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Holiday Weight Management by Successful Weight Losers and Normal Weight Individuals

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Abstract

This study compared weight control strategies during the winter holidays among successful weight losers (SWL) in the National Weight Control Registry and normal weight individuals (NW) with no history of obesity. SWL (n = 178) had lost a mean of 34.9 kg and had kept ≥13.6 kg off for a mean of 5.9 years. NW (n = 101) had a body mass index of 18.5–24.9 kg/m^2. More SWL than NW reported plans to be extremely strict in maintaining their usual dietary routine (27.3% vs. 0%) and exercise routine (59.1% vs. 14.3%) over the holidays. Main effects for group indicated that SWL maintained greater exercise, greater attention to weight and eating, greater stimulus control, and greater dietary restraint, both before and during the holidays. A Group × Time interaction indicated that, over the holidays, attention to weight and eating declined significantly more in SW than in NW. More SWL (38.9%) than NW (16.7%) gained ≥1 kg over the holidays, and this effect persisted 1 month later (28.3% and 10.7%, respectively). SWL worked harder than NW did to manage their weight, but they appeared more vulnerable to weight gain during the holidays.

Keywords

successful weight losers; National Weight Control Registry; holiday; weight gain; normal weight

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The prevalence of obesity has doubled over the past 2 decades, and an estimated 65% of the U.S. population is now overweight or obese (body mass index [BMI] ≥25 kg/m^2; Baskin, Ard, Franklin, & Allison, 2005). Changes in the environment that promote an abundance of calorically dense food and energy-saving devices have been heavily implicated in fueling this epidemic (Hill, Wyatt, & Melanson, 2000). In the context of this "toxic" environment, two groups have beaten the odds and are maintaining a healthy body weight (i.e., BMI < 25 kg/m^2): (a) successful weight losers (SWL) and (b) normal weight individuals without a history of obesity (NW). Although previous research has compared SWL and NW on physiologic parameters (e.g., metabolic rate; Amatruda, Statt, & Weile, 1993; Leibel & Hirsch, 1984; Wyatt et al., 1999), few researchers have examined the behaviors of these two groups to better understand how they are maintaining their body weight in the current obesogenic environment. It remains unclear whether SWL maintain their weight using behaviors similar to those of NW or whether they must work harder to maintain their body weight.

The holiday season is an opportune time to examine the weight control behaviors of these two groups, as it presents a high-risk situation due to increased availability of high-calorie, high-fat foods, increased time pressures and stress, and decreased opportunities for exercise (Marlatt & Gordon, 1985). Several studies have examined weight changes over the holidays and have suggested that obese or reduced-obese individuals may be most susceptible to this high-risk situation. Yanovski et al. (2000) reported a small mean weight gain of 0.37 kg over the holidays in a convenience sample of 195 adults. However, the risk of gaining at least 2.3 kg over the holidays was lowest in individuals of normal weight, moderate in overweight individuals, and greatest in obese individuals. Andersson and Rossner (1992) compared weight changes over the holidays in reduced-obese patients in a hospital-based weight loss maintenance program and a control group of hospital staff. Both groups gained an average of 0.5 kg over the holidays; however, the variation in weight change in the reduced-obese patients was far greater and ranged from a gain of 6.1 kg to a weight loss of 8.8 kg. Thus, overweight and obese individuals and those individuals who have lost weight may be more susceptible to this high-risk period.

Our purpose in this study was to systematically compare the behaviors of SWL and NW before, during, and after the winter holiday season. We hypothesized that (a) before the holidays, SWL would report more specific plans for controlling their weight over the holidays; (b) compared with NW, SWL would practice more extreme weight-controlling behaviors to manage their weight (perhaps due to a biological predisposition to obesity); and (c) despite their practice of more extreme weight-controlling behaviors, SWL would gain more weight over the holidays and would be less likely to "recover" from holiday weight gain at the 1-month follow-up compared with the NW. Moreover, to better understand the factors associated with weight regain, we examined predictors of holiday weight gain in the SWL group.

Method

Participants

SWL were defined as individuals who had lost ≥13.6 kg and had kept it off for at least 1 year. NW were defined as individuals who had no history of overweight or obesity (BMI ≥ 25 kg/m^2) and currently were of normal weight (BMI between 18.5 and 24.9 kg/m^2). The SWL in this study were participants in the National Weight Control Registry (NWCR) who had recently enrolled in the registry and had completed a baseline assessment. The NWCR is an ongoing longitudinal study evaluating the behaviors of over 5,000 adults (≥18 years) who have lost a minimum of 13.6 kg and have kept it off for at least 1 year (Klem, Wing, McGuire, Seagle, & Hill, 1997). NWCR participants who were interested in participating in this substudy were asked to identify a normal weight peer for participation. We chose the technique of having a participant identify a peer for participation (respondent-driven sampling) as a means of recruiting the NW to help reduce potential group differences in socioeconomic status and other demographic variables that could confound interpretation of study results (McPher-son & Smith-Lovin, 1987).

Fifty-seven percent of SWL who agreed to participate in the study were able to find a normal weight peer to participate with them. Independent *t* tests that compared participants who identified normal weight peers with those participants who did not revealed no significant differences in preholiday age, gender, BMI, body weight, and magnitude below maximum lifetime weight between the two groups. To maximize the sample size, we included all participants available in both groups in the analyses. However, analyses we conducted using matched-pair design yielded similar findings (data not shown).

The SWL went from an average lifetime maximum BMI of 37.4 kg/m^2 (*SD* = 9.4) to a current BMI average of 25.5 kg/m^2 (*SD* = 6.4). They had lost an average of 34.9 kg (*SD* = 16.5) and had kept off at least 13.6 kg (30 lbs) for an average of 5.9 years (*SD* = 6.8). The SWL (*n* = 178) and NW (*n* = 101) were similar with respect to age (*M* = 47.5 years, *SD* = 11.5, vs. *M* = 45.5 years, *SD* = 13.9, respectively) and gender (75% female, both groups); 96.2% of all participants were Caucasian, and 73% had attended college or beyond. SWL were significantly heavier than were NW (*M* = 74.2 kg, *SD* = 24.1, vs. *M* = 62.1 kg, *SD* = 9.9), $t(277) = 23.4$, $p = .0001$, and had a higher BMI at the start of the study (*M* = 25.5 kg/m^2, *SD* = 6.4, vs. *M* = 21.8 kg/m^2, *SD* = 1.9), $t(277) = 3.7$, $p = .0001$. Therefore, subsequent analyses controlled for difference in BMI. This study was approved by the Miriam Hospital Institutional Review Board for the Protection of Human Subjects in Research.

Measures

Questionnaires were sent to participants in the mail and were returned via postage-paid envelopes. Assessments were administered before the holiday (in early November), after the holiday (in early January), and at a 1-month follow-up (in early February). Participants were paid $10 for completion of the preholiday packet, $10 for completion of the postholiday packet, and $25 for completion of the 1-month follow-up assessment.

Weight and Height

Self-reported weight was collected before the holiday, after the holiday, and at the 1-month follow-up. The reliability and validity of participants' self-reported weight information have been documented previously (McGuire, Wing, Klem, Lang, & Hill, 1999; Stunkard & Waxman, 1981); the reliability of the normal weight peer's weight has not been empirically evaluated. Height was collected before the holiday and was used to compute BMI.

Preholiday Planning and Weight Loss

Preholiday planning and weight loss were assessed using single-item questions with 5–point Likert scales. Specifically, before the holidays, participants were asked, "To what extent do you have specific plans for controlling your weight over the holidays?" Responses were indicated on a Likert scale on which 1 = *no specific plan,* 3 = *have a fairly specific plan,* and 5 = *have a very specific plan.* Participants were also asked, "How 'strict' do you plan to be in maintaining your usual dietary routine over the holidays?" Responses were indicated on a scale on which 1 = *not at all strict,* 3 = *moderately strict,* and 5 = *extremely strict*. A similar question asked, "How 'strict' do you plan to be in maintaining your usual exercise routine over the holidays?" Responses used the same 5-point Likert scale.

Participants were also asked to report whether they had experienced any intentional weight changes recently, between October and November. Those who had lost weight were asked, "If you lost weight, did you do this to provide a 'safety net' in case you gained weight during the holidays?" Responses were "yes" and "no."

Behavioral, Meal Frequency, and Psychosocial Variables

The following behavioral variables (i.e., physical activity, weight control strategies), meal frequency variables, and psychosocial variables (i.e., weight concern and eating regulation) were assessed before and after the holiday but not at the 1-month follow-up.

Physical activity—We used the Paffenbarger Activity Questionnaire (Paffenbarger, Wing, & Hyde, 1978) to assess weekly calories expended in physical activity. The Paffenberger Activity Questionnaire has been shown to have a high test–retest reliability (Paffenbarger et al., 1978; Washburn, Smith, Goldfield, & Mc-Kinlay, 1991) and to be significantly correlated with measures of cardiovascular fitness (Siconolfi, Lasater, Snow, & Carleton, 1985).

Weight control strategies—We used the Eating Behavior Inventory (EBI; O'Neil et al., 1979) to assess frequency of practice of weight control behaviors. The EBI contains four subscales: Control of Eating (e.g., "I snack after supper," "I eat and just can't seem to stop"; items on this subscale are reverse scored); [1] General Attention to Weight and Eating Patterns (e.g., "I carefully watch the quantity of food which I eat," "I weigh myself daily"); Ability to Stop Eating ("If I'm served too much, I leave food on my plate"); and Stimulus Control Techniques (e.g., "I eat at only one place in my home"). Responses were indicated on a scale on which 1 = *never or hardly ever,* 2 = *some of the time,* 3 = *about half of the*

[1]This subscale was originally called "Personal Control of Eating" (O'Neil et al., 1979).

time, 4 = *much of the time,* and 5 = *always or almost always.* The EBI has been shown to have adequate internal validity and consistency (O'Neil et al., 1979).

Meal frequency—Assessments of weekly meal frequency ("Over the past month, on average how many days per week did you eat ____") included breakfast, lunch, dinner, snacks, and dessert/sweets. Frequency of fast-food consumption was assessed with the following categorical responses: 1 = *daily,* 2 = *weekly,* 3 = monthly, 4 = never.

Weight concern and eating regulation—Participants were also asked, "How difficult was it for you to control your weight over the holidays?" Responses were indicated on a 5-point Likert scale on which 1 = *not at all difficult,* 3 = *moderately difficult,* and 5 = *extremely difficult.*

We used four items from the Eating Inventory (Stunkard & Messick, 1985) to assess levels of dietary restraint and disinhibi-tion. In a previous analysis of obese individuals (data not shown; Phelan & Wing, 2003), we conducted a factor analysis of the Eating Inventory and identified two questions that loaded the highest on the Restraint and Disinhibition subscales. The Restraint questions were "I often stop eating when I am not really full as a conscious means of limiting the amount that I eat" and "I consciously hold back at meals in order not to gain weight." Both items were rated "true" or "false." The Dietary Disinhibition items were "Sometimes when I start eating, I just can't seem to stop," which was rated "true" or "false," and "Do you go on eating binges even though you are not hungry?" Responses to the latter item were 1 = *never,* 2 = *rarely,* 3 = *sometimes,* and 4 = *at least once a week.* Individuals were categorized as being high in restraint if they scored positively on both items and as being high in disinhi-bition if they answered "true" to eating binges and *sometimes* or *at least once a week* on frequency of eating binges. Participants who did not meet the criteria for being high in restraint or disinhibition were classified as being low in these domains.

Statistics

All analyses were performed with SPSS, Version 11.0. Descriptive statistics are presented as means plus standard deviations (unadjusted) for continuous measures or as percentages for categorical responses. We used independent *t* tests to compare differences in demographic variables between individuals who completed the follow-up assessments and individuals who did not and between participants who identified a normal weight peer and participants who did not. Our analysis of group differences in preholiday planning used analyses of covariance, controlling for preholiday BMI, and used a Bonferroni-corrected significance level of $p < .01$ (.05/4). Analysis of changes over time in behavioral variables (i.e., exercise, weight control strategies), meal frequencies, and psychosocial variables (i.e., weight concern and eating regulation) used separate multivariate analysis of variance (MANOVA) models for repeated measures, with preholiday BMI entered as a covariate. We interpreted significant main and interaction effects using adjusted (Bonferroni) significance levels of $p < .008$ (.05/6) for changes in behavioral variables relating to physical activity and weight control strategies, $p < .01$ (.05/5) for meal frequencies, and $p < .02$ (05/3) for psychological variables relating to weight concern and eating regulation.

Weight changes over time were analyzed with MANOVA for repeated measures and with the preholiday, postholiday, and 1-month follow-up time points. These analyses were conducted both with and without adjustment for preholiday BMI. Both main effects (for group) and Group × Time interactions were examined. We used Box's test to examine equality of covariance matrices across the groups in the repeated-measures model and used post hoc chi-square analyses to examine group differences in the proportion of participants who remained weight stable, gained weight, or lost weight at the postholiday and 1-month follow-up assessments.

Recovery from holiday weight gain was defined as a return to preholiday weight (±1 kg) or below at the 1-month follow-up. Group differences in the odds of recovery were examined with logistic regression analyses that adjusted for preholiday BMI and holiday weight gain. We used sequential linear regression to examine predictors and correlates of weight regain over the holidays in SWL. In the first step, preholiday BMI was forced into the model; in the second step, preholiday behavioral variables (i.e., exercise, weight control strategies), meal frequencies, and psychological variables (i.e., weight concern and eating regulation) were entered; and in the third step, pre- to postholiday changes in these variables were entered. Collinearity statistics (tolerance and variance-inflation factor) were examined; they indicated adequate independence among variables in the regression. Analyses that compared SWL with their matched NW peer on holiday weight changes and weight control behaviors yielded similar results (data not shown).

The sample size of this study (178 SWL and 101 NW) was calculated to provide at least 80% power for detection of effect sizes ranging from 0.28 to 0.37 for continuous outcomes, with a 5% Type I error rate. In a post hoc sample size calculation, using a pooled standard deviation estimate of 1.4 kg weight gain from pre- to postholiday, we had >80% power to detect a difference of 0.5 kg between groups. For physical activity, using a pooled standard deviation estimate of 2,229 kcal/week, we had >80% power to detect a difference of 850 kcal/week between groups.

Results

Attrition

A total of 90 NW (89.1%) and 167 SWL (93.8%) completed the postholiday assessment, and 85 NW (84.2%) and 167 SWL (93.8%) were available for the 1-month follow-up. Comparison of participants who dropped out of the study with participants who completed the study revealed no significant differences in age, BMI, or initial body weight among NW. Among SWL, those who did not complete the postholiday assessment were heavier than were those who remained in the study (M = 30.1 kg/m^2, SD = 10.1, vs. M = 25.2 kg/m^2, SD = 4.6, respectively), $t(177) = 4.9$, p = 002. Chi-square analyses revealed no significant differences in gender or ethnicity/race in dropouts versus completers.

Preholiday Planning

On the basis of assessments conducted in November (i.e., before the holiday), SWL were more likely to endorse plans to be extremely strict in maintaining their usual dietary routine

(27.3% vs. 0%), $\chi^2(4, N = 279) = 90.1$, $p = .001$. SWL also reported greater strictness in maintaining their exercise routines (59.1% vs. 14.3%), $\chi^2(4, N = 279) = 55.5$, $p = .0001$. A significantly greater proportion of SWL than of NW reported losing weight over the month prior to the holidays (24.7% vs. 11.3%, respectively), $\chi^2(3, N = 279) = 24.2$, $p = .006$. Although this result is not statistically significant, $\chi^2(1, N = 279) = .19$, $p = .65$, 18.2% of SWL versus 0% of NW reported having lost the weight to provide a safety net in case they gained weight during the holidays.

Holiday Weight Control Behaviors and Psychosocial Factors

Compared with NW, SWL reported engaging in significantly more physical activity both before and after the holidays (see Table 1). SWL also reported greater practice of weight control behaviors (as reflected in total EBI scores), including stimulus control techniques (e.g., eating at one place in the home). SWL reported greater attention to weight and eating (e.g., daily self-weighing) at both time points. A Group × Time interaction was observed in level of attention to weight and eating, $F(1, 254) = 6.9$, $p = .009$; level of attention decreased significantly more for SWL than for NW over the holidays (see Table 1). Despite greater attention to weight and eating and to stimulus control behaviors, SWL reported greater difficulty in controlling their weight both before the holidays ($M = 2.6$, $SD = 1.2$, vs. $M = 1.6$, $SD = 0.9$) and during the holidays ($M = 3.1$, $SD = 1.3$, vs. $M = 2.1$, $SD = 1.0$), $F(1, 254) = 33.4$, $p = .0001$. Notably, although SWL reported greater difficulty in controlling their weight at both the pre- and postholiday assessments, their ratings were in the moderately (and not extremely) difficult range at both time points.

On the Eating Inventory items, more SWL than NW reported dietary restraint both prior to the holidays (35.4% vs. 15.8%), $\chi^2(2, N = 279) = 24.6$, $p = .0001$, and during the holidays (38.9% vs. 23.3%), $\chi^2(2, N = 254) = 22.4$, $p = .0001$. However, no significant differences in disinhibition were observed.

SWL reported significantly greater weekly consumption of breakfast both before the holidays ($M = 6.4$ vs. $M = 5.6$ days/week) and during the holidays ($M = 6.4$ vs. $M = 5.7$ days/week), group main effect, $F(1, 254) = 7.8$, $p = .006$. SWL maintained their frequency of lunch consumption ($M = 6.3$ days/week), whereas NW marginally decreased this frequency over the holidays (from $M = 6.2$ to $M = 5.9$ days/week); Group × Time, $F(1, 254) = 4.7$, $p = .03$. There were no significant group differences in preholiday frequency or changes (pre- to postholiday) in consumption of dinner, snacks, or desserts (data not shown). The majority of SWL and only a third of NW avoided all fast food before the holidays (53.9% vs. 32.3%), $\chi^2(3, N = 279) = 13.4$, $p = .004$, and after the holidays (50.3% vs. 35.6%), $\chi^2(3, N = 254) = 5.9$, $p = .11$. Changes in this behavior over the holidays were not significant.

Weight Changes

In repeated-measures analyses (both adjusted and unadjusted for baseline BMI), no significant group differences in weight changes were observed (see Table 2). However, Box's test showed that there was significantly greater variability in weight changes in SWL compared with NW, $F(6, 164224) = 34.2$, $p = .0001$.

Differences in the variability of weight change were apparent in categorical analyses of the proportion of individuals in each group who had experienced weight losses (<1 kg), weight gains (>1 kg), or weight stability (±1 kg). As illustrated in Figure 1, over the holidays, more SWL than NW gained weight (38.9% vs. 16.7%) and fewer remained weight stable (±1 kg; 51.2 % vs. 74.4%), $\chi^2(2, N = 256) = 14.8$, $p = .001$. A similar pattern emerged when we examined categories of weight change overall, from preholiday to the 1-month follow-up; 28.3% of SWL gained weight compared with 10.6% of NW, and 59.6% of SWL remained weight stable compared with 81.2% of NW, $\chi^2(2, N = 251) = 12.6$, $p = .002$ (see Figure 2).

We also examined recovery from weight gain, defined as a return to preholiday weight (±1 kg) or below at the 1-month follow-up (in participants available for the 1-month follow-up). Among those who gained weight, there were statistically significant differences in magnitude of weight gain in those SWL ($n = 62$) and NW ($n = 12$) who gained >1 kg ($M = 2.3$ kg, $SD = 1.1$, vs. $M = 1.6$ kg, $SD = 0.4$, respectively), $t(74) = 2.5$, $p = .01$. Moreover, logistic regression analyses that adjusted for holiday weight gain indicated that the odds of recovery were 10.6 times greater in NW than in SWL ($B = 2.4$, $SE\ B = 1.1$, confidence interval = 1.2–90.2, $p = .04$). Of the 62 SWL who gained weight during the holidays, only 27 (43.5%) recovered, whereas of the 12 NW who gained weight over the holidays, 11 (91.7%) recovered. Due to small sample sizes and limited power, these analyses should be interpreted with caution.

Variables Associated With Weight Regain in SWL

Given the variability in holiday weight gain among SWL, we also examined predictors and correlates of pre- to postholiday weight changes in this group using sequential multiple regression analysis. Preholiday BMI was entered first; preholiday behavioral variables (i.e., physical activity, EBI subscales), meal frequency variables, and psychosocial variables (i.e., restraint, disinhibition, and weight control difficulty) were entered as the second step; and changes in these variables from pre- to postholiday were entered as the third step. At the first step (BMI), the multiple R was .26, $F_{change}(1, 159) = 11.4$, $p = .001$; adding the baseline (preholiday) variables did not significantly increase the multiple R ($R = .38$), $F_{change}(11, 148) = 1.2$, $p = .26$. However, adding pre- to postholi- day changes significantly improved the model (overall multiple $R = .60$), $F(11, 137) = 4.1$, $p = .0001$. Specifically, decreases in attention to weight and eating ($B = -.12$, $\beta = -.25$), $t(160) = -2.9$, $p = .005$, and increases in perceived difficulty in controlling weight ($B = .61$, $\beta = .38$), $t(160) = 4.4$, $p = .0001$, were related to greater weight gain.

Discussion

This study found that, compared with individuals with no history of obesity, even individuals who had clearly succeeded at losing weight and keeping it off for a long period of time (35 kg for 6 years) practiced more extreme weight control behaviors to manage their weight over the holidays. Before the holidays, SWL made more specific preholiday plans to control their eating and exercise and reported greater practice of stimulus control techniques, dietary restraint, breakfast eating, and exercise. They also reported greater difficulty in controlling their weight, although their perceived level of difficulty was moderate and not

extreme. Compared with NW, SWL reported greater overall attention to weight and eating. Moreover, during the holidays, SWL maintained nearly all of their more extreme weight-controlling behaviors; however, their attention to weight and eating decreased significantly more than was true for NW.

Despite their greater efforts, SWL appeared more vulnerable than did NW to weight gain over this high-risk period. Holiday weight gains were relatively minor in both SWL and NW (0.7 and 0.2 kg, respectively), but the weight changes of SWL were significantly more variable. During the holidays, more SWL than NW gained weight above baseline, and this effect persisted at the 1-month follow-up. Moreover, SWL who gained weight over the holidays were far less likely to lose the weight over the next month (and to return to their preholiday weight) than were NW. Previous research in a general population has found that weight gained over the winter holidays was not lost during the rest of the year (Yanovski et al., 2000). Thus, a significant minority of SWL may remain vulnerable to continued relapse after the holiday season.

These findings are consistent with self-regulation theory. Successful self-regulation involves monitoring one's behavior in relation to a goal or standard and changing or maintaining the behavior to maintain a desired effect (Kanfer, 1975). A significant cause of self-regulation failure is disengagement from self-monitoring (Baumeister, Heatherton, & Tice, 1994; Kirschen-baum, 1987; Marlatt & Gordon, 1985). Self-monitoring of eating, exercise, and weight is critical for weight control (K. N. Boutelle & Kirschenbaum, 1998; Wadden & Foster, 2000; Wing, Tate, Gorin, Raynor, & Fava, 2006). Self-monitoring increases awareness of behaviors and allows the individual to catch "lapses" in weight quickly and to adjust behaviors accordingly to prevent larger weight "relapses" (Kirschenbaum, 2005; Marlatt & Gordon, 1985). Studies have shown that promotion of increased awareness of eating through self-monitoring during the holidays can promote better weight control during this high-risk period (K. Boutelle, Baker, Kirschenbaum, & Mitchell, 1999). Moreover, in a randomized controlled trial of recent weight losers, a self-regulation intervention that promoted self-weighing and self-monitoring (to inform changes in eating and exercise) was shown to significantly reduce the risk of weight regain (Wing et al., 2006). In the current study, SWL reported a high level of attention to eating and weight. However, decreases in attention to eating and weight over the holidays were related to greater weight regain; this reduction in awareness may have left some SWL vulnerable to weight regain and less able to recover. These findings underscore the need for individuals to engage in consistent self-monitoring if they are to remain successful at weight control during challenging high-risk periods, such as the holidays.

Self-regulation theory also posits that people will be less effective at self-regulation when they confront circumstances that are unusually demanding and that deplete resources they need to perform necessary behaviors (Baumeister et al., 1994). The holiday season poses significant challenges to weight control and eating regulation. It is a time when high-calorie foods and sedentary activities abound. This study and prior research (Yanovski et al., 2000) suggests that those who can maintain weight control behaviors, such as a high level of physical activity, are the least likely to gain weight over the holidays. However, maintaining such behaviors in the face of competing demands requires significant effort. Many SWL in

this study were able to exert the effort required for weight control. However, for a significant subset of SWL, the demands of the holiday season may have overpowered resources typically reserved for weight control and may thereby have led to greater perceived difficulty in control of their weight and weight regain.

Clinical implications of these findings include having practitioners advise patients to pay attention to and monitor their eating, weight, and physical activity over the holidays. Use of preplanning and greater practice of stimulus control procedures, eating breakfast, and exercise, as well as high dietary restraint, may help offset the risk of weight regain. Practitioners may also need to help reduced-obese patients understand that, for them, compared with their normal weight peers, a higher degree of effort is required to manage their weight in the long term (Phelan, Roberts, Lang, & Wing, 2007). Identification of ways to preserve the effort needed to accomplish these behaviors during challenging times (e.g., by reducing competing demands during the holiday season) merits further investigation. Application of this study's methodology to examine self-regulation failure with other behaviors, such as smoking and alcohol consumption, may also be useful.

This study was the first to systematically compare the behaviors of SWL to those of NW over the holidays. The winter holiday season provides a unique setting for studying self-regulation disruption. The study was limited, however, by lack of measurement of dietary intake and use of some single-item measures, which were designed to reduce participant burden. Because the preholi-day assessment occurred in early November, it may not have captured preholiday conditions, as some patients reported that the holidays began during Halloween. Moreover, the generalizability of the study may be limited, as it used a self-selected sample and some participants chose not to identify a "matched" normal weight peer.

In sum, findings from this study suggest that SWL work hard to manage their weight both before and during the winter holiday season. Despite their efforts, they continue to report difficulties in managing their weight and monitoring their food intake and appear vulnerable to weight gain during this high-risk time. Their greater efforts, however, may ultimately serve to buffer against larger weight relapses and may allow most SWL to succeed at keeping weight off in the long term.

References

Amatruda JM, Statt MC, Weile SL. Total and resting energy expectancy in obese women reduced to ideal body weight. American Society for Clinical Investigation. 1993; 92:1236–1242.

Andersson I, Rossner S. The Christmas factor in obesity therapy. International Journal of Obesity and Related Metabolic Disorders. 1992; 16:1013–1015. [PubMed: 1335971]

Baskin M, Ard J, Franklin F, Allison D. Prevalence of obesity in the United States. Obesity Reviews. 2005; 6(1):5–7. [PubMed: 15655032]

Baumeister, RF.; Heatherton, TF.; Tice, DM. Losing control: How and why people fail at self-regulation. San Diego: Academic Press; 1994.

Boutelle K, Baker R, Kirschenbaum D, Mitchell M. How can obese weight controllers minimize weight gain during the high risk holiday season? By self-monitoring very consistently. Health Psychology. 1999; 18:364–368. [PubMed: 10431937]

Boutelle KN, Kirschenbaum DS. Further support for consistent self-monitoring as a vital component of successful weight control. Obesity Research. 1998; 6(3):219–224. [PubMed: 9618126]

Hill JO, Wyatt HR, Melanson EL. Genetic and environmental contributions to obesity. Medical Clinics of North America. 2000; 84(2):333–346. [PubMed: 10793645]

Kanfer, FH. Self-management methods. In: Kanfer, FH.; Goldstein, AP., editors. Helping people change. New York: Pergamon Press; 1975. p. 309-356.

Kirschenbaum DS. Self-regulatory failure: A review with clinical implications. Clinical Psychology Review. 1987; 7(1):77–104.

Kirschenbaum, DS. The healthy obsession program: Smart weight loss instead of low carb lunacy. Dallas, TX: Benbella Books; 2005.

Klem ML, Wing RR, McGuire MT, Seagle HM, Hill JO. A descriptive study of individuals successful at long-term maintenance of substantial weight loss. American Journal of Clinical Nutrition. 1997; 66:239–246. [PubMed: 9250100]

Leibel RL, Hirsch J. Diminished energy requirements in reduced obese patients. Metabolism: Clinical and Experimental. 1984; 33:164–170. [PubMed: 6694559]

Marlatt, GA.; Gordon, JR. Relapse prevention: Maintenance strategies in addictive behavior change. New York: Guilford; 1985.

McGuire MT, Wing RR, Klem ML, Lang W, Hill JO. What predicts weight regain among a group of successful weight losers? Journal of Consulting and Clinical Psychology. 1999; 67:177–185. [PubMed: 10224727]

McPherson JM, Smith-Lovin L. Homophily in voluntary organizations: Status distance and the composition of face-to-face groups. American Sociological Review. 1987; 52:370–379.

O'Neil PM, Currey HS, Hirsch AA, Malcolm RJ, Sexauer JD, Riddle FE, et al. Development and validation of the Eating Behavior Inventory. Journal of Behavioral Assessments. 1979; 1:123–132.

Paffenbarger RS, Wing AL, Hyde RT. Physical activity as an index of heart attack risk in college alumni. American Journal of Epidemiology. 1978; 108:161–175. [PubMed: 707484]

Phelan S, Roberts M, Lang W, Wing RR. Empirical evaluation of physical activity recommendations for weight control in women. Medicine & Science in Sports & Exercise. 2007; 39(10):1832–1836. [PubMed: 17909412]

Phelan, S.; Wing, RR. Factor analysis of Eating Inventory in obese individuals. 2003. Unpublished raw data

Siconolfi SF, Lasater TM, Snow RCK, Carleton RA. Self-reported physical activity compared with maximal oxygen uptake. American Journal of Epidemiology. 1985; 122:101–105. [PubMed: 4014188]

Stunkard AJ, Messick S. The Three-Factor Eating Questionnaire to measure dietary restraint, disinhibition and hunger. Journal of Psychosomatic Research. 1985; 29:71– 83. [PubMed: 3981480]

Stunkard AJ, Waxman M. Accuracy of self-reports of food intake: A review of the literature and a report of a small series. Journal of the American Dietetic Association. 1981; 79:547–551. [PubMed: 7026651]

Wadden TA, Foster GD. Behavioral treatment of obesity. Medical Clinics of North America. 2000; 84(2):441– 462. [PubMed: 10793651]

Washburn RA, Smith KW, Goldfield SRW, McKinlay JB. Reliability and physiologic correlates of the Harvard alumni activity survey in the general population. Journal of Clinical Epidemiology. 1991; 44:1319–1326. [PubMed: 1753263]

Wing RR, Tate DF, Gorin A, Raynor HA, Fava JL. A self-regulation program for maintenance of weight loss. New England Journal of Medicine. 2006; 346:393– 403.

Wyatt HR, Grunwald GK, Seagle HM, Klem ML, McGuire MT, Wing RR, et al. Resting energy expenditure in reduced-obese subjects in the National Weight Control Registry. American Journal of Clinical Nutrition. 1999; 69:1189–1193. [PubMed: 10357738]

Yanovski JA, Yanovski SZ, Sovik KN, Nguyen TT, O'Neil PM, Sebring NG. A prospective study of holiday weight gain. New England Journal of Medicine. 2000; 342(12):861– 867. [PubMed: 10727591]

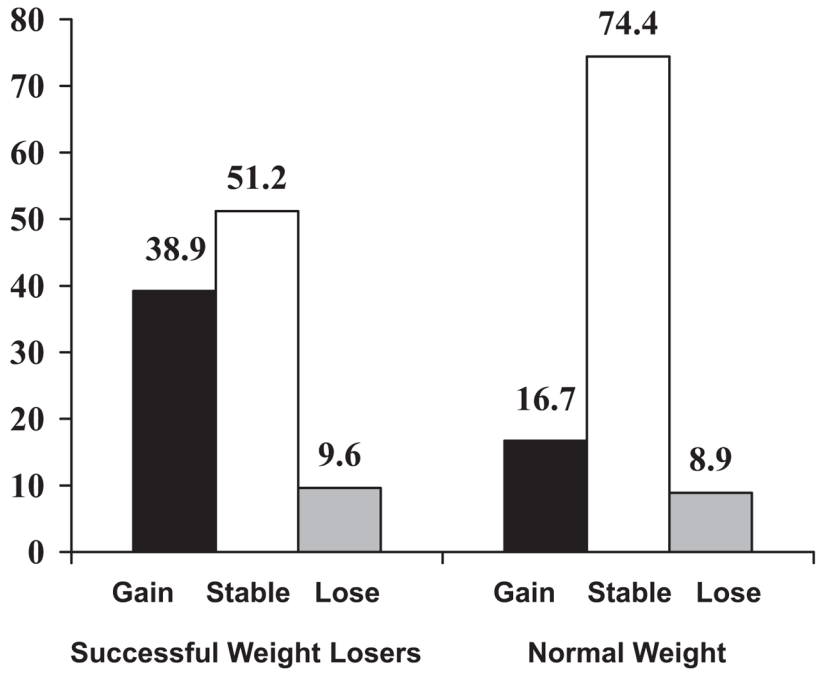

Figure 1.

Proportion of successful weight losers (SWL) and normal weight individuals (NW) who gained weight (>1 kg), lost weight (>1 kg), or remained weight stable between preholiday and postholiday assessments (i.e., November to January). *N*s for each category were as follows: Gain, SWL = 65, NW = 15; Stable, SWL = 85, NW = 67; Lose, SWL = 16, NW = 8; $\chi^2(2, N = 256) = 14.8$, $p = .001$.

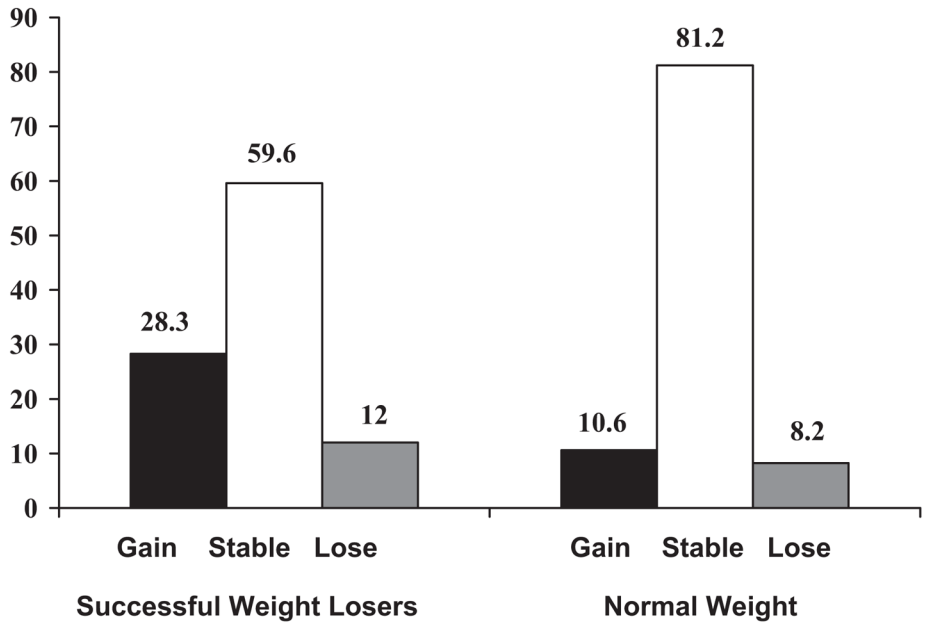

Figure 2.

Proportion of successful weight losers (SWL) and normal weight individuals (NW) who gained weight (>1 kg), lost weight (>1 kg), or remained weight stable between the preholiday assessment and 1-month follow-up (i.e., November to February). *N*s for each category were as follows: Gain, SWL = 47, NW = 9; Stable, SWL = 99, NW = 69; Lose, SWL = 20, NW = 7; $\chi^2(2, N = 251) = 12.6$, $p = .002$.

Table 1

Weight Control Behaviors Preholiday and Postholiday in Successful Weight Losers (SWL) and Normal Weight Individuals (NW)

Variable	Assessment	SWL (*n* = 167)	NW (*n* = 90)	Group	Time	Group = Time
Exercise (Kcal/wk)	Pre	3,075 ± 2,687	1,730 ± 1,772	*F* = 48.1, *p* < .0001*	*F* = .19, *p* = .66	*F* =.64, *p* = .42
	Post	2,701 ± 2,924	1,545 ± 1,857			
EBI (total)	Pre	89.5 3 10.8	80.2 ± 11.0	*F* = 40.6, *p* < .0001*	*F* = 1.2, *p* = .28	*F* = .03, *p* = .83
	Post	86.3 ± 11.4	77.9 ± 11.7			
EBI: Stimulus Control	Pre	17.25 ± 4.479	15.25 ± 4.801	*F* = 13.6, *p* < .0001*	*F* = .33, *p* = .56	*F* = 2.8, *p* = .09
Techniques	Post	17.07 ± 4.273	14.53 ± 4.883			
EBI: Control of Eating	Pre	27.1 ± 3.9	28.5 ± 4.1	*F* = 4.2, *p* =.04	*F* = .61, *p* = .41	*F* = .05, *p* = .78
	Post	27.0 ± 4.2	28.2 ± 4.4			
EBI: General Attention to	Pre	21.8 ± 5.6	13.2 ± 4.5	*F* = 138.9, *p* < .0001*	*F* = .01, *p* = .90	*F* = 6.9, *p* = .009*
Weight and Eating Patterns	Post	19.6 ± 5.5	12.3 ± 4.2			
EBI: Ability to Stop Eating	Pre	4.5 ± 2.2	5.1 ± 2.4	*F* = 1.8, *p* = .18	*F* = .69, *p* = .41	*F* = .66, *p* = .41
	Post	4.5 ± 2.2	5.1 ± 2.4			

Note. Analyses were conducted adjusting for BMI; however, unadjusted values are displayed for ease in interpretation. Values for SWL and NW are *M* + *SD*. The preholiday assessment (pre) was conducted in early November; the postholiday assessment (post) was conducted in early January. For all analyses, BMI was entered as a covariate and *df*s = 1, 254. EBI= Eating Behavior Inventory.

*Significant *p* value (Bonferroni *p* < .008).

Table 2

Weight Changes (Kg) in Successful Weight Losers (SWL) and Normal Weight Individuals (NW)

Assessment period	SWL (*n* = 167)	NW (*n* = 90)
Preholiday to postholiday	+0.7 ± 1.8	+0.2 ± 1.0
Postholiday to 1-month follow-up	−0.3 ± 1.5	−0.1 ± 1.1
Preholiday to 1-month follow-up	+0.4 ± 1.6	+0.2 ± 1.0

Note. The preholiday, postholiday, and 1-month follow-up assessments took place in early November, early January, and early February, respectively. Values for SWL and NW are *M* + *SD*. Multivariate analysis of variance for repeated measures (with and without adjustment for preholi-day body mass index) indicated no significant differences in weight changes over time (using preholiday, postholiday, and 1-month follow-up assessment points).