlated with autonomous motivation and relationship satisfaction at baseline (Table 4a). Relationship satisfaction was also positively correlated with autonomous motivation and directive support variables at baseline. There were no significant associations between SDT variables (needs support, directive support, autonomous motivation and controlled motivation) and relationship satisfaction or weight outcomes at 6-weeks (Table 4b).

**Autonomous motivation and needs support.** Paired samples t-tests revealed that participants' average rating of needs support was 6.3 ( $\pm 1.0$ ) at baseline and 5.1 ( $\pm 1.1$ ) at 6-week follow-up ( $p < .001$ ). Additionally, participants' average self-report rating of directive support was 5.1 ( $\pm 1.3$ ) at baseline and 4.3 ( $\pm 1.4$ ) at 6-week follow-up ( $p < .01$ ). Needs support ratings were significantly higher than directive support ratings at baseline and 6-weeks respectively ( $t(49) = 8.8, p < .001$ ;  $t(48) = 4.6, p < .001$ ).

Participants' self-reported level of autonomous motivation was, on average, 6.0 ( $\pm 0.9$ ) at baseline and 5.9 ( $\pm 1.1$ ) at 6-week follow-up ( $p = .3$ ). Additionally, participants' average controlled motivation scores were 4.4 ( $\pm 1.3$ ) at baseline and 4.2 ( $\pm 1.5$ ) at 6-weeks ( $p = .4$ ). Autonomous motivation ratings were significantly higher than controlled motivation at baseline and 6-week follow-up respectively ( $t(49) = 7.7, p < .001$ ;  $t(48) = 7.2, p < .001$ ).

### Central Multivariate Analyses

**Regression analyses.** Regression analyses were conducted adjusting for gender and baseline weight. Collinearity statistics for predictor variables (i.e. Tolerance and VIF) were all within acceptable limits (Pedazur, 1997; Tabachnick & Fidell, 2001). Weight-related outcome variables were regressed separately on baseline SDT variables, specifically needs support, directive support, and autonomous motivation. Needs support did not predict a significant amount of variance in weight at completion ( $R^2 = 0.96$ ,  $\beta = .04$ ,  $SE = 1.4$ ,  $t(49) = 1.2$ ,  $p = .23$ ), overall weight loss ( $R^2 = .05$ ,  $\beta = -.12$ ,  $SE = 0.63$ ,  $t(49) = -0.71$ ,  $p = .48$ ), or percent weight loss ( $R^2 = .04$ ,  $\beta = 0.16$ ,  $SE = 0.63$ ,  $t(49) = 1.1$ ,  $p = .29$ ). Similarly, autonomous motivation at baseline did not predict a significant amount of variance in weight at completion ( $\beta = .05$ ,  $SE = 1.2$ ,  $t(49) = 1.5$ ,  $p = .14$ ), overall weight loss ( $\beta = -.08$ ,  $SE = 0.70$ ,  $t(49) = -0.5$ ,  $p = .60$ ), percent weight loss ( $\beta = .21$ ,  $SE = .70$ ,  $t(49) = 1.4$ ,  $p = .17$ ). Finally, directive support did not predict a significant amount of variance in weight at completion, overall weight loss, or percent weight loss ( $\beta = -.07$ ,  $SE = .45$ ,  $t(49) = -0.5$ ,  $p = .62$ ).

Weight outcome variables were also regressed on baseline relationship satisfaction. Similar findings revealed that baseline relationship satisfaction did not predict a significant amount of variance in weight loss outcomes at study completion ( $R^2 = 0.96$ ,  $\beta = -.02$ ,  $SE = 0.83$ ,  $t(49) = -0.15$ ,  $p = .90$ ).

**Mediation analysis.** A series of hierarchical regression analyses were conducted to examine autonomous motivation as a secondary outcome variable of interest. Baseline weight and gender were entered into the model first. Autonomous motivation was then regressed on baseline relationship satisfaction in the second step. Regression analyses revealed that baseline relationship satisfaction significantly predicted autonomous motivation at study completion ( $R^2$

## PARTNER SUPPORT AND HEALTH BEHAVIOR CHANGE

= 0.15,  $\beta = 0.41$ , SE = 0.18,  $t(49) = 2.8$ ,  $p < .01$ ). Autonomous motivation was then separately regressed on needs support, again with baseline weight and gender entered into the model first. Similarly, analyses revealed that needs support at baseline and 6-week time points significantly predicted autonomous motivation at study completion ( $R^2 = .04$ ,  $\beta = 0.5$ , SE = 0.13,  $t(49) = 1.1$ ,  $p = .02$ ) (Table 5). Finally, a single mediation model was conducted to examine the proposed mechanism of needs support as a mediator between relationship satisfaction and autonomous motivation. This proposed mediation model was tested using bootstrapped resampling methods with the PROCESS macro (Hayes, 2012). The overall model fit and total effect were significant ( $R^2 = 0.28$ ,  $F(4,44) = 4.3$ ,  $b = .41$ ,  $t = 2.8$ ,  $p < .01$ ). Unstandardized indirect effects were computed for 1000 bootstrapped samples at the 95% confidence interval. The indirect effect of relationship satisfaction on autonomous motivation through the proposed mediator needs support was significant ( $b = .18$ , 95 % BCa CI [0.02, 0.4]). The direct effect of relationship satisfaction on autonomous motivation, controlling for needs support, was also tested and found to be non-significant, as predicted ( $b = 0.33$ , 95 % BCa CI [-0.04, 0.70]) (Figure 3).

### Discussion

Health behavior change, particularly weight-related changes, can be difficult to initiate, and even more challenging to sustain over time. As evidenced by repeated weight regain patterns post-behavioral weight loss intervention, there is a clear need to understand tools and mechanisms to promote successful long-term weight management (Wadden et al., 2004; Wing, 1998; Wing et al., 2006). As individuals embark on weight loss and weight loss maintenance goals, the interplay of personal, interpersonal, and environmental factors is critical to progress

## PARTNER SUPPORT AND HEALTH BEHAVIOR CHANGE

and success. SDT clearly defines support, autonomy, and motivation as being central to health behavior outcomes and overall wellbeing more generally (Deci & Ryan, 2000). Behavioral health research grounded in Self-Determination Theory has focused largely on approaches that foster autonomy, self-determined motivation, and personally meaningful choices in initiating and sustaining behavior change (Williams et al., 1996, 1998; Deci & Ryan 2000, Williams et al., 2006b,c, Gorin et al., 2014). As much of this research, particularly weight-related health behavior change research, begins to focus on existing, coequal interpersonal relationships (e.g. friends and significant others) as key supports in successful behavior change, a better understanding of satisfaction within these relationships is also critical (Powers et al., 2008; Koestner et al., 2012; Gorin et al., 2013).

The Self-Determination Theory approach to weight management may be particularly important to consider in a college student sample, as college students are at particular risk for rapid weight gain early in their undergraduate careers. Additionally, undergraduates typically experience significant shifts in autonomy and social support networks beginning in college and continuing throughout young adulthood. SDT provides a fresh perspective by incorporating both individual and environmental considerations of health-behavior change and weight management in a single theoretical model. This study used a Self-Determination Theory framework to examine social support, motivation, and relationship satisfaction in a self-guided health behavior change program in college students. To our knowledge, this is the first study that has explored the use of a self-guided health behavior change program with a college sample to assess the development and interplay of all three variables (support, relationship satisfaction and motivation) on behavior change outcomes from a Self-Determination Theory perspective.

## PARTNER SUPPORT AND HEALTH BEHAVIOR CHANGE

Study results indicate that a self-guided health behavior change approach did not produce a significant amount of weight loss over a 6-week period. The relatively small sample size and minimal intensity of the intervention may have jointly contributed to these findings. Despite observed changes in self-reported support and motivation during the program, it is likely that significant weight-related change, particularly in a self-guided program, may take longer than 6-weeks to occur. Additionally, when compared to population estimates of weight change in college students within the first semester and first year of college (Lewis et al., 2000; Truesdale et al., 2006; Fedewa et al., 2014), the small weight change yielded in our study was found to be significantly lower. More compelling is the finding that, in a sample of students who are at high risk for weight-gain, over half of the sample (56%) lost or maintained weight status during the 6-week program. Our results indicate that this group did not differ from those who gained weight in the program on any demographic variables at baseline, including chosen support partners or place of residence. Some of these results are consistent with previous research suggesting that the type of support relationship does not differentially impact the association between needs support and goal progress (Koestner et al., 2012). Given our results, future studies should consider additional predictor variables, including health behaviors like sleep hygiene, alcohol consumption, and frequency and/or intensity of physical activity, to better understand factors that may contribute to positive responses to self-guided health behavior change initiatives.

Several study results indicate that relationship satisfaction and needs support play an important role in the development of autonomous motivation in our sample. Most importantly, our results indicate that both relationship satisfaction and needs support significantly predict autonomous motivation at study completion, and that the active ingredient in the association

## PARTNER SUPPORT AND HEALTH BEHAVIOR CHANGE

between relationship satisfaction and autonomous motivation is needs support. Our findings suggest that even minimal intensity, low cost interventions may be effective in supporting the development of autonomous motivation, and that this developmental course should be assessed alongside weight loss outcomes over the course of interventions. These results are not only consistent with Self-Determination Theory, but also add a novel component to our understanding of the specifics surrounding existing interpersonal support relationships and the interplay of satisfaction and support towards engendering motivation and eventual goal progress. Our results provide a more nuanced perspective on the development of autonomous motivation in coequal support relationships, rather than hierarchical relationships, in health behavior change. Specifically, these findings indicate that relationship satisfaction can exist, and be rated highly by participants, but that needs support is the active ingredient in engendering autonomous motivation, a factor that SDT and previous literature strongly supports as a consistent predictor of successful goal progress and sustained wellbeing.

Results also indicate that participants reported higher levels of needs support than directive support from their natural support networks and higher levels of autonomous motivation than controlled motivation at study entry and study completion. These results are promising given the growing body of SDT literature emphasizing the importance of needs support specifically from close or important others in successful and sustained health behavior change (Williams et al., 2006a; Powers et al., 2008; Gorin et al., 2005, 2014).

Several study findings were unexpected. Contrary to our hypotheses, neither needs support nor autonomous motivation significantly predicted weight related outcomes at study completion. These results oppose the well-established literature indicating needs support and autonomous motivation as highly predictive of goal progress, perceived competence, and

## PARTNER SUPPORT AND HEALTH BEHAVIOR CHANGE

weight-specific outcomes (Williams et al., 1996, 2002, 2004, 2006 b, c; Deci & Ryan 2000; Powers et al., 2008; Silva et al., 2010, Koestner et al., 2012). Similar to the current findings, Gorin and colleagues (2014) reported that in the LEAP trial, baseline measures of support and autonomous motivation were not predictive of weight loss at 6 or 18 months. Gorin et al., note that participants' levels of support and motivation at the beginning of an intervention program may not be as important as how these factors change and develop over time, and that "building autonomy support for behavior change can lead to internalization of autonomous motivation and weight loss success" (Gorin et al., 2014). The results of our study may suggest a similar trajectory; support behaviors and, consequently, motivation development, likely shift over the course of an intervention. A subjective baseline measure of support and motivation may be less predictive of eventual behavior change outcomes than measures obtained periodically throughout the active periods of a behavior change program.

It is also interesting to note that our results indicate participants' subjective average rating of needs support from their identified partner was significantly lower at study completion than at baseline. At baseline, participants highly agreed that their partner's behaviors were needs supportive. Therefore, it is possible that a drop in average endorsement of needs support across the 6-week program is due to a ceiling effect. However, another potential explanation is that, as participants are prompted (on a weekly basis) to consider the support styles and supportive behaviors they are receiving from the identified partner they are beginning to reconsider and re-conceptualize their understanding of what needs support looks like in the context of their health behavior-change goals. This possibility would hold important implications for future research focused on training both primary participants and their support

## PARTNER SUPPORT AND HEALTH BEHAVIOR CHANGE

partners to first identify needs supportive behaviors within existing relationships (perhaps in contrast to more directive styles of support), before learning to provide needs support to others.

Our study adds to the small but growing body of literature focused specifically on applying Self-Determination Theory to understanding the role of existing, coequal support relationships and autonomous motivation in weight-related health behavior change. However, this study was limited in several important ways. First, the diversity and size of the study sample were limited. Weight-related outcomes and the application of the SDT model to our sample may have yielded unexpected results due to insufficient power. Additionally, the majority of participants were Caucasian females, as is seen frequently in weight loss interventions. Although the sample was representative of the university population, future studies should seek to recruit from a more diverse population in an attempt to understand how individuals of different genders and race/ethnicities may experience certain support behaviors to be differentially helpful or unhelpful in reaching health-related behavior change goals.

A second important limitation to our study is that relationship satisfaction was only measured at baseline. We were therefore unable to assess the possibility of relationship satisfaction as a mediator in the association between needs support and autonomous motivation. Additionally, our study did not assess the full range of common health-related behaviors that may contribute to weight gain among college students (e.g. drinking behavior, sleep patterns, etc.). Future studies should therefore build on these findings by assessing a wider range of college students' health behaviors, particularly students who are early in their careers, to determine how baseline health behaviors, like alcohol consumption, may impact a self-guided behavior change approach. Moreover, studies should seek to establish a better understanding of how relationship satisfaction and needs support work together to engender autonomous

## PARTNER SUPPORT AND HEALTH BEHAVIOR CHANGE

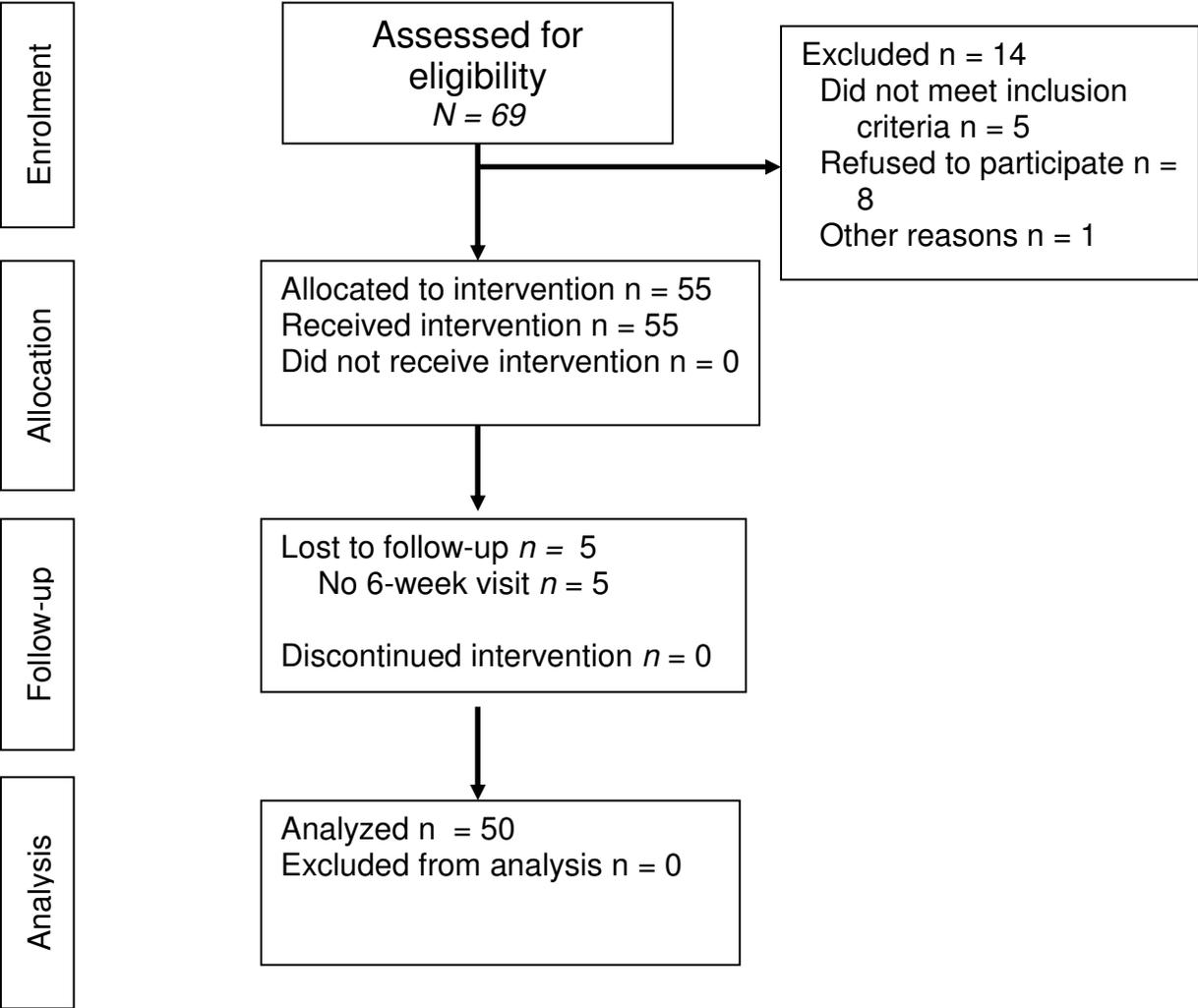
motivation by assessing these variables over time at multiple points throughout health behavior-change programs. It is theoretically valid to consider relationship satisfaction as a potential mediator for the association between needs support and motivation development. Therefore, measuring each of these factors at various time points throughout interventions will provide a better perspective on how, specifically, these factors are associated and how interplay between all three may shift over time.

Finally, this study was designed to observe changes and development of support behavior among existing interpersonal support systems over time. The self-guided study approach was not designed to intervene on support, therefore study variables were not experimentally manipulated and did not assess whether increasing or decreasing autonomous motivation in individuals may impact goal progress and behavior change outcomes.

In conclusion, study findings build on the growing body of SDT literature suggesting that coequal, pre-existing interpersonal relationships are an important source of support for college students seeking to initiate weight-related health behavior change. More importantly, this study suggests that when considering existing relationships as support networks, the level of satisfaction within the relationship may only impact the development of autonomous motivation when needs support behaviors specifically are provided by the support partner. It is therefore important for future interventions to engage partners in open dialog surrounding support behaviors; to establish what is perceived as helpful and unhelpful from each partner, and to test whether training partners to provide needs support might impact health behavior change and long term weight maintenance.

Appendix 1: Tables and Figures

**Table 1.**  
*Recruitment CONSORT Diagram*



PARTNER SUPPORT AND HEALTH BEHAVIOR CHANGE

**Table 2.**  
*Baseline Participant Demographics (Full and Retained Samples)*

	Full sample		Retained sample	
	N (55)	%	N (50)	%
<b>Gender</b>				
Male	15	27	13	26
Female	40	73	37	74
<b>Ethnicity</b>				
Caucasian	37	67.2	32	67.3
African American	7	12.7	7	12.3
Asian	7	12.7	7	12.3
Hawaiian/Alaskan Native	1	1.8	1	1.8
Other	3	5.5	3	8.8
Hispanic/Latino	5	9	5	10
<b>Age</b>	19.7 years (mean)	SD ±1.2 years	18.8 years (mean)	SD ±1.2 years
<b>BMI</b>	28.6 kg/m <sup>2</sup> (mean)	SD ± 4.1 kg/m <sup>2</sup>	28.6 kg/m <sup>2</sup> (mean)	SD ± 4.2 kg/m <sup>2</sup>

PARTNER SUPPORT AND HEALTH BEHAVIOR CHANGE

**Table 3.**  
*Baseline characteristics of weight groups (gained vs. lost)*

<b>Participant Demographics by Response</b>	<b>Lost/ Maintained (56%)</b>	<b>Gained (44%)</b>	<b>Significance (p)</b>
<b>M<sub>Change</sub> (lbs.)</b>	-2.4 lbs. (±3.1)	3.4 lbs. (±2.3)	t(48) = 7.5, p = <.001**
<b>% WL (lbs.)</b>	-1.1 lbs. (±0.8)	1.2 lbs. (±0.81)	t(48) = -2.0, p = .05*
<b>BL Weight (lbs.)</b>	173.7 lbs. (±6.1)	182.9 lbs. (±8.0)	t(48) = -0.9, p = .36
<b>Gender:</b>			
Male	21.4%	31.8%	$X^2 = .70, p = .41$
Female	78.6%	68.1%	
<b>Age</b>	18.6 (±1.1)	19.1 (±1.4)	t(47) = -1.7, p = .16
<b>Living:</b>			
On Campus	93%	86.4%	$X^2 = .60, p = .45$
Off Campus	7%	--	
Home	---	13.6%	
<b>Partner</b>			
Friend	64.3%	32.8%	$X^2 = 3.9, p = .15$
Romantic	7.1%	13.6%	
Family	28.6%	50%	

PARTNER SUPPORT AND HEALTH BEHAVIOR CHANGE

**Table 4a.**  
*Baseline Correlations, Means and Standard Deviations*

Dependent variable	Correlations						M	SD
	1	2	3	4	5	6		
1. Weight (lbs.)	-----						177.7	±34.5
2. Needs Support	-.15	-----					6.3	±1.0
3. Directive Support	-.20	.66**	-----				5.1	±1.3
4. Autonomous Motivation	-.05	.40**	.24	-----			6.0	±0.9
5. Controlled Motivation	-.20	.06	.14	.07	-----		4.4	±1.3
6. Relationship Quality	-.06	.66**	.33*	.29*	-.17	-----	6.1	±0.8

\*p < .05. \*\*p < .01. \*\*\* p <.001

**Table 4b.**  
*Time 2 Correlations, Means and Standard Deviations*

Dependent variable	Correlations					M	SD
	1	2	3	4	5		
1. Weight (lbs.)	-----					177.5	±34.1
2. Needs Support	-.26	-----				5.1	±1.1
3. Directive Support	-.20	.56**	-----			4.3	±1.4
4. Autonomous Motivation	.02	.43**	.22	-----		5.9	±1.0
5. Controlled Motivation	-.13	.11	.24	.10	-----	4.2	±1.5

\*p < .05. \*\*p < .01. \*\*\*p<.001

PARTNER SUPPORT AND HEALTH BEHAVIOR CHANGE

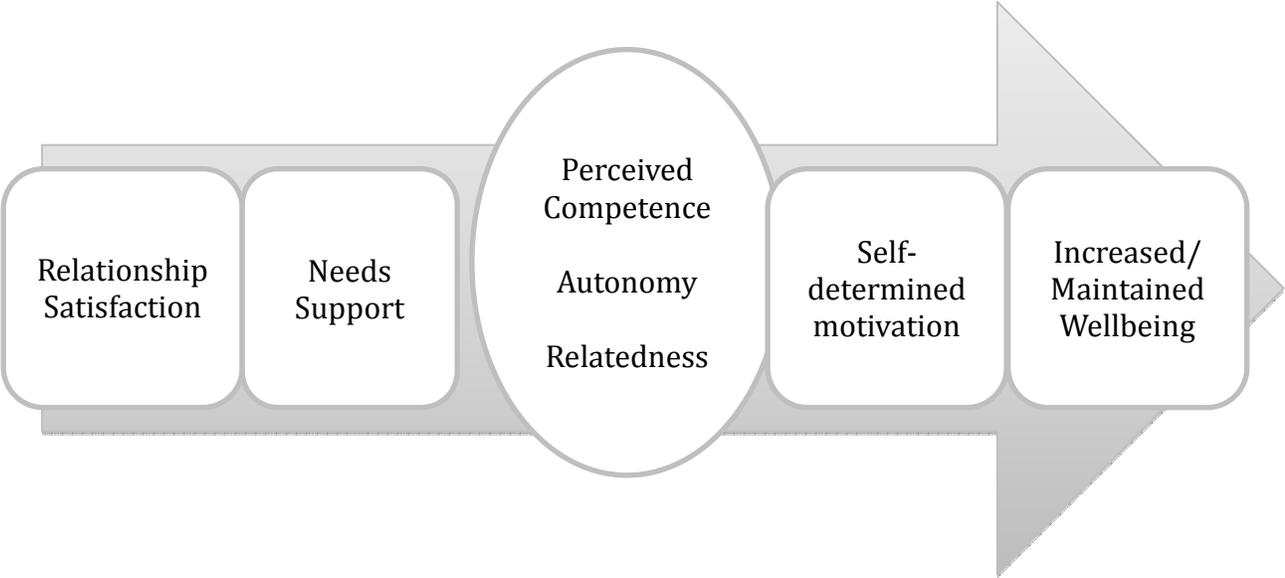
**Table 5.**  
*Hierarchical regression coefficients predicting autonomous motivation from relationship satisfaction and needs support.*

	$\beta$	B(SE)	R <sup>2</sup>
<i>Set 1</i>			
Gender (1= male/2=female)	.03	.07 (.41)	
BL Weight	.04	.001(.01)	
<i>Set 2a</i>			
Relationship satisfaction	.41**	.51(.18)**	.09*
<i>Set 2b</i>			
Needs support	.50***	.46(.13)***	.23**

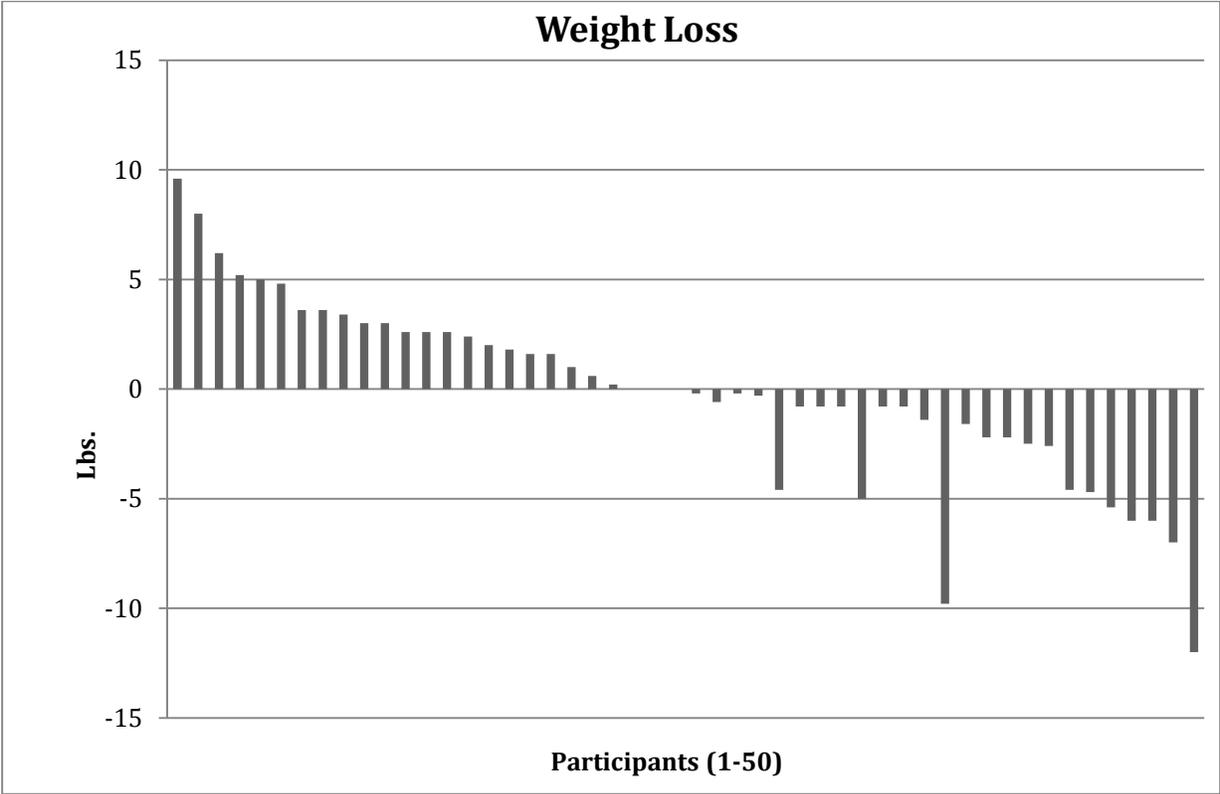
\**p* <.05. \*\**p*,

.01. \*\*\**p*<.001

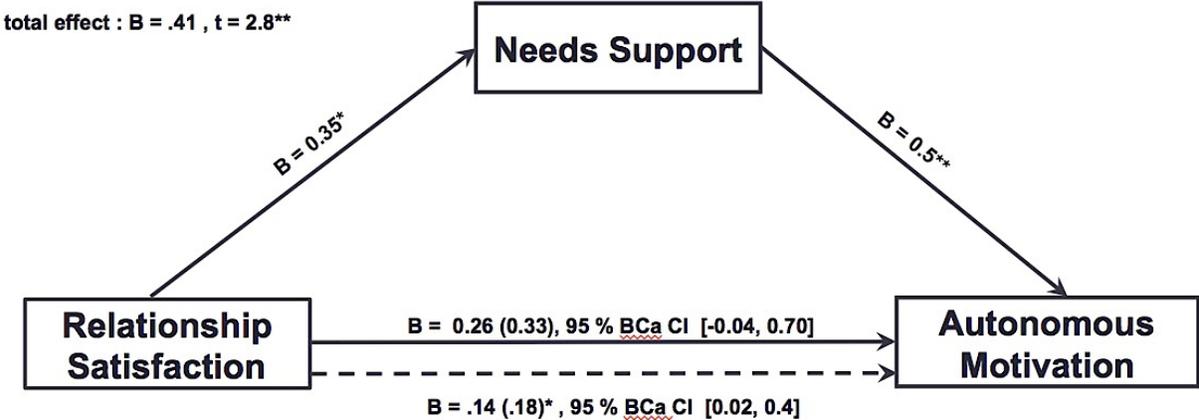
**Figure 1.**  
*SDT Process Model* (adapted from Ryan, Patrick, Deci & Williams, 2008)



**Figure 2.**  
*6-week Weight Response*



**Figure 3.**  
*Model of Needs Support As a Mediator*



Note. \*  $p < .05$  \*\*  $p < .01$  \*\*\*  $p < .001$   
\*Bootstrapped CI's based on 1000 samples

$R^2 = 0.28, F(4,44) = 4.3, p < .01^{**}$

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PARTNER SUPPORT AND HEALTH BEHAVIOR CHANGE