

Relationship between Semi-Starvation Symptoms, Self-Efficacy, and Weight Loss

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ABSTRACT

The purpose of this study was to explore whether overweight college dieters, engaged in self-structured weight loss efforts, experienced physical symptomatology that has previously been associated with severe caloric restriction. The relationships between physical symptomatology, self-efficacy, and future dieting behavior were also investigated. Forty college students (21 female, $M_{\text{age}} = 19.58$ years, $SD = 1.85$) self-reported caloric intake and completed self-efficacy measures and physical symptom reports for three weeks. Results indicated that weekly physical symptom reports were not associated with caloric deficit and did not predict future dieting behavior. Physical symptoms were negatively related to self-efficacy for dieting and exercise as predicted, but in several analyses, higher self-efficacy actually predicted less calorie restriction. Physical symptom reports were predicted by trait neuroticism and neuroticism was also significantly and negatively associated with eating and exercise self-efficacy. Results raised issues about the accuracy of caloric restriction reporting and suggested that personality characteristics may have an important impact on an individual's perception of dieting experiences and levels of self-efficacy during dieting.

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INTRODUCTION

Several authors have noted that weight loss treatments often do not produce large and permanent weight reductions either in the short term or in the long term (Blaine, Rodman, & Newman, 2007; Jeffery, Kelly, Rothman, Sherwood, & Boutelle, 2004; Rothblum, 1999). Understanding the various reasons why people have trouble maintaining caloric restriction is important to developing further insight into the weight loss process. Exploring the factors that impede people from achieving their weight loss goals can also provide important information to researchers engaged in behavioral health initiatives.

Rothman, Baldwin, & Hertel (2004) propose that four distinct phases exist in the behavior change process: initial response, continued response, maintenance, and habit. Behavioral initiation is often based on a person's favorable expectancies regarding the future outcomes of their new behavior. In initiating a new behavior, the individual believes that the potential benefits afforded by the new pattern of behavior will be superior to the outcomes that they are currently experiencing. An initial response occurs as soon as someone begins an effort to change his or her behavior. After an individual has reliably performed the desired behavior and their behavior is not due to chance, the person has initiated the behavior and can move into the continued response phase. Continued response is the phase of behavior change where an individual has initiated the change and now struggles with continuation of the change. During this time, a struggle exists between one's ability and motivation to consistently change his or her behavior and the obstacles and unpleasant experiences that leave one susceptible to lapses and relapses (Rothman et al., 2004). Individuals are working to gain mastery over their behavior change during this time and their attention shifts from expectations regarding the behavior change to their experiences with it. If people find that the new behavior is unpleasant or necessitates a large amount of mental and/or physical energy, their commitment to and/or confidence in their ability to change their behavior may dwindle.

Not much is known about the experiential process people undergo as they are losing weight (Rothman et al., 2004). It is important to understand factors which make it

harder for people to engage in continued response and which may make the weight loss experience unpleasant. Depending upon the degree of caloric restriction, dieting may be similar to semi-starvation and produce physical symptomatology that is a potential barrier. Severe caloric restriction, or semi-starvation, is conceptualized as a 40% or larger reduction in caloric intake, compared to the recommended caloric intake to maintain ones current weight. A limited amount of data has been collected on people engaged in semi-starvation and the issue of whether or not average dieters engaged in normal levels of caloric restriction experience similar physical symptoms has not been well studied in the mainstream weight loss population. This is an area where further investigation is clearly warranted. Johnstone (2007) noted that how people feel during the weight loss process is important because it may be an indicator of whether or not they continue to engage in weight loss behaviors. Furthermore, it is important to understand whether or not experiencing symptoms associated with semi-starvation has a detrimental effect on an individual's weight loss and exercise self-efficacy.

Keys, Brozek, Henschel, Mickelson, & Taylor (1950) conducted a landmark study where 32 healthy men voluntarily participated in 24 weeks of semi-starvation. During semi-starvation, the participants in the Minnesota Experiment ate about 38% of the number of calories they were consuming before the experiment began (Hagan, Tomaka, & Moss, 2000). Each month, the men were given a Complaint Inventory, which inquired about specific symptoms they may be experiencing. These men indicated that they experienced an array of symptoms which included an increase in tiredness, irritability, muscle soreness, apathy, appetite (desire for food) and dizziness, compared to baseline levels. They also experienced a decrease in the ability to concentrate and decreased ambition. The authors noted several symptoms that were not measured in the Complaint Inventory which the participants exhibited. Specifically, these were weakness and lack of energy, general slowing down, sensitivity to cold, and concern with thoughts about food (Keys et al., 1950). On the 50 question Complaint Inventory, the average number of undesirable responses per man increased from 6.6 during the control period to 20.5 at the end of the semi-starvation period. By the end of the semi-starvation period 97% of the subjects tired quickly, 81% felt weak all over, and 66% found it hard to keep themselves focused on whatever task they were engaged in. Although this study lacked a normal

eating control group, the magnitude of change in physical symptoms suggests these participants clearly experienced symptomatology which, if experienced by normal dieters, would deter someone from continuing with their weight loss efforts.

Hagan, Tomaka, & Moss (2000) investigated whether conventional dieting practices of highschool and college aged students were associated with the symptoms of semi-starvation derived from the Minnesota experiment. They measured restraint history, which was conceptualized as the degree of past weight gain, weight loss, and weight fluctuation. Restraint concern, which is the degree of attention, attitudes, and feelings associated with eating, was also measured. College students high in restraint history reported significantly more affect symptoms, including depression, concern for health, lower self-esteem, and increased social withdrawal. College students high in restraint concern reported a greater incidence of depression, moodiness, and generalized apprehension. High school students with a high restraint history reported significantly more hunger pain, blank spells, and lower self-esteem. High school students with high restraint concern also reported decreased self-esteem. This study suggests that individuals engaged in normal caloric restraint do experience some symptoms associated with their restraint. But, this study has important limitations. This study was completed retrospectively and the restraint scales are very imprecise measures of dieting. They do not measure the level of caloric restriction an individual is engaged in and there is no way to know how the symptoms measured by the Complaint Inventory compare to a continuum of caloric restriction. Furthermore, the questionnaire asks how many pounds an individual has lost in a month, gained in a week, and how many pounds his or her weight fluctuates during a typical week. If people answering this questionnaire do not often weigh themselves, this would be an inaccurate assessment of restraint history.

Johnstone (2007) laments the paucity of fatigue research on obese subjects who are undergoing weight loss. She examined hunger and fatigue responses in obese participants who engaged in fasting, a very-low-calorie diet (VLCD), or a low-calorie diet (LCD). Hunger was measured with an hourly questionnaire every day in which participants were engaged in the study. She found that hunger was significantly elevated within the fasting and VLCD groups, but not within the LCD group. Fatigue was also measured with an hourly questionnaire each day participants were engaged in the study.

Results indicated that there was a significant increase in fatigue for the fasting group. Participants in the VLCD group experienced increased fatigue during the initial 5% weight loss period, but these increases were not experienced during the 10% weight loss period. Fatigue was unchanged in the LCD group. These data seem to indicate that the faster the rate of weight loss, the greater the impact on participants perceptions of fatigue and hunger. The sample size was small and consisted of 6 men per group. Despite the fact that this data suggests that people who are engaged in a LCD approach do not experience significant hunger or fatigue symptoms, it is unclear whether or not this would remain true for non-obese individuals. We do not know the extent to which people who are simply overweight, or who are dieting on their own, restrict their intake. The question of whether or not they would experience hunger and fatigue symptomatology remains. Furthermore, the samples sizes were small enough to warrant further investigation of this topic.

It is important to note that severe caloric restriction is an unhealthy and ineffective long term method of weight loss. Research has indicated that individuals treated with VLCD's regain 35-50% of the weight lost within a year of treatment, even after receiving lifestyle modification education. Furthermore, a meta-analysis of six randomized controlled trials found that weight loss attained with VLCD's was not significantly different from weight loss attained with a 1,000-1,500 kcal/day diet over the course of a year or more (Wadden & Berkowitz, 2002). VLCD's necessitate physician supervision and put individuals at risk for medical side effects and complications (Tsai & Wadden, 2006). Currently, weight loss programs emphasize slight to moderate caloric reductions (roughly 300 – 500 kcal daily) and an increase in physical activity. While severe caloric restriction is not recommended as a weight loss strategy, it important to discern whether people who are engaged in slight to moderate caloric restriction perceive themselves to experience some of the physical symptomatology associated with severe caloric restriction.

If people are experiencing physical symptomatology associated with semi-starvation when engaging in the weight loss process, this has the potential to affect their level of self-efficacy. Self-efficacy is defined by Bandura (1997) as an individual's judgment regarding his or her ability to perform certain behaviors. Perceived self-efficacy

is domain specific and it is also considered an important determinant of performance, which may be relatively independent of one's true underlying skill performing a behavior (Warziski, Serelka, Styn, Music, & Burke, 2008). When people have higher levels of perceived self-efficacy, they are more likely to continue performing a behavior until they have achieved success (Bandura, 1982). Sources of self-efficacy include actual performance of a task, witnessing others comparable to oneself perform the task, verbal persuasion from others that one has the ability to perform a task, and physiological cues related to task performance (Bandura, 1997).

Bandura (1997) explains that people use somatic information conveyed by physiological states as a component of their self-efficacy judgments. Physiological activation in taxing situations may be regarded as a sign of vulnerability to dysfunction and somatic cues are especially relevant when considering efficacy related to physical accomplishments and health functioning. "In activities involving strength and stamina, people read their fatigue, windedness, aches, and pains as indicators of physical inefficacy" (p. 106) and individuals with low self-efficacy are more likely to have a heightened sensitivity to bodily arousal in areas where they distrust their coping capabilities. Furthermore, it is not only the intensity of the physical response that is important, but also how that experience is perceived and interpreted. The same bodily sensations can be perceived as positive or negative depending on the construal bias of the individual. Evaluations of self-efficacy are based on perceived autonomic reactions, as opposed to actual autonomic activation. If individuals experience physical discomfort related to the weight loss process which they perceive as negative, this may be regarded as a barrier to weight loss, and as a physiological cue that decreases self-efficacy.

Physical discomfort associated with engaging in weight loss clearly has the potential to fit into social cognitive theory. Because this is an area of research that has not received much attention, it is important to determine whether or not people experience physical discomfort during weight loss, and whether or not this discomfort is associated with an individual's perceived weight loss or exercise self-efficacy. If perceived self-efficacy is affected, an individual's weight loss efforts may suffer.

In several recent studies, higher weight loss self-efficacy has been associated with greater weight loss (Linde, Rothman, Baldwin, & Jeffery, 2006; Palmeira et al., 2007;

Roach et al., 2003; Warziski et al., 2008). Palmeira et al. (2007) tested variables within Social Cognitive Theory (SCT), the Theory of Planned Behavior, the Transtheoretical Model, and Self-Determination Theory, and found that changes in self-efficacy explained 20.5% of the weight change variance in the SCT model. They concluded that change in weight management self-efficacy was the single best correlate of weight reduction and that weight management models had greater predictive power than exercise-related models.

These recent self-efficacy studies have also revealed a potential downward trend in weight loss self-efficacy over time and no specific explanation has been proposed for why this may occur. Studies by both Linde et al. (2006) and Warziski et al. (2008) found that participants' self-efficacy decreased over time. Specifically Linde et al. (2006) found that during active treatment, increased weight loss and exercise self-efficacy predicted greater engagement in a range of weight loss related behaviors. After active treatment, both weight loss and exercise self-efficacy decreased and was no longer predictive of behavior at the 6 month follow-up. Warziski et al. (2008) encountered a similar situation. Participant's self-efficacy changes mirrored their weight changes and both self-efficacy and weight loss began to decline from 6 to 12 months. After active treatment ended, weight loss self-efficacy decreased significantly and significant weight regain occurred. It appears that following active treatment, people have an especially hard time maintaining increased levels of self-efficacy. The reason why this occurs is unknown and the question remains whether or not people perceive that they are experiencing negative physical symptoms during weight loss which then impacts their weight loss self-efficacy. Furthermore, because exercise is an important part of weight loss, it is also necessary to determine whether or not the symptoms associated with semi-starvation impact exercise self-efficacy.

The aim of this study is to examine whether college students engaged in their own self-structured weight loss regimen perceive that they experience physical symptoms associated with semi-starvation; and, if so, the frequency with which the symptoms are experienced. Furthermore, it is important to examine whether experiencing these physical symptoms is related to weight loss or exercise self-efficacy and persistence in dieting behavior. The strength of this inquiry lies in the fact that the participants will be of

different weights, engaged in different levels of caloric restriction, and using their own self-selected methods of weight loss. This should be applicable to what people experience when they are trying to lose weight without any group support or personally tailored intervention strategies. Additionally, it may be apparent if there is a certain level of caloric restriction at which people begin to notice physical symptoms as part of the weight loss experience.

Based on the reviewed literature, it is hypothesized that greater levels of caloric deficit will lead to increased occurrence of physical symptoms. Furthermore, it is predicted that increased experience of physical symptoms will lead to decreased eating and exercise self-efficacy, which will ultimately lead to less success in maintaining caloric deficits (See Figure 1).

Method

Participants

The sample consisted of 40 (21 female) student participants who were recruited from psychology classes at Virginia Polytechnic and State University. The mean age of the sample was 19.58 years ($SD= 1.85$) and the racial distribution was 87.5% Caucasian, 2.5% African American, 5% Hispanic, and 5% Asian or Pacific Islander. To be eligible for the study, participants needed to be at least 18 years of age with a body mass index (BMI) of 25 or higher. Participants needed to have daily access to the internet and the ability to come in to the lab at the beginning and end of the study. Participants were required to be currently dieting, or have the intention to start a diet, to be eligible for participation in the study. Specifically, participants who were already dieting must have initiated the diet within the past month to be eligible for study involvement and their dieting strategy needed to include caloric restriction. Participants who were interested in beginning a diet and participating in the study had to be willing to begin the diet within the next five days and plan on restricting caloric intake as a part of their weight loss strategy.

Procedures

Students were recruited from psychology classes via the SONA internet-based software. A description of the study and eligibility requirements was posted on the SONA system and interested students were able to sign up for an individual screening and

baseline assessment session. Brief presentations to various psychology classes were also used to attract students to the study. Prospective participants were told that the study was designed for people who were going to begin a diet or who had recently started a diet. It was explained that participation requirements included tracking of time spent exercising each day for three weeks, tracking of food intake four days a week for three weeks, answering questionnaires about dieting experiences once a week for three weeks, completing the baseline assessment, and attending a final meeting to measure the amount of weight that was lost. Participants from psychology classes received 10 credits for full participation in the study.

Individuals who did not qualify for the study due to BMI did not receive any credits for attending the 15 minute screening procedure. This was due to the explicit information given on SONA about how to check whether a person would meet the BMI requirements. Individuals who attended the screening and were ineligible for any other reason received one credit point. Two credit points were awarded for individuals who completed the screening and baseline procedures. Eight credit points were awarded for the tracking of food intake and exercise and attendance at a final weight assessment meeting. Participants were told that the purpose of the project was to learn more about participant's weight loss experiences and how these experiences relate to dieting success or non-success.

Baseline Meeting. Participants signed up on for the experiment on the Sona Experiment Management System run by the Department of Psychology. Each individual registered for a time slot where they came into the lab and completed the screening and baseline procedures. When participants entered the lab they were given a consent form to review (see Appendix A) and given the chance to ask questions about what was involved in study participation. If they consented to participate, participants were given an unsigned copy of the consent form to keep. They were then assessed to determine whether or not they met the study eligibility requirements. Participants' height, weight, age, BMI, dieting status, and access to a computer were assessed. BMI was calculated based on height and weight using a BMI calculator from an online website run by the Department of Health and Human Services (<http://www.nhlbisupport.com/bmi/>). Eligible participants were then assigned a participant identification number (PID) by the assessor,

which was used to track their data. The PID was kept separate from any identifying personal information. Next, participants completed several baseline questionnaires in the lab. They filled out a demographic information sheet, two self-efficacy questionnaires, a personality inventory questionnaire, a physical symptoms questionnaire, and an eating attitudes questionnaire.

After questionnaire completion, each participant was given a food scale and food diary worksheets to aid with the accuracy of caloric intake tracking. Each participant was given a demonstration of how to weigh and measure several different types of foods using the food scale and how to read caloric information on food labels. The assessor showed the participant how to record each food example on a sample food diary. Next, participants were given a demonstration of how to enter their food intake and exercise information into the online website FitDay (www.fitday.com). Participants were strongly encouraged to track their food intake on paper throughout the day and transfer this information into the FitDay website in the evening. The assessor explained to the participant that the website estimated the number of calories they needed each day to maintain their current weight based on their age, weight, height, and duration of activity completed for the day. Participants were shown how to access this information and advised that they would likely need to have an intake level that was somewhere below this value to experience weight loss. Participants were then shown how to use the Journal tab.

The Journal tab option in FitDay had two uses for participants, which was explained at this time. The Journal tab was used as a way for participants to indicate to the assessor that they had completed their tracking entries for the day. Participants were asked to type the word “Complete” in the blank box underneath this tab at the end of entering their information each day. It was also explained to participants that if they had trouble entering in a particular food item or day of exercise, they should enter in as much information as possible about the food they ate or exercise they did into this tab. The assessor checked this tab daily to check for any entry problems that participants were having.

Participants were then given a worksheet which summarized the days that they were responsible to track food and exercise and the dates of their online assessments. The

worksheet also included detailed instructions about how to enter information into the FitDay system in case participants had trouble remembering how to complete any aspects of the tracking entries. It was clearly explained that the assessor would also have access to the FitDay account and would be logging in daily to check whether or not the participant had completed the food diary and exercise tracking. It was explained to participants that if they did not log in their food or exercise one day, such as Monday, they would be e-mailed and asked to input the information the following day, Tuesday. If the information was not entered within two days, it would not be counted as valid. Finally, participants who verbally reported eating at the university dining halls were shown where to find nutritional information online for all of the dining hall food products. Participants were asked to come into the lab at the end of their three week participation for a final weight assessment.

If a participant asked about how to lose weight, they were simply told that weight loss occurs when people enter into a caloric deficit over an extended period of time and that they could use the information provided by the FitDay program to determine whether or not they had achieved a caloric deficit for each day. All individuals were also given a list of websites to refer to which discussed weight loss, exercise and dieting strategies (see Appendix B).

Weekly Follow-Up Assessments. Participants were reminded via e-mail of the date they needed complete online follow-up measures. This e-mail was sent the day before the online follow-up assessment should be completed and it included a PID identified link to the assessment. This e-mail also thanked the participants for completing their tracking over the past week. Participants were also sent a “thank-you” e-mail after completing each online assessment. Participants had two days available to complete the posted follow-up measures. Weekly follow-up measures assessed eating and exercise self-efficacy and physical symptoms over the past week.

Final Weight Assessment. A final meeting was scheduled for participants within five days of when they finished completing the final follow-up assessment. At the meeting, participants were weighed and thanked for their participation in the study.

Measures

Participants completed questionnaires at baseline and at weekly intervals over the course of 3 weeks.

Demographics, Height, Weight and BMI. Sex, age, and ethnicity were assessed by questionnaire at baseline. Height was assessed at baseline using a wall-mounted ruler. Weight was assessed at baseline in light clothing and without shoes on a digital scale. BMI was calculated based on assessed height and weight using a BMI calculator from an online website run by the Department of Health and Human Services.

Food scale and food tracking worksheets. Each participant was given a food scale and a set of food tracking worksheets at baseline (See Appendix G). Participants were encouraged to use these to aid tracking the food they ate during the day.

BMR, Fit Day, and Caloric Restriction Computation. Participants were required to enter their time spent exercising each day of the week and their food consumption four days per week for three consecutive weeks into the FitDay program. This was an online nutritional website which kept a record of the participant's food and exercise entries. It contained nutritional information corresponding to each food entered and estimated the number of calories burned during various types of exercise. It also allowed the participants to enter their own food labels into the program. The program calculated each individual's basal metabolic rate (BMR) and adjusted this daily based on the intensity and duration of exercise completed. Exercise activities and the corresponding time and energy spent engaged in exercise were entered into the FitDay program daily.

Participants self-reported caloric intake four days per week for three consecutive weeks. The magnitude of the difference between caloric intake and caloric need was examined in two ways. For each week, the average number of calories needed over the 7 day period based on BMR and exercise completed (6 days in week 3) was computed and the average of self-reported caloric intake was computed for the 4 days of available data. Average caloric intake was subtracted from average caloric need so that increasingly positive values reflected greater caloric deficit. This calculation was referred to as the "absolute caloric deficit" variable. The difference between caloric intake and caloric need was also explored by dividing average caloric need by average caloric intake. This was done because a calorie reduction of, for example, 500 calories, represented a

proportionally larger caloric decrease for individuals who had smaller calorie needs compared to individuals with larger calorie needs. Higher values were again reflective of greater caloric restriction. This calculation was referred to as the “relative caloric deficit” variable.

Eating Self-efficacy. The Weight Efficacy Lifestyle (WEL) Scale (See Appendix C) was used as the measure of self-efficacy regarding eating behaviors. This is a 20 item questionnaire which asked participants to rate their confidence in their ability to avoid eating in certain situations on a 10-point Likert scale. Responses range from 0 (not confident) to 9 (very confident) (Clark, Abrams, Niaura, Eaton, & Rossi, 1991). The WEL consists of 5 subscales: negative emotions (“I can resist eating when I’m irritable”), availability (“I can resist eating when there are many different kinds of food available”), social pressure (“I can resist eating when I have to say no to others”), physical discomfort (“I can resist eating when I feel physically run down”), and positive activities (“I can resist eating when I am watching TV”). WEL scores can range from 0 to 180 and higher scores were indicative of higher levels of perceived eating self-efficacy. Global WEL scores were computed by totaling the responses for all of the items. Subscales scores were computed by totaling the responses for the four items within each subscale. The WEL was administered at baseline and at the end of Weeks 1, 2, and 3. Cronbach alpha coefficients for the entire scale ranged from 0.86 to 0.97. Cronbach alpha coefficients for the subscales were good overall and ranged from .85 to .92 for negative emotions, .71 to .91 for social pressure, .61 to .86 for positive activities, .51 to .88 for availability, and .67 to .92 for physical discomfort. The external validity of the WEL has been established in other weight loss studies (Clark, Cargill, Medeiros, & Pera, 1996; King, Clark, & Pera, 1996; Miller, Watkins, Sargent, & Rickert, 1999; Pinto et al., 1999; Pinto, Clark, Cruess, Szymanski, & Pera, 1999).

Exercise Self-efficacy. Exercise self-efficacy was assessed using a 21 item scale (Dwyer, Allison, & Makin, 1998) (See Appendix D) which asked participants to rate their confidence that they could perform vigorous physical activity despite internal and external barriers. Responses were given on a 5-point Likert scale ranging from 1 (not at all confident) to 5 (very confident). Global exercise self-efficacy scores were computed by totaling the responses for all of the items except the global self-efficacy question.

Subscales scores were computed by totaling the responses for the items within each subscale. Higher scores were indicative of greater exercise self-efficacy. Exercise self-efficacy were administered at baseline, and Week 1, Week 2, and Week 3. Cronbach alpha coefficients for the entire scale were excellent and ranged from 0.91 to 0.97. Cronbach alpha coefficients for the subscales were also very good and ranged from .84 to .95 for the internal barriers and external barriers subscales.

Neuroticism. The Eysenck Personality Questionnaire Revised- Short Scale (EPQR-S) (See Appendix E) was administered to participants as part of an exploratory analysis to determine whether or not neuroticism would better account for physical symptom reports than caloric intake. Previous research has indicated that trait negative affectivity (NA) is highly correlated with symptom reports and that high NA individuals consistently report physical symptoms more than low NA individuals (Pennebaker, 2000). The EPQR-S is a shortened version of the Eysenck Personality Questionnaire Revised (EPQR) (Eysenck, Eysenck, & Barrett, 1985). It consisted of 48 items which comprised three domains of personality and a lie scale: Psychoticism (P); Extraversion (E); Neuroticism (N); and Lie Scale (L). The response option for items consisted of a “yes/no” format and included questions such as “Would you call yourself tense of ‘highly-strung’?” and “Do you worry too long after an embarrassing experience?”. Based on five previous studies, the internal consistency reliability of the neuroticism domain ranges from .74 to .87 (Alexopoulos & Kalaitzidis, 2004). The test-retest reliability for the neuroticism domain has been reported to be .85 and the EPQR-S has been reported to show good concurrent validity when correlated with other scales from Eysenck and Eysenck and the NEO Personality Inventory Revised (Alexopoulos & Kalaitzidis, 2004). The entire scale was administered to participants but only the 12 items from the neuroticism scale were scored and analyzed. Higher scores on this measure are indicative of greater levels of neuroticism and the EPQR-S was administered at baseline only. The Cronbach alpha coefficient for the neuroticism subscale in the current study was .85.

Physical Symptoms Questionnaire. The physical symptoms questionnaire (See Appendix F) was administered to participants to assess what physical symptomatology the participants experienced during the previous week of dieting. This scale was created

by the investigator. Items were chosen and created based on items and item categories that were used in the Complaint Inventory in the Minnesota Experiment (Keys et al., 1950). The scale items created were also compared to symptoms of malnutrition listed on a dietary assessment questionnaire that is commonly used by nutritionists. The physical symptoms questionnaire was composed of 25 items, 11 of which were included in both the Complaint Inventory and the dietary assessment questionnaire, 13 from the Complaint Inventory only, and 1 from the dietary assessment questionnaire only. The scale used a dichotomous “Yes/No” format to inquire whether or not the participant has experienced a particular symptom, asked the number of days (out of 7) which the symptom had been experienced, and used a 3 point scale to determine if the participant was bothered by the particular symptom. The physical symptoms variable for each participant was computed weekly by summing the number of symptoms the person experienced during the previous week. The questionnaire was administered at baseline and Weeks 1, 2, and 3. The Cronbach alpha coefficients for the physical symptoms counts ranged from .83 to .86.

Results

Participants BMI ranged from 25.7 to 34.2, and of the 77.5% who had engaged in previous weight loss attempts, the mean number of previous attempts was 3.39. The mean difference between participant’s actual weight at baseline and self-reported goal weight was 21.5 pounds and the amount of weight lost at study completion ranged from -5 pounds (lbs.) to 9.6 lbs. During the three week study, 62.5% of participants lost greater than .5 lbs and 55% lost one lb. or more. Approximately one-third of participants were already dieting when they entered the study and all of these people had started their diet within the last 14 days (see Table 1).

At baseline, 62.5% of participants reported that they had been exercising on a regular basis for the past 6 months (see Table 2). Of those who reported exercising regularly, the mean number of days they reported exercising per week was 3.8 and the mean of the amount of time they reported exercising on a normal day of exercising was 56.4 minutes (SD=26.2). The majority of participants did engage in some exercise over the course of the study with 92.5%, 95%, and 82.5% doing some amount of exercise during Weeks 1, 2, and 3, respectively. The mean of average absolute caloric deficit per day of the sample for Weeks 1, 2, and 3 was 513.7, 539.0, and 522.6, respectively. The

mean of average relative deficit per day for Weeks 1, 2, and 3 was 1.37, 1.43, and 1.42, respectively (see Table 2).

Zero-order correlations were computed among relevant variables to explore the covariance of the constructs before hypothesis tests were completed (see Table 3). Neuroticism was positively and significantly correlated with the number of physical symptoms reported at baseline, and Weeks 1, 2, and 3. Neuroticism was also negatively and significantly correlated with eating and exercise self-efficacy at every time point. The number of physical symptoms reported at baseline, Week 1, and Week 3 were significantly and negatively correlated with the corresponding levels of eating and exercise self-efficacy measured at the same time points, although correlations for Week 2 did not reach significance. Eating and exercise self-efficacy were significantly and positively correlated at all time points.

There were no significant zero-order relationships between reports of physical symptoms and the caloric deficit variables at any assessment point. Eating and exercise self-efficacy were significantly and negatively correlated with the concurrent absolute and relative caloric deficit at Week 3. Eating self-efficacy prospectively predicted relative caloric deficit and exercise self-efficacy prospectively predicted absolute caloric deficit for the subsequent week when assessed at Week 2. It should be noted that the direction of these relationships was opposite to predictions, with greater eating and exercise self-efficacy predicting less caloric restriction.

Multiple regression analyses were computed to examine the relationships in the conceptual model. To test the hypothesis that greater levels of caloric deficit would lead to increased occurrence of physical symptoms, physical symptom counts measured at Weeks 1, 2, and 3, were regressed separately onto the corresponding caloric deficit values for the same weeks after controlling for neuroticism (see Table 4). Because results were nearly identical when analyses were computed using either absolute caloric deficit values or relative caloric deficit values, only the relative restriction values are displayed. The overall regression model was significant for Week 1 $F(2,37) = 6.16, p < .01$, and Week 2 $F(2,37) = 6.34, p < .01$. The model for Week 3 was not significant $F(2,37) = 2.59, p = .09$. Consistent with the zero-order correlations, and contrary to expectations, relative caloric deficit was not predictive of physical symptoms at any assessment, after

controlling for baseline neuroticism. Neuroticism remained a significant positive predictor of the number of physical symptoms reported at each assessment point.

To test the hypothesis that increased experience of physical symptoms would lead to decreased eating and exercise self-efficacy, eating and exercise self-efficacy measured at Weeks 1, 2, and 3, were regressed separately onto physical symptoms reported for the same weeks (see Table 5). The regression models for eating self-efficacy were significant at Week 1 $F(1,38) = 9.97, p < .01.$, and Week 3, $F(1,38) = 9.47, p < .01$, and approached significance at Week 2, $F(1,38) = 4.00, p = .06$. Similarly, physical symptoms were significant predictors of exercise self-efficacy at Week 1 $F(1,38) = 13.33, p < .01$, and Week 3 $F(1,38) = 4.54, p < .05$, but not at Week 2 $F(1,38) = 3.12, p = .085$. Higher physical symptoms reports were predictive of decreased levels of eating and exercise self-efficacy. Overall, the regression analyses seemed to support the hypothesis that increased experience of physical symptoms would be associated with decreased eating and exercise self-efficacy.

The hypothesis that increased physical symptoms would lead to decreased eating and exercise self-efficacy which would ultimately lead to less success in maintaining caloric deficit was tested by regressing caloric deficit at Week 2 onto physical symptoms, eating self-efficacy, and exercise self-efficacy at Week 1. This analysis was repeated by regressing caloric deficit at Week 3 onto at the same predictors at Week 2 (see Table 6). Contrary to expectations, the regression model was not significant at either Week 2 $F(3,36) = .41, p > .05$, or Week 3, $F(3,36) = 1.99, p > .05$.

Further exploratory analyses were conducted to examine relationships among the constructs. The eating self-efficacy scale (WEL) contained five subscales, negative emotions, social pressure, positive attitudes, availability, and physical discomfort. Correlations were computed to examine the bivariate relationships among physical symptom counts for each week and the five WEL subscales measured each week (see Table 7). It was expected that the physical symptoms questionnaire would show stronger negative correlations with the negative emotions and physical discomfort subscales because physical symptoms appear to be more closely related to these types of barriers to restricted eating. During Weeks 1 and 2, physical symptom counts were significantly and negatively associated with the negative emotions and physical discomfort subscales and

not significantly correlated with any other subscales. During Week 3, physical symptoms were significantly and negatively with all eating self-efficacy subscales except social pressure.

The exercise self-efficacy scale contained two subscales, internal barriers, and external barriers. Correlations were computed to examine the bivariate relationships among physical symptom counts for each week and the two exercise self-efficacy subscales measured each week (see Table 8). It was expected that the physical symptoms measured at each week would show stronger negative correlations with internal barriers compared to external barriers. Contrary to expectations the correlations among physical symptoms and internal and external barriers were similar.

To examine the accuracy of the reporting of caloric deficit, correlations among the average absolute and average relative caloric deficit for all three weeks, and weight lost were explored. The correlations between weight lost and average absolute caloric deficit ($r = .12, p > .05$) and average relative caloric deficit ($r = .21, p > .05$) were positive, but not statistically significant.

Previous analyses showed the neuroticism measured at baseline was a significant predictor of physical symptom counts at Weeks 1, 2, and 3. In addition physical symptom counts at Weeks 1 and 3 were significant predictors of eating and exercise self-efficacy at Weeks 1 and 3. Analyses were computed in order to examine whether neuroticism was related to self-efficacy and whether physical symptoms were predictive of self-efficacy over and above neuroticism. Eating and exercise self-efficacy at Weeks 1, 2, and 3 were regressed onto the physical symptom counts for the corresponding weeks and neuroticism measured at baseline and (see Table 9). The regression model of eating self-efficacy at Week 1 onto neuroticism and physical symptoms at Week 1 was significant $F(2,37) = 16.85, p < .01$. The model for Week 2 was significant $F(2,37) = 10.62, p < .01$, and the model for Week 3 was also significant $F(2,37) = 10.34, p < .01$. The regression model of exercise self-efficacy at Week 1 onto neuroticism and physical symptoms at Week 1 was significant $F(2,37) = 9.64, p < .01$. The model for Week 2 was significant $F(2,37) = 6.99, p < .01$, and the model for Week 3 was also significant $F(2,37) = 7.95, p < .01$. Neuroticism was a significant negative predictor of eating and exercise self-efficacy each week. After controlling for neuroticism, physical symptoms emerged as a significant

negative predictor of eating self-efficacy at Week 3 and of exercise self-efficacy at Week 1.

Discussion

The present study explored the relationships between adverse physical symptoms experienced during dieting and future dietary restriction. Counter to prediction, moderate levels of caloric deficit were not predictive of the number of physical symptoms experienced weekly and levels of symptomatology were not related directly to the subsequent week's caloric deficit. Rather, neuroticism measured at baseline was a significant predictor of physical symptom reports. Examining the relationships between physical symptoms and self-efficacy for dieting and exercising initially revealed associations suggesting that the experience of symptoms may undermine confidence in maintaining weight loss behaviors; however, at least some this relationship was accounted for by trait neuroticism. The negative relationships found between self-efficacy and caloric deficit were also counterintuitive and in need of explanation.

Previous research has shown a relationship between extreme caloric deficit and adverse physical symptom reports (Johnstone, 2007; Keys et al., 1950). Based on these findings, it was inferred that moderate dieters may also experience a portion of these symptoms and that these symptoms would negatively affect one's ability to maintain the caloric deficits needed to lose weight. Contrary to expectations, the current analyses did not support this prediction. Though surprising, these results were similar to Johnstone (2007) who observed significantly increased hunger and fatigue only in participants who were fasting and consuming 600 calories per day, but did not observe these effects in those consuming 1200 calories per day. No participants in the current study reported eating an average of 600 or fewer calories per day. Furthermore, the average daily absolute caloric deficit reported each week during this study was consistent with the Dietary Guidelines for Americans, which recommend a reduction of about 500 calories per day to attain gradual and stable weight loss (U.S. Department of Health and Human Service & U.S. Department of Agriculture, 2005). The lack of association between caloric restriction and physical symptoms reports was a potentially positive finding which suggested that individuals restricting calories at recommended levels were not suffering adverse consequences from this moderate restriction level. Future studies should

investigate this further by randomizing participants to conditions which recommend varying restriction levels and assessing physical symptom reports on a more frequent basis.

Analyses did support a significant positive relationship between neuroticism and physical symptoms. This was consistent with previous literature which has indicated that individuals with higher levels of neuroticism are more likely to report physical symptoms (Friedman & Silver, 2007; Pennebaker, 2000) and experience negative affect during dieting (Williams, Surwit, Babyak, & McCaskill, 1998).

There was some evidence that greater adverse physical symptoms were negatively related to self-efficacy for calorie restriction and exercise, which was consistent with hypotheses. Dealing with negative physical states brought on by caloric restriction may undermine confidence and resolve and be a significant barrier to successful weight loss. This finding was also consistent with Bandura's (1997) proposal that people use somatic information conveyed by physiological states as a component of self-efficacy judgments. However, trait neuroticism was also significantly and negatively related to eating and exercise self-efficacy and when entered as a control variable, it accounted for much of the relationship between physical symptom counts and self-efficacy. This was consistent with other research that has shown neuroticism to be predictive of decreased health behavior self-efficacy (Williams, O'Brien, & Colder, 2004) and decreased self-efficacy for task performance (Judge & Ilies, 2002). Physical symptoms remained a significant predictor of self-efficacy after controlling for neuroticism in two of the analyses and the effect sizes in several of the non-significant analyses were large enough to suggest that with larger sample sizes and greater power, there may have been more evidence of a relationship between physical symptoms and self-efficacy. Exploratory analyses showed that physical symptom counts were most strongly and consistently correlated with the negative emotions and physical discomfort subscales of the WEL, lending further credence to the meaningfulness of the relationships between physical symptoms and self-efficacy.

Contrary to expectations the relationships between the self-efficacy measures and caloric deficit were non-significant and negative instead of positive in several analyses.

Though these findings are difficult to explain, there are at least two plausible possibilities. The first possibility is that measurement error was a contributor. Reviews of research have shown that adolescents and adults overestimate self-reported physical activity (Sallis & Saelens, 2000) and that self-reported caloric intake is consistently under-reported in diverse samples of all age ranges. Under-reporting of caloric intake has been shown to occur even after portion size training (Hill & Davies, 2001). In the current sample, caloric intake and expenditure were estimated based solely on self-reported data. In addition, caloric intake was estimated weekly based on four days of data. If caloric intake and expenditure values were not estimated accurately, it is possible that the relationships among physical symptoms, self-efficacy, and caloric deficit could not emerge. Alternatively, recent research has shown self-efficacy to be unrelated to caloric intake, and instead related to specific diet-related behavioral strategies, such as self-monitoring, planning, buy/preparation, portion control, and others (Nothwehr, 2008). This line of research postulates that diet-related behaviors are more proximal to self-efficacy measurements and that caloric intake is too distal to be predicted by self-efficacy.

Limitations of the current research included the necessity of relying on self-reported caloric intake data. Though there are other methods of monitoring the caloric intake of participants, such as meal provision or asking participants to stay in a residential unit where food intake is weighed and monitored, this was beyond the scope of the study. Another potential limitation was the retrospective reporting of physical symptoms for a seven day period. Other approaches, such as ecological momentary assessments or daily diary entries may have provided more accurate measurements of physical symptoms experienced by participants. In addition, the study design did not include a control group or randomization to condition which made it impossible to know whether dieters experienced more physical symptoms than average individuals might as part of daily living.

In conclusion, this study investigated the question of whether dieters engaged in moderate levels of caloric deficit experience noticeable physical symptoms that were related to restriction. The design of the study mimicked everyday dieting in that no prescriptive intervention was provided, participants caloric intakes were not monitored

for compliance with a specific type of diet and dieting behaviors were left to the decision and motivation of the individual. Furthermore, weekly data collection allowed for prospective analyses of the relationships among future dieting behavior and other constructs of interest. Results indicated that negative physical experiences during dieting were not related to moderate restriction levels, but were related to the neuroticism personality dimension. Furthermore, neuroticism consistently predicted decreased eating and exercise self-efficacy during study involvement. These findings imply that personality characteristics have the potential to affect both experiential self-assessments and self-efficacy judgments during dieting. This study demonstrated the need to investigate the role of personality factors in relationship to weight loss to determine whether individuals with certain personality profiles may necessitate additional or unique interventions. Certain personality profiles may predispose an individual to view the weight loss process more negatively and this could be addressed in a behavioral interventions.

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Table 1
Selected sample demographics

	BMI ^a	Previous ^b Weight Loss Attempts	Weight Lost ^a	Goal Diff ^c	% of subjects ^a
Minimum	25.7	1	-5.0	5	-
Maximum	34.2	8	9.6	57.2	-
Mean	27.96	3.39	1.97	21.5	-
SD	2.12	1.72	3.38	12.59	-
Lost ≥ 1 lb.	-	-	-	-	55.0
Lost > .5 lb.	-	-	-	-	62.5
Already dieting	-	-	-	-	35.0

Note. BMI = body mass index; Previous weight loss attempts = the mean and SD were computed only for people who had previously tried to lose weight and scale options ranged from 1 to 8 or more; Weight lost = measured in pounds; Goal diff = the difference between a participants baseline weight and their self-reported goal weight measured in pounds.

^an = 40. ^bn = 31. ^cn = 38.

Table 2
Exercise frequency and caloric deficit data

	% who exercised ^a	Mean number of Days	Mean Time Spent Per Day	Mean of Average Absolute Caloric Deficit ^a	Mean of Average Relative Caloric Deficit ^a
Baseline (SD)	62.5%	3.8 ^b (1.32)	-	-	-
Week 1 (SD)	92.5%	3.41 ^c (1.72)	28.12 ^c (28.6)	513.7 (344.7)	1.37 (.30)
Week 2 (SD)	95.0%	2.79 ^d (1.54)	22.58 ^d (25.8)	539.0 (437.5)	1.43 (.38)
Week 3 ^e (SD)	82.5%	2.76 ^f (1.25)	22.35 ^f (18.5)	522.6 (367.6)	1.42 (.42)

Note. Dashes indicate values were not available at these time points. % who exercised = % of participants who reported exercising at the different time points.

^a n = 40. ^bn = 25. ^cn = 37. ^dn = 38. ^eweek 3 = 6 days. ^fn = 33.

Table 3
Zero-order correlations among theoretically relevant variables

	Baseline			Week 1	
	Phy Sxs	Eat SE	Exer SE	Abs CD	Rel CD
Baseline					
Neuro ^a	.69**	-.66**	-.35*	.12	.17
Phy Sxs	-	-.50**	-.43**	.10	.08
Eat SE	-	-	.45**	-.07	-.18
Exer SE	-	-	-	.07	-.04

	Week 1			Week 2	
	Phy Sxs	Eat SE	Exer SE	Abs CD	Rel CD
Week 1					
Neuro ^a	.47**	-.67**	-.49**	.12	.17
Phy Sxs	-	-.46**	-.51**	-.06	-.09
Eat SE	-	-	.52**	-.10	-.24
Exer SE	-	-	-	-.03	-.03
Abs CD	-	-	-	-	.90**
Rel CD	-	-	-	-	-

	Week 2			Week 3	
	Phy Sxs	Eat SE	Exer SE	Abs Cr	Rel CR
Week 2					
Neuro ^a	.50**	-.60**	-.52**	-.03	-.04
Phy Sxs	-	-.31	-.28	-.05	-.08
Eat SE	-	-	.61**	-.01	-.11
Exer SE	-	-	-	-.17	-.14
Abs CD	-	-	-	-	.86**
Rel CD	-	-	-	-	-

	Week 3			Abs CD	Rel CD
	Phy Sxs	Eat SE	Exer SE	CD	CD
Week 3					
Neuro ^a	.35*	-.53**	-.53**	.17	.26
Phy Sxs	-	-.45**	-.38*	.15	.10
Eat SE	-	-	.66**	-.44**	-.54**
Exer SE	-	-	-	-.39*	-.35*
Abs CD	-	-	-	-	.86**

Note. Neuro = neuroticism; Phy Sxs = physical symptoms; Eat SE = eating self-efficacy; Exer SE = exercise self-efficacy; Abs CD = average absolute caloric deficit per day; Rel CD = average relative caloric deficit per day; n = 40.

^a= Neuroticism was the only construct measured at baseline only.

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

Table 4
Caloric deficit predicting physical symptom counts controlling for neuroticism

	ΔR^2	t	β	p
Week 1				
Neuroticism ^a	.22	3.45	.50	<.01
Relative Caloric Deficit	.03	-1.20	-.17	ns
Week 2				
Neuroticism ^a	.25	3.52	.50	<.01
Relative Caloric Deficit	.00	-.42	-.06	ns
Week 3				
Neuroticism ^a	.12	2.18	.35	.04
Relative Caloric Deficit	.00	.05	.01	ns

Note. n = 40.

^a= Neuroticism was the only construct measured at baseline only.

Table 5
Weekly physical symptom counts predicting weekly eating and exercise self-efficacy

	Criterion	R^2	t	β	p
Week 1					
Physical Symptoms	Eating self-efficacy	.21	-3.16	-.46	<.01
	Exercise self-efficacy	.26	-3.65	-.51	<.01
Week 2					
Physical Symptoms	Eating self-efficacy	.10	-2.00	-.31	ns
	Exercise self-efficacy	.08	-1.77	-.28	ns
Week 3					
Physical Symptoms	Eating self-efficacy	.20	-3.08	-.45	<.01
	Exercise self-efficacy	.11	-2.13	-.33	<.05

Note. n = 40.

Table 6
Prediction of subsequent weeks' caloric deficit from theoretically relevant variables

	Criterion	ΔR^2	t	β	p
Week 1					
Physical symptoms	Week 2 Relative caloric deficit	.00	-.01	.00	ns
Eating self-efficacy		.00	.69	.14	ns
Exercise self-efficacy		.03	-1.03	-.21	ns
Week 2					
Physical symptoms	Week 3 Relative caloric deficit	.00	-.52	-.09	ns
Eating self-efficacy		.09	-.82	-.16	ns
Exercise self-efficacy		.05	-1.40	-.27	ns

Note. n = 40.

Table 7
Physical symptom scale and eating self-efficacy subscale correlations by week

	Negative Emotions ^a	Physical Discomfort ^a	Availability ^a	Social Pressure ^a	Positive Attitudes ^a
Week 1					
Physical Symptoms	-.47**	-.63**	-.16	-.21	-.23
Week 2					
Physical Symptoms	-.49**	-.34*	-.18	-.14	-.15
Week 3					
Physical Symptoms	-.44**	-.48**	-.42**	-.29	-.38*

Note. n = 40.

^a = Self-efficacy subscale values were calculated each week and were compared to physical symptom counts measured each week.

Table 8

Physical symptom scale and exercise self-efficacy subscale correlations by week

Week 1	Internal Barriers	External Barriers
Physical Symptoms	-.43**	-.53**
Week 2	Internal Barriers	External Barriers
Physical Symptoms	-.29	-.26
Week 3	Internal Barriers	External Barriers
Physical Symptoms	-.33*	-.32*

Note. n = 40.

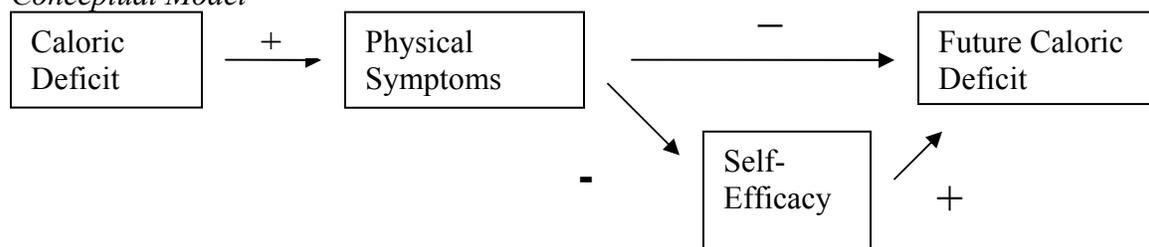
Table 9
Neuroticism and physical symptom counts predicting eating and exercise self-efficacy

	Criterion	ΔR^2	t	β	p
Week 1					
Neuroticism ^a	Eating self-efficacy	.45	-4.36	-.59	<.01
Physical Symptoms		.03	-1.33	-.18	ns
Neuroticism ^a	Exercise self-efficacy	.24	-2.16	-.33	<.05
Physical Symptoms		.10	-2.36	-.36	<.05
Week 2					
Neuroticism ^a	Eating self-efficacy	.37	-3.96	-.60	<.01
Physical Symptoms		.00	-.05	-.01	ns
Neuroticism ^a	Exercise self-efficacy	.27	-3.18	-.52	<.01
Physical Symptoms		.00	-.12	-.02	ns
Week 3					
Neuroticism ^a	Eating self-efficacy	.28	-3.03	-.43	<.01
Physical Symptoms		.08	-2.12	-.30	<.05
Neuroticism ^a	Exercise self-efficacy	.28	-3.20	-.47	<.01
Physical Symptoms		.02	-1.10	-.16	ns

Note. $n = 40$.

^a = measured at baseline only.

Figure 1
Conceptual Model



Appendix A
Informed Consent Form
VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIVERSITY
Informed Consent for Participants of Investigative Projects

Title of Project: Self-Monitoring of Food Intake and Exercise during Weight Loss

Investigators: Courtney Fox, B.A.
Robert S. Stephens, Ph.D.

I. The Purpose of this Project

The purpose of this project is to learn more about participant's weight loss experiences and how these experiences relate to dieting success or non-success.

II. Procedures

You will be asked to come into the lab to complete an initial interview. During this initial interview your weight, height, and eligibility criteria will be assessed to determine if you are eligible for the study. If ineligible, your participation will end at this point. If eligible, you will be asked to fill out several questionnaires. As part of the initial interview, you will be asked some questions about your eating attitudes and behaviors. If your responses to some of these questions indicate that you may be experiencing unusual eating patterns, you will be given a reference for the Psychological Services Center. You are responsible for obtaining follow-up care if you are interested in doing so. This will not prevent you from participating in the study.

Participation outside of the lab includes four days of tracking food intake and daily exercise tracking for three consecutive weeks. Tracking of food intake and exercise is estimated to take 30 minutes for each of the four days of tracking. You will also be asked to complete online assessment measures taking approximately 20 minutes once a week for three weeks. You may complete the online assessment measure from a location of your choosing but it is recommended that completion of these online assessments take place in a place which is free from distractions. During the initial interview, you will be given a password to the online tracking system, instructed how to enter the required information, and given the link to where the weekly online assessments are located. You will also be asked to come back to the lab for a final debriefing meeting at the end of your participation in the study. At this time your weight will once again be assessed. In addition, the principal investigator and/or the research assistant assigned to the study will contact you via e-mail throughout the duration of the study to remind you of dates and times by which certain procedures must be completed.

III. Risks

Few risks are involved with participation in this study. You will not be asked to engage in dieting or exercise behaviors other than what you already intend to do on your own. If there are any questions that make you feel uncomfortable, you may refuse to answer those questions or discontinue your participation in the study without loss of benefits to which you are otherwise entitled.

IV. Benefits of this Project

You may benefit from participating in this study by becoming more aware of your eating and exercise habits. In addition, you may benefit by learning how psychological research is conducted. If you are interested in receiving information about the results of this study following its completion, please indicate so in the box at the end of the next page and provide an e-mail address where you would like to receive this information. *Agreeing to receive this information will in no way affect the confidentiality of your responses today.*

V. Extent of Anonymity and Confidentiality

All responses will be kept strictly confidential. All questionnaire and survey data will be labeled with a participant number and will not have your name or anything that could identify you on it. The consent form and a list with your participant number and log-on codes will be stored separately from your responses in a locked cabinet that is accessible only to members of the research team.

VI. Compensation

Participants who are found ineligible during the baseline session based on BMI will receive 0 credits for participation. Participants who are found ineligible during the baseline session based on any other eligibility criteria will receive one credit for participation in the consent and eligibility process. Participants will receive 2 credit points for completing the full baseline interview and 8 credit points for full participation in the remainder of the study. Full participation includes food and exercise tracking on four days in each of three consecutive weeks, completion of several online questionnaires once a week for three consecutive weeks, and attendance at a debriefing meeting with a week of completing the final day of food and exercise tracking. Participants will not be awarded partial credit for any participation beyond the baseline interview. That is, all remaining study requirements must be completed in order to earn the additional 8 credits.

VII. Freedom to Withdraw

If at any time during the study you become uncomfortable, you are free to withdraw from participating without any penalty or loss of benefits to which you would otherwise be entitled. You also may choose not to answer specific questions without penalty.

VIII. Approval of Research

This research project has been approved (IRB# 08-516), as required, by the Institutional Review Board for Research Involving Human Subjects at Virginia Polytechnic Institute and State University and by the Human Subjects Committee of the Department of Psychology.

IX. Participant's Responsibilities

I voluntarily agree to participate in this study. I will be responsible for completing the baseline interview which consists of allowing the investigator to obtain weight and height measurements and completion of several questionnaires. I will also be responsible for recording my food intake and exercise on four days during each of 3 weeks. Lastly, I will be responsible for completing a brief web-based follow-up assessment once per week during this 3 week period and attending a final debriefing meeting where my weight will be assessed. I further give permission for the investigator and/or research assistant assigned to the study to contact me via e-mail.

X. Participant's Permission

I have read and understand the Informed Consent and conditions of this project. I have had all my questions answered. I hereby acknowledge the above and give my voluntary consent for participation in this project. If I participate, I may withdraw at any time without penalty. I agree to abide by the rules of this project.

Printed Name	Signature	Date
Should I have any questions about this research or its conduct, I may contact:		
Courtney Fox, B.A.	231-7631	smudge@vt.edu
Robert S. Stephens, Ph.D.	231-6304	stephens@vt.edu
IRB Representatives:		
David Harrison, Ph.D.	231-4422	Dr. David Moore
Chair, Psychology Human	dwh@vt.edu	Chair, IRB
Subjects Committee		231-4991
		moored@vt.edu
		CVM Phase II

VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIVERSITY
Informed Consent for Participants of Investigative Projects

Title of Project: Self-Monitoring of Food Intake and Exercise during Weight Loss

Investigators: Courtney Fox, B.A.
 Robert S. Stephens, Ph.D.

Participant's Responsibilities

I voluntarily agree to participate in this study. I will be responsible for completing the baseline interview, which consists of allowing the investigator to obtain weight and height measurements and completion of several questionnaires. I will also be responsible for recording my food intake and exercise on a daily basis for a period of 3 weeks. Lastly, I will be responsible for completing a brief web-based follow-up assessment once per week during this 3 week period and attending a final debriefing meeting where my weight will be assessed. I understand that the investigator will contact me via e-mail as needed for the duration of my involvement in the study.

Participant's Permission

I have read and understand the Informed Consent and conditions of this project. I have had all my questions answered. I hereby acknowledge the above and give my voluntary consent for participation in this project. If I participate, I may withdraw at any time without penalty. I agree to abide by the rules of this project.

 Printed Name

 Signature

 Date

If you are interested in receiving information on the results of this study please check the box below and provide an e-mail address. This information will be sent out when the study is completed – expect to receive an e-mail sometime in the Fall of 2009.

Yes, I would like to receive this information at the following e-mail address:

Appendix B

Weight Loss Strategies and References

http://www.fda.gov/fdac/features/2002/102_fat.html

<http://exercise.about.com/od/weightloss/u/weightlossbasics.htm>

<http://www.wikihow.com/Lose-Weight-Fast>

<http://www.loseweightgroup.com/tips/>

http://www.holisticonline.com/Remedies/weight/weight_10-easy-to-follow-tips.htm

http://www.weightlossresources.co.uk/diet/diet_tips.htm

Use of any of the information provided by these websites is the sole responsibility of the participant. The investigator does not seek to advocate or endorse any company, weight loss strategy, or weight loss program. These listings are provided so that individuals may have references with which to read about weight loss, associated strategies, and link to additional resources.

Appendix C

Weight Efficacy Lifestyle (WEL) Scale

Please rate your ability to resist eating in following situations. Responses should range from 0 – 9.

0	1	2	3	4	5	6	7	8	9
Not Confident									Very Confident

- 1) _____ I can resist eating when I am anxious (nervous)
- 2) _____ I can resist eating even when I am at a party
- 3) _____ I can resist eating when I feel physically run down
- 4) _____ I can resist eating even when others are pressuring me to eat
- 5) _____ I can resist eating when I am watching TV
- 6) _____ I can resist eating even when high-calorie foods are available
- 7) _____ I can resist eating when I am depressed (or down)
- 8) _____ I can resist eating even when I think others will be upset if I don't eat
- 9) _____ I can resist eating when I feel uncomfortable
- 10) _____ I can resist eating even when I have a headache
- 11) _____ I can resist eating when I am reading
- 12) _____ I can resist eating when I have experienced failure
- 13) _____ I can resist eating just before going to bed
- 14) _____ I can resist eating even when I have to say "no" to others
- 15) _____ I can resist eating when I am in pain
- 16) _____ I can resist eating when I am angry (or irritable)
- 17) _____ I can resist eating even when I feel it's impolite to refuse a second helping
- 18) _____ I can control my eating on the weekends
- 19) _____ I can resist eating when I am happy
- 20) _____ I can resist eating when there are many different kinds of food available.

Appendix D

Exercise Self-Efficacy Scale

Please rate your level of confidence that you will participate in vigorous physical activity under the following circumstances: (vigorous activity = activity that lasts for 20 minutes or more, makes your heart beat faster, and makes you breathe a lot faster)

Responses should range from 1 – 5.

1	2	3	4	5
Not Confident				Very Confident

1. At least three days per week.
2. If there is a lack of time due to school work.
3. If there is a lack of time due to part-time work.
4. If there is a lack of time due to family responsibilities.
5. If there is a lack of time due to other interests.
6. If you lack energy (too tired).
7. If you lack athletic ability.
8. If there is a lack of programs.
9. If there is a lack of facilities.
10. If you lack a partner.
11. If there is a lack of support from family.
12. If there is a lack of support from friends.
13. If participation costs money.
14. If you lack self-discipline or willpower.
15. If you are self-conscious (feeling uncomfortable).
16. If you have a long-term illness, disability, or injury.
17. If you have a fear of injury.
18. If you feel stressed.
19. If you do not feel in the mood.
20. If you feel discomfort (for example, soreness).
21. If you do not have fun.

Appendix E

Neuroticism Scale (EPQR-S)

Items will be answered with a “Yes/No” format.

1. Does your mood often go up and down?
2. Do you take much notice of what people think?
3. Are you a talkative person?
4. If you say you will do something, do you always keep your promise no matter how inconvenient it might be?
5. Do you ever feel 'just miserable' for no reason?
6. Would being in debt worry you?
7. Are you rather lively?
8. Were you ever greedy by helping yourself to more than your share of anything?
9. Are you an irritable person?
10. Would you take drugs which may have strange or dangerous effects?
11. Do you enjoy meeting new people?
12. Have you ever blamed someone for doing something you knew was really your fault?
13. Are your feelings easily hurt?
14. Do you prefer to go your own way rather than act by the rules?
15. Can you usually let yourself go and enjoy yourself at a lively party?
16. Are *all* your habits good and desirable ones?
17. Do you often feel 'fed-up'?
18. Do good manners and cleanliness matter much to you?
19. Do you usually take the initiative in making new friends?
20. Have you ever taken anything (even a pin or button) that belonged to someone else?
21. Would you call yourself a nervous person?
22. Do you think marriage is old-fashioned and should be done away with?
23. Can you easily get some life into a rather dull party?
24. Have you ever broken or lost something belonging to someone else?
25. Are you a worrier?
26. Do you enjoy co-operating with others?
27. Do you tend to keep in the background on social occasions?
28. Does it worry you if you know there are mistakes in your work?
29. Have you ever said anything bad or nasty about anyone?
30. Would you call yourself tense or 'highly-strung'?
31. Do you think people spend too much time safeguarding their future with savings and insurances?
32. Do you like mixing with people?
33. As a child were you ever cheeky to your parents?
34. Do you worry too long after an embarrassing experience?
35. Do you try not to be rude to people?
36. Do you like plenty of bustle and excitement around you?
37. Have you ever cheated at a game?
38. Do you suffer from 'nerves'?
39. Would you like other people to be afraid of you?
40. Have you ever taken advantage of someone?
41. Are you mostly quiet when you are with other people?
42. Do you often feel lonely?
43. Is it better to follow society's rules than go your own way?
44. Do other people think of you as being very lively?
45. Do you always practice what you preach?
46. Are you often troubled about feelings of guilt?
47. Do you sometimes put off until tomorrow what you ought to do today?
48. Can you get a party going?

Appendix F

Physical Symptoms Questionnaire

During the past 7 days, have you experienced.....	Yes or No		If yes, please indicate the number of days: (1,2,3,4,5,6,7)	If yes, please indicate how bothered you were by this experience? Not at all, moderately, extremely		
Hunger pains in you stomach	Yes	No		Not at all	Moderately	Extremely
Feeling dizzy when you stood up or lightheaded	Yes	No		Not at all	Moderately	Extremely
Attacks of nausea or vomiting	Yes	No		Not at all	Moderately	Extremely
Feeling depressed or down throughout the day	Yes	No		Not at all	Moderately	Extremely
Feeling sleepy or tired during the day	Yes	No		Not at all	Moderately	Extremely
Feeling hungry frequently	Yes	No		Not at all	Moderately	Extremely
Fainting	Yes	No		Not at all	Moderately	Extremely
A lack of energy	Yes	No		Not at all	Moderately	Extremely
Apprehensiveness or worry	Yes	No		Not at all	Moderately	Extremely
Thoughts of food frequently throughout the day	Yes	No		Not at all	Moderately	Extremely
Feeling sensitive to cold, i.e. getting the shivers or needing more clothes to stay warm than usual	Yes	No		Not at all	Moderately	Extremely

Feeling apathetic (like you don't care about things)	Yes	No		Not at all	Moderately	Extremely
Trouble concentrating or trouble with your ability to focus on what you're doing	Yes	No		Not at all	Moderately	Extremely
A lack of motivation to achieve your goals	Yes	No		Not at all	Moderately	Extremely
An inability to follow through on things that you planned to do	Yes	No		Not at all	Moderately	Extremely
Feeling irritable or getting annoyed easily	Yes	No		Not at all	Moderately	Extremely
Feeling that you were not mentally alert	Yes	No		Not at all	Moderately	Extremely
Being concerned about your health	Yes	No		Not at all	Moderately	Extremely
Feeling like you did not want to be around others	Yes	No		Not at all	Moderately	Extremely
Feeling physically weak	Yes	No		Not at all	Moderately	Extremely
Mood swings	Yes	No		Not at all	Moderately	Extremely
Feeling generally slowed down	Yes	No		Not at all	Moderately	Extremely
Muscle soreness or cramps	Yes	No		Not at all	Moderately	Extremely
Tingling sensations in your hands or feet	Yes	No		Not at all	Moderately	Extremely

