

Autonomy Support From Family and Friends and Weight Loss in College Women

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This study examined the effect of autonomy support and autonomous self-regulation on self-reported weight loss. Participants reported significantly greater weight loss when they perceived their family and friends as autonomy supportive of their weight loss efforts. Autonomy support from family and friends was also shown to moderate the effects of an experimental intervention that was delivered in an autonomy-supportive or controlling manner. Furthermore, autonomy support was significantly related to autonomous self-regulation, but its effects on weight loss held true even after controlling for self-regulation, suggesting an independent role of autonomy support from important others. Finally, the effects of autonomy support were distinguished from more directive support from significant others, which did not show similar effects. These findings point to the potential usefulness of developing intervention strategies focused on facilitating the autonomy-supportive behavior of significant others.

Keywords: autonomous self-regulation, autonomy support, weight management

Behaviorally based weight loss programs are effective in the short term, but have been unable to produce long-term weight loss maintenance (Jeffery et al., 2000). One reason for this failure may be that current interventions pay limited attention to motivational factors that are important in both initiation and sustained maintenance of key eating and exercise behaviors. This study addresses this deficiency by beginning to consider the importance of internally initiated change and the support for that change that is provided by family and friends.

Excessive weight has become the norm in the United States, with a large percentage of American adults attempting to better manage their weight (Ogden et al., 2006). The associated social costs of this trend can be considerable. The treatment of choice for overweight to moderately obese individuals (body mass index [BMI] of 25–40 kg/m²) is behavioral weight control, which includes education about nutrition and physical activity and instruction in key behavioral techniques (e.g., self-monitoring and problem solving) known to facilitate behavior change (Wing, Gorin, & Tae, 2006). These types of programs

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produce average weight losses of 8%–10% of initial body weight over 6 months of treatment; however, long-term maintenance of this weight loss is rarely attained (Wing, 1998). At 1-year posttreatment, only 60%–70% of weight loss is maintained, and nearly all weight is regained within 3 to 5 years (Perri & Corsica, 2002). Efforts to improve behavioral weight control results through strategies such as extending the length of treatment, emphasizing problem-solving skills, and increasing the amount of recommended exercise have produced only minor improvements in weight loss maintenance, creating an urgent need for new treatment approaches (Wadden, Butryn, & Byrne, 2004).

An often ignored and yet potentially crucial element of sustained behavioral change is the motivation for that change. When motivation is considered at all, it is generally considered as a unitary construct, with high motivation producing greater change than low motivation. Self-determination theory offers a unique perspective for understanding the motivation for health-related behavior change by drawing the distinction between autonomous and controlled motivations (Deci & Ryan, 2000). An individual is autonomously motivated to the degree that he or she experiences goals and decisions to be self-generated and freely chosen rather than controlled by external or internal pressures. Autonomous self-regulation has been consistently related to greater persistence in the face of adversity, better learning, superior task performance, more effective coping, and better health outcomes (Deci & Ryan, 2000). These effects appear to be particularly apparent for sustained change, which is precisely the shortfall of behavioral weight loss interventions to date.

Self-determination theory also suggests that interpersonal support for autonomy plays a significant role in facilitating the internalization of autonomous self-regulation and associated behavior change. Au-

tonomy support establishes the context for the development of self-directed, personally meaningful choice. This can occur by creating an environment that allows inherent autonomous self-regulation to thrive and flourish, that is, not to be thwarted or disrupted. This may also happen by creating an environment in which external motives can be internalized in a benign and adaptive way, thus allowing them to become more fully integrated into the developing self (Deci & Ryan, 2000). Autonomy support is provided by acknowledging an individual's feelings and unique perspective, by providing choices and options, and by refraining from excessive control and pressure (Reeve, Bolt, & Cai, 1999). Autonomy-supportive environments have repeatedly been associated with greater internalized motivation and the promotion of healthy adaptation, and interventions delivered in an autonomy-supportive fashion have been associated with better goal functioning (Deci, Eghari, Patrick, & Leone, 1994; Grolnick & Ryan, 1989; Joussemet, Koestner, Lokes, & Houliort, 2004; Koestner et al., 2006).

The role of both autonomous self-regulation and autonomy support in relation to health-related goals such as losing weight or quitting smoking has been examined extensively by Williams and his colleagues (Williams, Grow, Freedman, & Deci, 1996; Williams et al., 2002; Williams, McGregor, Zeldman, Freedman, & Deci, 2004). Personal autonomy was assessed in terms of an individual's reasons for pursuing a specific health goal, with a distinction made between autonomous reasons for goal pursuit ("I plan to stay in this weight loss program because it is important to me personally to succeed in losing weight") versus controlled reasons ("because I'll feel like a failure if I don't"). These studies also assessed the extent to which individuals perceive health care personnel to be supporting their autonomy as they pursue their health goals ("My doctor listens to how I would like to do things"). Both autonomous

self-regulation and autonomy support appear to play an important role in weight loss and related medical comorbidities. In one study, autonomous self-regulation predicted greater weight loss in a sample of obese patients and also predicted better maintenance of that weight loss (Williams et al., 1996). Autonomous self-regulation for weight loss was predicted by perceived autonomy support from the health care providers in that study. In a study of diabetes management, autonomy and competence were predicted by perceived autonomy support from providers, and changes in perceptions of autonomy and competence predicted greater glycemic control (Williams et al., 2004). Similar results have been found in studies of smoking cessation and other medical treatments (Williams, Gagne, Ryan, & Deci, 2002).

Until recently, most of the research has assessed the role of autonomy support from health care providers. However, given that much of weight management involves eating and exercise choices made in the home, it is important to also consider the supportive behavior of family and friends. Previous efforts to examine the role of significant others in weight management have focused on changing the behaviors of spouses. In various studies, spouses have been trained to praise and not criticize or punish weight loss efforts, model appropriate eating behaviors, contract and set goals for appropriate eating and exercise, and devise solutions to weight-related problems with their spouse (Black, Gleser, & Kooyers, 1990). Many of these strategies produced greater initial weight losses than participant-only interventions. A review of the support behaviors indicated in the studies included in Black et al.'s (1990) meta-analysis of couples' weight loss programs suggests that a wide range of behavior is included as supportive, some of which may be experienced as quite controlling, such as having a spouse provide financial incentives for weight loss progress. Despite the best of intentions, both trained profes-

sionals and significant others may provide help and support in directive or even controlling ways. From a self-determination perspective, efforts to provide help that are perceived as controlling are likely to be suboptimal and may in fact undermine autonomous self-regulation and sabotage the very success these efforts are intended to promote.

Recently, Williams et al. (2006) developed a measure of autonomy support that patients perceived from their "important others." They demonstrated that such support was associated with increases in perceived autonomy and perceived competence, as well as better outcomes in smoking cessation and dietary intervention trials. Interestingly, the measure of autonomy support from important others provided variance distinct from the measure of autonomy support from health care providers, suggesting that both provide independent contributions to the prediction of outcomes. When allowed to compete for variance, both contributed to smoking outcomes, but the important-other measure appeared to be the stronger and more consistent predictor of dietary outcomes (Williams et al., 2006). This finding indicates the potential importance of partners in weight management interventions and suggests that autonomy support from significant others may be even more important than the support of health care providers. The present research examined this support from family and friends and attempted to go one step further by distinguishing autonomy support from the more structuring or directive support that may be provided by these significant others.

This study examined the effect of autonomy support and autonomous self-regulation on the self-reported weight loss of female university students. We assessed the impact of a minimal intervention, delivered in an autonomy-supportive or controlling fashion, and the impact of perceived autonomy support from family and friends on weight loss over the course of a month. We

also assessed the participants' motivation for weight loss. We hypothesized that participants who received the autonomy-supportive intervention would show greater weight loss than those who received the controlling intervention, and we hypothesized that autonomous self-regulation would be associated with greater weight loss. We also hypothesized that perceived autonomy support from family and friends would be associated with greater weight loss and that more directive support would be unrelated to weight loss. Finally, we examined whether the autonomy-supportive experimental instructions would interact with the autonomy support provided by family and friends to affect weight loss, but we offer no specific hypothesis because this was exploratory in nature.

METHOD

Participants

Participants were 73 female undergraduate students recruited through the introductory psychology participant pool at the University of Massachusetts Dartmouth. All participants were required to attend an initial session in person and to complete follow-up questionnaires online at 2 weeks and 1 month after the initial session. Participants' age ranged from 18 to 46, with a mean age of 19.54 ($SD = 3.97$). Mean BMI, calculated from self-reported height and weight, was 24.66 kg/m² ($SD = 5.12$), ranging from 18.79 to 41.64. The Centers for Disease Control and Prevention has suggested that a BMI of 18.5–25 kg/m² may indicate optimal weight, and a number above 25 may indicate that the person is overweight. On the basis of concern about including individuals with possible eating disorders, 3 participants with a reported BMI less than 18.5 and 2 participants who endorsed a screening question addressing a history of eating disorders were excluded before moving on to the experimental portion of the study. Of participants, 76% con-

sidered themselves currently overweight, but 41% actually met the established criteria. Eighty-seven percent reported having made a previous attempt to lose weight. Sixty-two participants completed all three assessments, and only this group is included in the results. Twelve participants dropped out of the study (5 in the autonomy support condition and 7 in the controlling condition). These participants did not differ from those who continued in either initial reported weight or in their initial level of autonomous self-regulation ($ps > .20$).

Procedure

During the initial session, participants were asked how much weight they realistically expected to lose over the upcoming month and then completed a series of baseline questionnaires. The participants were randomly assigned to one of two groups: autonomy supportive or controlling. Both groups were then referred via a handout to the Small Steps Web site (<http://www.smallstep.gov>), which is sponsored by the U.S. Department of Health and Human Services for weight loss suggestions. The entire procedure was conducted by the same two female undergraduate research assistants. The instructional handouts were given to the participants, and the participants were asked to take a moment to read the handout before leaving. The handouts were administered in a uniformly pleasant but neutral fashion by the same assistant in each of the conditions, so that the only difference between the conditions should have been the content of the instructional handout. The handout in the autonomy-supportive condition referred participants to the Small Steps Web site in a manner that encouraged their own choices, and the handout in the controlling condition urged participants in a more demanding fashion to make use of the site's guidelines. (The exact instructions for the two conditions are provided in the Appendix.) At both 2 weeks and 1 month,

participants received an e-mail with a reminder of their weight loss goal and were directed to a Web site to complete an assessment. At 2 weeks, the e-mail also contained a reminder to use the Small Steps site with the same instruction set as at the initial session.

Measures

Weight

At baseline, 2 weeks, and 1 month, participants self-reported their current weight. Weight loss was calculated by subtracting self-reported weight at 1 month from the weight that was reported at baseline.

BMI

The BMI takes into account both a person's height and his or her weight and is calculated using this mathematical formula: $[\text{weight (lb)}/\text{height (in.)}^2] \times 703$. A BMI below 18.5 is considered underweight, and a BMI of 18.5 to 25 is representative of normal weight. A BMI of 25 to 30 is generally considered overweight, and a BMI higher than 30 is generally considered obese. On the basis of these norms, 59% of the sample would be categorized in the normal range, 27% in the overweight range, and 14% in the obese range. BMI reduction was calculated by subtracting BMI at 1 month from the BMI at baseline.

Autonomous Self-Regulation

Autonomous reasons for losing weight (e.g., "Because I personally believe it is the best thing for my health"; "Because I feel that I want to take responsibility for my own health") were assessed at baseline and 1 month with a six-item measure adapted from Williams et al. (1996). The items were modified from the Treatment Self-Regulation Questionnaire used by Williams et al. (1996) because there was no clinical intervention in the current study, and the items were thus adjusted to better suit the current purposes. Additionally, unlike the

Treatment Self-Regulation Questionnaire, we included only autonomous reasons because several studies have shown autonomous self-regulation to consistently predict goal progress, whereas controlled motivation has shown unreliable and inconsistent relations to goal progress (Koestner, Otis, Powers, Pelletier, & Gagnon, 2008). Participants responded using a 7-point Likert scale ranging from 1 (*not at all true*) and 7 (*very true*). The internal reliability of the current scale was .81 (Cronbach's α).

Autonomy Support Scale

At 2 weeks, the degree of autonomy support that the participants perceived from their family and friends regarding their weight loss efforts was assessed with an eight-item scale also adapted from Williams et al. (1996) (e.g., "I feel that my family and friends understood how I see things with respect to my weight"; "My family and friends listened to how I would like to do things regarding my weight"). Participants responded using a 7-point Likert scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). The internal reliability of the scale was .83 (Cronbach's α).

Directive Support Scale

At 2 weeks, we assessed the degree of more directive support participants perceived from their family and friends regarding their weight loss efforts with four items created for this study (e.g., "My family and friends repeatedly reminded me of my goal"; "My family and friends consistently called attention to situations where I had to control my behavior"). Participants responded using a 7-point Likert scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). The internal reliability of the scale was .84 (Cronbach's α).

Use of the Small Steps Web Site

Participants were asked two questions regarding their use of the Small Steps Web site ("To what degree did you use the Small Steps website?" and "How helpful was it?").

RESULTS

Preliminary Analysis

Table 1 presents the results of a principal-components factor analysis (with varimax rotation) of the eight items assessing autonomy support from family and friends and the four items assessing controlling support. Two factors emerged with eigenvalues greater than 1.0, and these factors accounted for 63.4% of the variance. It can be seen that the eight autonomy support items loaded together on the first factor (eigenvalues = 5.41), whereas the four directive support items loaded together on the second factor (eigenvalues = 2.19). Only one item showed significant loadings on both factors.

Table 2 presents the means and standard deviations for all of the baseline variables, separately for the experimental conditions. No significant differences were obtained between conditions, but there was a trend for participants in the autonomy-supportive condition to be somewhat higher than the controlling condition on initial weight and initial autonomous self-regulation. These variables were controlled for in the central

analyses that follow. Participants set a goal of losing approximately 8 lbs over the month and reported relatively high levels of autonomous self-regulation.

Two weeks into their weight loss efforts, participants reported higher levels of autonomy support ($M = 5.09$, $SD = 1.03$) than directive support ($M = 3.87$, $SD = 1.56$) from their family and friends, $t(72) = 7.45$, $p < .001$. At the end of the month, participants in the sample reported a significant drop in weight from a mean of 146.31 to a mean of 144.50, $t(61) = 2.63$, $p < .01$. This drop in weight was matched by a significant decline in participants' BMI over the month, from a mean of 24.75 to a mean of 24.44, $t(61) = 2.60$, $p < .01$. There was no difference between conditions in the amount of weight lost over the month, $t(61) = 0.03$, or in the decline in BMI, $t(61) = 0.01$. There was also no difference between the groups in how much they reported using the Small Steps Web site or how helpful they perceived the Web site to be ($ps > .20$). The questions about the Small Steps Web site were also unrelated to both autonomy support and controlling support ($ps > .20$).

Table 1
Factor Loadings for Family and Friend Support Items

Item	Factor 1	Factor 2
1. My family and friends understood how I see things with respect to my weight.	.58	.38
2. I was able to be open with my family and friends about my weight.	.73	.21
3. My family and friends conveyed confidence in my ability to control my weight.	.88	.02
4. I felt a lot of trust in my family and friends.	.82	.01
5. My family and friends listened to how I would like to do things regarding my weight.	.62	.29
6. My family and friends handled my emotions very well.	.82	.11
7. My family and friends tried to understand how I see my weight and whether I control it.	.52	.49
8. I felt able to share my feelings with my family and friends.	.80	.03
9. My family and friends made sure that I really understand the importance of controlling my weight without pressuring me to do so.	.31	.76
10. My family and friends encouraged me to talk about my weight.	.32	.73
11. My family and friends repeatedly reminded me of my goal.	-.04	.84
12. My family and friends consistently called attention to situations where I had to control my behavior.	-.04	.88

Table 2
Group Means and Standard Deviations for Baseline Variables

Variable	Autonomy support	Controlling	<i>t</i>	<i>p</i>
Weight at baseline	149.20 (39.07)	143.86 (22.86)	0.71	.47
Body mass index at baseline	25.55 (5.64)	24.34 (4.35)	0.94	.33
Weight loss goal at baseline	8.07 (5.13)	7.80 (4.22)	0.25	.81
% who said they were overweight	84	70	1.35	.18
% who made previous weight loss attempt(s)	86	90	0.40	.70
Autonomous self-regulation at baseline	5.64 (1.06)	5.28 (0.85)	1.66	.11

Table 3 provides the correlations among the key variables. It can be seen that many marginal and significant positive relations emerged. Notably, autonomy support from family and friends was significantly positively correlated with directive support, autonomous self-regulation, and weight loss. Directive support was unrelated to autonomous self-regulation and weight loss. There was a trend for autonomous self-regulation at baseline and 1 month to be positively associated with weight loss.

Central Analyses

We used a hierarchical multiple regression analysis to examine the relation of condition (autonomy supportive vs. controlling), autonomous self-regulation, autonomy support, and directive support to weight loss over the month. All variables were standardized. Weight loss at 1 month was the dependent variable. Variables were entered in the regression model in a sequence of three sets. BMI at baseline, previous weight loss attempts, autonomous self-regulation at baseline, and condition were entered together as the first set. Autonomy support from family and friends at 2 weeks and directive support from family and friends at 2 weeks were entered together as the second set. We entered the interactions (computed as product terms) of Condition \times Autonomy Support and Condition \times Directive Support together as a third set. The regression model was significant ($R = .57$), $F(8, 53) = 3.16$, $p < .01$.¹

Table 4 presents the standardized regression coefficients (betas), *t* tests, and significance levels from the regression analysis. Two marginal effects and three significant effects emerged. Initial level of autonomous self-regulation was marginally positively associated with weight change over the month, as was initial BMI. Having made previous weight loss attempts was significantly positively related to weight loss over the month. Autonomy support from family and friends was significantly positively associated with weight loss over the month. Furthermore, a significant interaction between condition and perceived autonomy support from family and friends emerged. To interpret the interaction, we performed a median split on participants' scores on autonomy support from family and friends and conducted a 2×2 analysis of variance with experimental condition (controlling or autonomy supportive) and level of family and friend autonomy support (low or high) as between-subjects factors and weight loss as the dependent variable. Figure 1 shows that the autonomy support

¹ We also performed the hierarchical regression using participants' weight at 1 month as the dependent variable (rather than weight loss at 1 month) and including Time 1 weight in the first set of predictors. The results of this regression were nearly identical to those reported here—significant effects ($p < .05$) emerged for both autonomy support from family and friends, $t(55) = 2.27$, $p < .05$, and for the interaction of condition with autonomy support from family and friends, $t(53) = 2.31$, $p < .05$.

Table 3
Correlations Among Key Variables

Variable	1	2	3	4	5	6	7
1. Body mass index baseline	—						
2. Previous weight loss attempts	-.19	—					
3. Autonomous self-regulation baseline	.27*	-.12	—				
4. Autonomy support 2 weeks	.19	-.14	.39**	—			
5. Directive support 2 weeks	.23*	-.08	.15	.47**	—		
6. Autonomy self-regulation 1 month	.24*	.05	.50**	.44**	.18	—	
7. Weight loss 1 month	.20 [†]	.24 [†]	.22 [†]	.29*	.04	.21 [†]	—

* $p < .05$. ** $p < .01$. [†] $p < .10$.

condition led to relatively greater weight loss than the controlling condition for participants who were high in autonomy support from family and friends; however, the autonomy support condition led to relatively less weight loss than the controlling condition for participants who were low in autonomy support from family and friends. This pattern suggests that the impact of the experimental manipulation was conditional on participants' level of autonomy support from family and friends.

We repeated this regression model with BMI change from baseline to 1 month as the dependent variable. The results were nearly identical to those for weight loss. The regression model was significant ($R = .55$), $F(8, 53) = 2.85$, $p = .01$. Autonomy support from family and friends was significantly positively related to BMI change ($\beta = 0.34$), $t(55) = 2.32$, $p < .05$. The interaction of autonomy support from family and friends and condition was also significant ($\beta = -.30$), $t(53) = 2.30$, $p < .05$.²

We also conducted a regression analysis to examine change in autonomous self-regulation over the month. Autonomous self-regulation at 1 month was the dependent variable. Variables were entered in the regression model in a sequence of three sets: (a) BMI at baseline, previous weight loss attempts, condition, and autonomous self-regulation at baseline; (b) autonomy support from family and friends at 2 weeks and directive support from family and friends at 2 weeks; (c) the interactions (computed as product terms) of Condi-

tion \times Autonomy Support and Condition \times Directive Support. The regression model was significant ($R = .62$), $F(8, 52) = 4.27$, $p < .01$. There were two significant predictors of autonomous self-regulation at 1 month. First, baseline level of autonomous self-regulation was highly related to autonomous self-regulation at 1 month ($\beta = 0.51$), $t(57) = 4.12$, $p < .001$. Second, autonomy support from family and friends at 2 weeks was significantly positively related to autonomous self-regulation at 1 month ($\beta = 0.35$), $t(55) = 2.68$, $p < .01$.

The fact that autonomy support from family and friends at 2 weeks was significantly positively related to both autonomous self-regulation and weight loss at 1 month raises the possibility of mediation among these variables. One mediation model that has previously been explored in self-determination research would proceed from autonomy support to increased autonomous self-regulation to better health outcomes (Williams et al., 2004). Such a model is not tenable in this study, however, because autonomous self-regulation at 1 month and weight loss at 1 month were uncorrelated ($r = .21$, $p = .11$), and a significant relation between the mediator and the outcome is required to demonstrate

² We repeated the regression analyses of weight loss and BMI change with the inclusion of the three-way interaction between autonomous self-regulation, condition, and autonomy support from family and friends added as a fourth step. The three-way interaction did not approach significance in either analysis ($ps > .10$).

Table 4
Standardized Regression Coefficients of Weight Loss Over 1 Month

Variables	β	<i>t</i>	<i>p</i>
Set 1			
Initial body mass index	0.24	1.82	.07
Previous weight loss attempts	0.32	2.57	.01
Autonomous self-regulation baseline	0.23	1.73	.09
Condition (-1 autonomy support/+1 controlling)	0.10	0.84	<i>ns</i>
Set 2			
Autonomy support	0.34	2.36	.02
Directive support	-0.16	-1.17	<i>ns</i>
Set 3			
Condition \times Autonomy support	-0.33	-2.39	.02
Condition \times Directive support	0.13	0.96	<i>ns</i>

true mediation (Baron & Kenny, 1986). It should also be noted that change in autonomous motivation over the month was unrelated to weight loss ($r = .01$).

DISCUSSION

This study supports the theoretical assumption that autonomy support can be an important variable in weight loss efforts. The results demonstrated that autonomy support from family and friends was a significant predictor of short-term weight loss. Moreover, autonomy support from family and friends was also shown to moderate the effects of a minimal experimental intervention encouraging the use of a weight loss information Web site and delivered in an autonomy-supportive or controlling fashion. Although autonomy support was significantly related to autonomous self-

regulation, autonomous self-regulation was only marginally predictive of weight loss, which suggests that autonomy support may exert its impact on weight loss by some means beyond this relation.

These findings are consistent with the growing body of research indicating the impact of autonomy support (Williams et al., 1996, 2002, 2004). They go further, however, by emphasizing the importance of receiving autonomy support in the naturally existing social environment of family and friends. Previous research has primarily been focused on the autonomy-supportive behavior of health care providers, which is no doubt important. Williams et al. (2006), however, began to highlight the need to extend our empirical observations to include the social context in which people live, which is supported by this study. It is also important to note that the support from important others must be of a particular nature. Well-meaning but directive support was not found to be associated with better outcomes in this study. These findings point to the potentially unique benefits of the more empathic and responsive approach entailed in autonomy support.

The study of the home environment may be particularly important in the area of weight management because many of the vital choices and necessary behaviors take place in the home and involve significant others. Having health care providers who

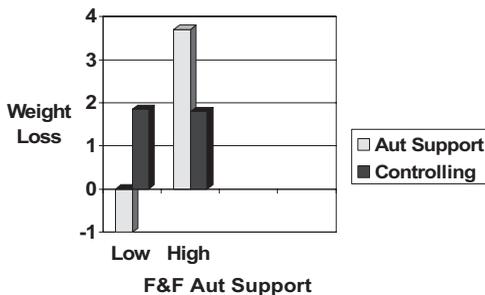


Figure 1. Weight loss by condition and level of autonomy support from family and friends.

behave in an autonomy-supportive fashion has a demonstrable effect on intervention outcomes, but these providers have relatively limited direct contact with their patients. Having family members who are skilled at behaving in autonomy-supportive ways may potentially add substantial benefit to intervention programs. In this study, the minimal intervention, which may in fact be quite similar to an autonomy-supportive intervention potentially deliverable in the course of normative health care, did not itself facilitate behavior change but seemed to be more helpful in the larger context of an autonomy-supportive environment from family and friends. It is entirely possible that the intervention in this study was not sufficiently potent to produce a significant direct effect on weight loss. It might be also be the case that an autonomy-supportive social environment is necessary for autonomy-supportive interventions to enhance change. Perhaps the social environment in which people live exerts a potentiating influence on intervention strategies. It is possible that a type of priming occurs that allows people who are receiving autonomy support in the home environment to be more responsive to subsequent interventions that are provided in such a fashion. It is unclear why the participants who perceived low autonomy support from family and friends tended to do relatively worse with the autonomy-supportive intervention than the controlling condition. One possibility is that there may be a matching or congruence effect in operation, whereby the support from the social environment and the intervening environment needs to be congruent. Incongruence in the messages an individual receives may result in a type of backfire effect that adversely affects behavior change. Further research would be necessary to explore these and other intriguing possibilities.

In this study, autonomy support was associated with higher autonomous self-regulation, and autonomous self-regulation was associated with weight loss, but

the effect was marginal. These relations are consistent with previous research, but the association between autonomous self-regulation and outcome was not as strong. This may be because of the small sample size or some other factors. What does seem important, however, is the finding that autonomy support was a stronger predictor of weight loss and that the effect on weight loss persists when autonomous self-regulation is statistically controlled. A mediational model of the effect of autonomy support through autonomous self-regulation to weight loss could therefore not be supported. This suggests that autonomy support may exert its influence on weight loss by some means other than, or in addition to, its effect on autonomous self-regulation. Perhaps the effect of autonomy support from significant others is mediated by perceived competence or perhaps by increased self-confidence, greater goal commitment, or even a greater sense of relatedness. The results from Williams et al. (2006) suggest a possible link from perceived autonomy support through perceived competence to greater weight loss. These and other potential mediators of autonomy support need to be considered in future research.

Limitations

The current study is limited in a number of ways. First, the measures of weight loss and of autonomy support were by self-report. Measured weight loss would be the preferred metric in future studies; however, the self-report bias should not have affected the interaction effect discovered in this study. This study measured participants' perceptions of autonomy support from family and friends, which is in and of itself important, but assessments of the actual behavior of significant others would also be useful to disentangle the effects of behavior from potentially distorted perceptions. In addition, the support measures in this study assess perceptions of family and friends together, but in light of recent findings suggesting that peer influences

may be even more important than those from family, it may be illuminating to dismantle these potentially different effects (Christakis & Fowler, 2007). The directive support measure was developed for the current purposes, and its reliability and validity remain to be established. Conclusions drawn from the results obtained with this measure must, therefore, be tentative until further corroborating data can be gathered. The average reported weight loss in this study was quite small and certainly not in line with the average goals that the participants set for themselves, but the time frame was quite short and the average goals were likely unrealistic for such a time frame. Although we used a prospective design, most of the core analyses of the study were correlational, and therefore it is important to note that causal inferences cannot be entirely supported. The generalizability of the study is limited by the relatively small sample size, the exclusive use of college women, and the 4-week duration of the study. Finally, the use of a sample of participants who were on average of high normal weight also limits the generalizability of the results. There are likely to be interesting differences between a clinically obese sample and a sample of women who on average may be more likely to be attempting to lose weight for self-image reasons than for health reasons. In addition, the fact that a substantial percentage of the women in this study considered themselves to be overweight but did not meet the established criterion may suggest a disturbing sociological trend that may also be inappropriately supported by the interpersonal environment. It is potentially important to consider why so many normal-weight women may pursue weight loss and whether it is better to facilitate these efforts or instead to foster self-acceptance and a focus on health. This area requires further study, and likewise, future research with a clinical sample of

overweight or obese individuals followed over a longer time frame would expand the generalizability and clinical relevance of the current findings.

Conclusions

This study highlights the importance of autonomy support from significant others and suggests that weight loss interventions may work best if delivered in an autonomy-supportive manner and within a social environment of autonomy support. As Williams et al. (2006) indicated, measures of autonomy support from important others need to be developed and validated, and future studies ought to consider this important variable. Likewise, interventions that focus on enhancing autonomy-supportive behavior among significant others need to be developed and tested. Specifically regarding weight management, since many of the diet and exercise choices and behaviors are performed in the home, facilitating the autonomy-supportive behavior of significant others may substantially improve the long-term outcomes of weight management interventions.

REFERENCES

- Baron, R. M., & Kenny, D. A. (1986). The moderator–mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology, 51*, 1173–1182.
- Black, D. R., Gleser, L. J., & Kooyers, K. J. (1990). A meta-analytic evaluation of couples' weight-loss programs. *Health Psychology, 9*, 330–347.
- Christakis, N. A., & Fowler, J. H. (2007, July 26). The spread of obesity in a large social network over 32 years. *New England Journal of Medicine, 357*, 370–379.
- Deci, E. L., Eghrari, H., Patrick, B. C., & Leone, D. R. (1994). Facilitating internalization: The self-determination theory perspective. *Journal of Personality, 62*, 119–142.
- Deci, E. L., & Ryan, R. M. (2000). The “what” and “why” of goal pursuits: Human needs and the self-determination of behavior. *Psychological Inquiry, 11*, 227–268.
- Grolnick, W. S., & Ryan, R. M. (1989). Parent styles associated with children's self-regula-

- tion and competence in school. *Journal of Educational Psychology*, 81, 143–154.
- Jeffery, R. W., Drewnowski, A., Epstein, L. H., Stunkard, A. J., Wilson, G. T., Wing, R. R., & Hill, D. R. (2000). Long-term maintenance of weight loss: Current status. *Health Psychology*, 19(Suppl.), 5–16.
- Joussemet, M., Koestner, R., Lekes, N., & Houffort, N. (2004). Introducing uninteresting tasks to children: A comparison of the effects of rewards and autonomy support. *Journal of Personality*, 72, 141–169.
- Koestner, R., Horberg, E. J., Gaudreau, P., Powers, T. A., DiDio, P., Bryan, C., et al. (2006). Bolstering implementation plans for the long haul: The benefits of simultaneously boosting self-concordance or self-efficacy. *Personality and Social Psychology Bulletin*, 32, 1–12.
- Koestner, R., Otis, N., Powers, T. A., Pelletier, L., & Gagnon, H. (2008). Autonomous motivation, controlled motivation, and goal progress. *Journal of Personality*, 76, 1201–1230.
- Ogden, C. L., Carroll, M. D., Curtin, L. R., McDowell, M. A., Tabak, C. J., & Flegal, K. M. (2006, April 5). Prevalence of overweight and obesity in the United States, 1999–2004. *Journal of the American Medical Association*, 295, 1549–1555.
- Perri, M. G., & Corsica, J. A. (2002). Improving the maintenance of weight lost in behavioral treatment of obesity. In T. A. Wadden & A. J. Stunkard (Eds.), *Handbook of obesity treatment* (pp. 357–382). New York: Guilford Press.
- Reeve, J., Bolt, E., & Cai, Y. (1999). Autonomy supportive teachers: How they teach and motivate students. *Journal of Educational Psychology*, 91, 537–548.
- Wadden, T. A., Butryn, M. L., & Byrne, K. J. (2004). Efficacy of lifestyle modification for long-term weight control. *Obesity Research*, 12(Suppl.), 151S–162S.
- Williams, G. C., Gagne, M., Ryan, R. M., & Deci, E. L. (2002). Facilitating autonomous self-regulation for smoking cessation. *Health Psychology*, 21, 40–50.
- Williams, G. C., Grow, V. M., Freedman, Z. R., Ryan, R. M., & Deci, E. L. (1996). Motivational predictors of weight loss and weight-loss maintenance. *Journal of Personality and Social Psychology*, 70, 115–126.
- Williams, G. C., Lynch, M. F., McGregor, H. A., Ryan, R. M., Sharp, D., & Deci, E. L. (2006). Validation of the “important other” climate questionnaire: Assessing autonomy support for health-related change. *Families, Systems, & Health*, 24, 179–194.
- Williams, G. C., McGregor, H. A., Zeldman, A., Freedman, Z. R., & Deci, E. L. (2004). Testing a self-determination process model for promoting glycemic control through diabetes self-management. *Health Psychology*, 23, 58–66.
- Wing, R. R. (1998). Behavioral approaches to the treatment of obesity. In G. A. Bray, C. Bouchard, & W. P. T. James (Eds.), *Handbook of obesity* (pp. 855–873). New York: Marcel Dekker.
- Wing, R. R., Gorin, A. A., & Tate, D. F. (2006). Strategies for changing eating and exercise behavior. In B. A. Bowman & R. M. Russell (Eds.), *Present knowledge in nutrition* (9th ed., pp. 822–837). Washington, DC: ILSI Press.

Appendix Instructional Handouts

Autonomy-Supportive Instructions

Some potentially useful information and helpful hints can be found at a website sponsored by the U.S. Department of Health and Human Services. You can find this by going to www.smallstep.gov. If you are wondering how to approach this challenging process that you have chosen to embark upon, this site may provide beneficial assistance. Research has consistently shown these strategies to be helpful, but not all strategies are helpful

for all people and individuals need to see what works for them. We hope that these guidelines can provide some useful assistance. You may find them helpful if they suit your style. See what works best for you.

Controlling Instructions

Information and directions for weight control are found at a website sponsored by the U.S. Department of Health and Human Services. You will find this by going to www.smallstep.gov. These are

(Appendix continues)

important guidelines and we urge you to use this resource, if you truly want to accomplish your goal. Those that are serious about weight loss should adhere as closely as possible to these directives. It is very difficult to manage weight loss

without a serious program of intervention, and the accomplishment of your weight loss goals is dependent on initiating these types of measures. Failing to incorporate these types of changes significantly reduces your chances of success.

Call for Nominations: *Psychology of Violence*

The Publications and Communications (P&C) Board of the American Psychological Association has opened nominations for the editorship of *Psychology of Violence*, for the years 2011–2016. The editor search committee is chaired by William Howell, PhD.

Psychology of Violence, to begin publishing in 2011, is a multidisciplinary research journal devoted to violence and extreme aggression, including identifying the causes and consequences of violence from a psychological framework, finding ways to prevent or reduce violence, and developing practical interventions and treatments.

As a multidisciplinary forum, *Psychology of Violence* recognizes that all forms of violence and aggression are interconnected and require cross-cutting work that incorporates research from psychology, public health, neuroscience, sociology, medicine, and other related behavioral and social sciences. Research areas of interest include murder, sexual violence, youth violence, inpatient aggression against staff, suicide, child maltreatment, bullying, intimate partner violence, international violence, and prevention efforts.

Editorial candidates should be members of APA and should be available to start receiving manuscripts in early 2010 to prepare for issues published in 2011. Please note that the P&C Board encourages participation by members of underrepresented groups in the publication process and would particularly welcome such nominees. Self-nominations are also encouraged.

Candidates should be nominated by accessing APA's EditorQuest site on the Web. Using your Web browser, go to <http://editorquest.apa.org>. On the Home menu on the left, find "Guests." Next, click on the link "Submit a Nomination," enter your nominee's information, and click "Submit."

Prepared statements of one page or less in support of a nominee can also be submitted by e-mail to Emnet Tesfaye, P&C Board Search Liaison, at Emnet@apa.org.

Deadline for accepting nominations is January 31, 2009, when reviews will begin.