EFFECT OF AN ONLINE SOCIAL NETWORK ON PERCEIVED SOCIAL SUPPORT

AND SELF-EFFICACY TO ADOPT AND MAINTAIN HEALTH BEHAVIORS

A Thesis

presented to

the Faculty of California Polytechnic State University,

San Luis Obispo

In Partial Fulfillment

of the Requirements for the Degree

Master of Science in Agriculture,

Specialization in Food Science and Nutrition

by

Caitlin Kingston Leff

June 2011

COMMITTEE MEMBERSHIP

TITLE: Effect of an Online Social Network on Perceived Social

                                Support and Self-Efficacy to Adopt and Maintain Health

                                Behaviors

AUTHOR: Caitlin Kingston Leff

DATE SUBMITTED: June 2011

COMMITTEE CHAIR: Dr. Lisa Nicholson, Associate Professor

                                Food Science and Nutrition

COMMITTEE MEMBER: Dr. Ann McDermott, Associate Professor

                                Kinesiology

COMMITTEE MEMBER: Dr. Scott Reaves, Associate Professor

                                Food Science and Nutrition

ABSTRACT

Effect of an Online Social Network on Perceived Social Support and Self-Efficacy

to Adopt and Maintain Health Behaviors

Caitlin Kingston Leff

Objective: The purpose of this pilot study was to examine the effect of an online social network used as an adjunct to a behavioral weight loss intervention on participants' perceived social support and perceived self-efficacy using constructs of Social Cognitive Theory as a basis for website development.

Methods: 13 adult women (mean age: 43 years of age, range: 25-63 years) participated in a 12-week behavioral weight-loss intervention with the option to access the Transformation Challenge Online Community (TCOC), an internet-based support and informational website. The TCOC was developed using constructs of the Social Cognitive Theory. Data analyzed included online site usage software and pre- and post-questionnaire results. Time spent online, unique visits to the webpage, and pre and post-intervention data were analyzed using a mixed methods approach.

Results: Average time spent on TCOC was 95.6 minutes over the entire three month intervention (range: $0 - 287$ minutes). Website usage varied widely ranging from a participant who never accessed the site to another participant who logged on daily and commented a total of 27 times. Perceived self-efficacy to maintain a learned health behavior without the aid of a professional, as well as overall perceived social support were statistically significantly greater post-intervention. Confidence in the TCOC's ability to aid in making healthy lifestyle changes decreased significantly from pre- to post-intervention while website usage also decreased over time.

Conclusions: The internet may be a valuable tool for improving perceptions of social support and increasing access to reliable information and education. A web-based intervention can be used as an adjunct to a face-to-face intervention to provide additional support and information, as well as used to reach groups who may not have access to a face-to-face option. Considerations should be given to the structure of the online program; the potential for dynamic, aesthetically pleasing self-regulation tools; and content that is tailored to the individual. Decreased usage of the website over time may reflect similar difficulties in maintaining participation in face-to-face weight loss interventions. Attention should also be given to the target audience as participant comfort levels and feelings towards using the internet may differ significantly between users and therefore impact outcomes.

AKNOWLEDGMENTS

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1

Introduction

The "Transformation Challenge Online Community" (TCOC) was developed to test the effect of using an online social network for social support in a behavior change program. Specifically, a website was created as an adjunct to an existing behavioral weight loss intervention for weight loss ("The Transformation Challenge") for adult women aged 18 and older in San Luis Obispo, California. The development of the website and the website content were based on constructs from successful behavioral interventions and the Social Cognitive Theory. Content was specifically designed to examine perceived social support, perceived self-efficacy, knowledge, and health behavior changes. Individuals in the program participated in a face-to-face behavioral intervention that focused on creating positive health behavior changes with regards to physical activity and nutrition. The TCOC concept was created after formative data from a previous Transformation Challenge session reflected a need for continued support when individuals were away from the in-person support at the gym. The goal of the TCOC was to see if an internet-based support and information system could increase perceived social support and perceived self-efficacy for adopting and maintaining healthy behaviors. TCOC was also designed to assess the specific characteristics of participants that both utilized the website and experienced positive changes in perceived social support and self-efficacy.

Definitions

The following terms are defined for the purpose of this study:

1. Successful Weight Loss Maintenance: Intentional weight loss of at least 10% initial body weight that is kept off for at least 1 year (Wing & Hill, 2001).

2. Successful Weight Loss: The loss of at least 5% of baseline bodyweight has been shown to be clinically significant in decreasing the risk for chronic disease (National Heart, Lung, and Blood Institute, 1998).

3. Behavioral Therapy: Most common therapy used in obesity counseling; incorporating various learning strategies intended to help change and reinforce new dietary and physical activity behaviors as well as thoughts and attitudes. Focuses on short-term, problem-oriented treatments that address the present and future (Kushner, Kushner, & Blatner, 2009).

4. Behavioral Treatment/Intervention: A weight loss approach that focuses more upon principles and techniques of identifying and modification of learned behaviors than on the specific diet or exercise plan that is adopted (Winett, Tate, Anderson, Wojcik, & Winett, 2005).

5. Body Mass Index (BMI): Calculated from a person's weight and height (kg/m^2), BMI is an indicator of body fatness. BMI does not measure body fat directly, but research has shown that BMI correlates to direct measures of body fat (Center for Disease Control and Prevention, 2009). (See Table 1.1)

Table 1.1: Body Mass Index Classifications for Adults (CDC 2009)

BMI (kg/m^2)	*Weight Status*
Below 18.5	Underweight
18.5-24.9	Normal
25.0-29.9	Overweight
30.0 and Above	Obese

6. Social Support: A perception of the degree of gratification of one's basic social needs with others (affection, esteem or approval, belonging, identity, and security) met either by socioemotional aid (affection, sympathy and understanding, acceptance, and esteem) or instrumental aid (advice and information) (Thoits, 1982).

7. Face-to-Face or In-Person Intervention: Any (weight loss) intervention that is delivered on-site with direct in-person contact with participants.

8. Internet-Based Intervention: Any (weight loss) intervention that is delivered completely online where there is no in-person contact between researchers and participants. All communication is conducted over the internet.

9. Hybrid Intervention: Any (weight loss) intervention that combines both Face-to-Face and Internet-Based communication for the duration of the study.

CHAPTER 2

Review of Literature

The Need for Prevention and Treatment of Overweight and Obesity

Adult overweight and obesity is a major health concern in the United States. The prevalence of adult obesity doubled between 1978 and 2000 (Flegal, Carroll, Ogden, & Johnson, 2002) and has increased among all ages, racial and ethnic groups, all educational levels, and both genders (Mokdad, Bowman, Ford, Vinicor, Marks & Koplan, 2001). From 2005 to 2006 more than one-third (34%) of US adults (age 20 and older) were classified as obese and two-thirds are considered overweight (Ogden, Carroll, Curtin, McDowell, Tabak, & Flegal, 2006). As a result, less than one-third of US adults age 20 and older are at a healthy weight (BMI ≥ 18.5-24.9) (National Institutes of Health [NIH], 2007). Despite efforts made in recent years to reduce the prevalence, no statistically significant change in the amount of overweight adults in the US was seen between 2003-2004 and 2005-2006 (Ogden, Carroll, McDowell, & Flegal, 2007).

While increases in the prevalence of obesity have not grown, the BMI's of the American adult population ages 20-74 have steadily increased from 1980 to 2006, especially at the upper percentiles of the population. While the total number of overweight and obese Americans has not increased or decreased, those who were overweight or obese are now heavier than they were 25 years ago (Ogden et al., 2007). Using NHANES data with regression models, a study conducted by Wang, Beydoun, Liang, Caballero, and Kumanyika (2008) predicted that if trends continued at the current rate, by the year 2030, 90% of all American adults would be overweight or obese, and 51.1% would be obese. Mean BMI would also increase from 27.9 in 1999-2004 to 31.2 in 2030 (Wang et al, 2008).

Health Costs of Obesity

The prevention of chronic disease, especially those diseases associated with modifiable risk factors such as dietary intake has become increasingly important for a variety of reasons. Some of the most prevalent chronic diseases in the United States are associated with overweight and obesity including type 2 diabetes, heart disease, hypertension, stroke, and some cancers (National Institutes of Health [NIH], 2008). The increasing numbers of diagnoses of these chronic diseases continues to parallel the obesity epidemic. The National Health and Nutrition Examination Survey III (NHANES III) data from 1988-94 found that the prevalence of type 2 diabetes increased by 25% over the decade and this number continues to grow (Harris, Flegal, Cowie, & Eberhardt, 1998). In the Nurse's Health Study, one of the largest and longest running prospective studies on women's health, the risk for ischemic stroke was 75% higher in women with a BMI greater than 27, and 137% higher in those with a BMI greater than 32 as compared to women with a BMI less than 21 (Rexrode et al., 1997). Other non-chronic disease health complications associated with obesity include gallbladder disease, nonalcoholic steatohepatitis, gastroesophageal reflux, osteoarthritis, gout, pulmonary complications, and reproductive disorders (National Institutes of Health [NIH], 2008). According to the National Task Force on the Prevention and Treatment of Obesity report "Overweight and Obesity, and Health Risk" (2009) the overall risk for mortality is significantly increased for those individuals who are classified as obese. Obese individuals had a 10% to 50% increased risk of death from all causes compared with individuals with a healthy weight, with most of the risk attributed to cardiovascular disease (National Heart, Lung, and Blood Institute [NHLB], 1998). Flegal, Graubard, Williamson, and Gail (2005) also examined mortality risks for overweight and obese individuals using NHANES data.

5

After adjusting for major confounding variables Flegal et al. (2005) found that obese individuals (BMI ≥ 30 kg/m^2) have an associated increased risk of death, with the greatest risk seen in individuals with a BMI of 35 kg/m^2 or higher. The data also indicated that obesity is associated with about 112,000 excess deaths per year relative to healthy weight individuals. The majority of these deaths were seen in individuals younger than 70 years old

Psychological Costs of Obesity

The complications associated with obesity and overweight also include psychological and emotional side effects, both of which have also been strongly associated with excess weight. Significant stigmas attached to being overweight in America have been observed in various classic psychological studies. When shown images of varying body compositions, children young as three years old have rated "chubby" figures more negatively than average weight or thin figures (Cramer & Steinwert, 1998), and children as young as six years old described the silhouettes of an overweight child as "dirty," "lazy," "stupid," and "ugly" (Staffieri, 1967). Adults and children appear equally prejudiced against overweight or obese individuals as two separate studies found that both age groups believed that obese individuals were more likely to be carrying communicable pathogens than the non-obese (Klaczynski, 2008; Park, Schaller, & Crandall, 2007). Roehling (1999) conducted a literature review of discrimination related to obesity and found that obese people, especially women, had experienced unfair hiring practices, placement, compensation, promotion, discipline, and firing (Roehling, 1999). Additionally, research has reported a link between obesity and depression. Carpenter, Haisin, Allison, and Faith (2000) found that obese females were 20% more likely to report thoughts of suicide, 23% more likely to have made a suicide

attempt in the last year, and to have experienced a 37% higher prevalence of significant depression. This study did not find the same results for men.

Financial Costs of Obesity

As the prevalence of obesity continues to grow so do the national expenditures associated with medical costs and lost productivity. Using data from the 1998 Medical Expenditure Survey and the 1996 and 1997 National Health Interview Surveys, Finkelstein, Fiebelkorn, and Wang (2003) estimated that 9.1% of total medical costs in the US were associated with overweight and obesity in 1998. Wang, Bydoun, Liang, Caballero, and Kumanyika (2008) analyzed the economic costs of overweight and obesity in the U.S. to predict future implications if current weight trends continued. These researchers concluded that costs will more than double each decade and by 2030 health care costs associated with obesity and overweight could be between $860 to $965 billion dollars, or 15.8 to 17.6% of total US health care expenditure (Wang et al., 2008). Further, the cost of lost productivity related to obesity in 1995 for Americans aged 17 to 64 was $3.9 billion dollars based on lost workdays, physician office visits, restricted activity days, and bed days (Wolf & Colditz, 1998). As the number of obese in America has grown since 1995, this number has grown as well.

Effect of Weight Loss on Obesity Related Health Indicators

Obesity continues to be a multifaceted issue with multiple etiological factors. While some of these factors may not be under the control of the individual (eg: genetics; chronic disease; or environmental factors such as food accessibility, poverty, or socio-economic factors) many of the other major risk factors for obesity are modifiable including lifestyle behaviors, diet, and physical activity (NIH, 2008). Not only are many of these diseases entirely preventable with proper diet and exercise, but small amounts of

weight loss have been shown to significantly reduce many of the associated complications. Serum lipid values and risk factors associated with Coronary Heart Disease (CHD) are also significantly reduced with weight loss. A meta-analysis conducted by Dattilo and Kris-Etherton (1992) found that weight losses as small as 1 kg decreased serum cholesterol levels by 2.28 mg/dl, LDL cholesterol by almost 1 mg/dl, and triglycerides by 1.54 mg/dl. In a comprehensive review, Anderson and Konz (2001) reported that blood glucose levels are also significantly affected by weight loss. A 5 kg weight loss has been shown to decrease average fasting blood glucose levels in people with diabetes by 18 mg/dl (Anderson & Konz, 2001). While diet is responsible for the majority of participants' weight loss and corresponding positive results in clinical lab indicators, combined programs that utilize physical activity as well as diet as target behaviors yield better weight loss results (Filiault, 2008).

These physical, psychological, and economic costs of obesity support the crucial need to target the modifiable factors in order to treat and prevent obesity and the associated risks of chronic disease.

Behavioral Intervention Strategies

As overweight and obesity are preventable modifiable risk factors for chronic disease, researchers continue to focus on the effective components of weight loss interventions. While studies have confirmed that significant weight loss can be accomplished by maintaining caloric deficits for weight loss (Makris, Foster, & Astrup 2008), the maintenance of following a low calorie meal pattern is a difficult task that requires further behavior modifications. As an individual's overall diet is affected by many factors including genetics, environment, and the individual's relationship with food, no specific approach or method seems to be the one right way to treat obesity. Of

the many obesity treatments that exist, interventions that use a combination of diet, exercise, and behavioral changes have seen the most success.

History of Behavioral Weight Loss Interventions

First used in the treatment of obesity between 1960 and 1970, behavioral-based interventions focus on restructuring learned behaviors through self-monitoring, goal setting, nutrition education, exercise, stimulus control, problem solving, cognitive restructuring, and relapse prevention (Wing, 2008). Behavioral weight loss interventions focus on the premise that eating and exercise patterns are learned behaviors that can be modified by changes in the surrounding environment, in associated cues to behavior and to the behavioral reinforcements. Modifying eating and exercise behaviors should in turn lead to a change in body weight (Wing, 2008). If one can identify and remove triggers that lead to unhealthy behaviors, an individual can potentially learn new responses (Jones & Wadden, 2006). Behavioral interventions seek to target the environment, the surrounding support, habits and preferences, all while focusing on methods to positively change existing behaviors. The ultimate goal of a behavioral-based intervention is long term adaptation to newly acquired behaviors and skills, to overcome negative health behaviors through consistent self-monitoring and awareness, and to arm individuals with the tools, and therefore the self-confidence to do so. A successful intervention helps participants to identify specific behaviors that are barriers to successful weight loss or maintenance and helps to change the environment that support that behavior (Wing, 2008).

An excellent resource on the history of behavioral weight loss interventions is Dr. Rena Wing's chapter in The Handbook of Obesity (2008), "Behavioral Approaches to the

Treatment of Obesity". According to Wing's analysis, since the 1970's weight loss

programs have used a variety of cognitive and behavioral interventions to facilitate

successful weight loss and the success of these interventions continues to grow and

develop. In the 1970's while behavioral interventions were shown to be more effective

than nutrition education or psychotherapy, the average weight loss over an 8.4-week

treatment was only 3.8 kg (Wing, 2008). Wing states that as behavioral interventions

continued to develop and evolve, treatment outcomes continually improved due to better

application of techniques and thorough understanding of the treatment (Wing, 2008).

Earlier program emphasis was placed on changing eating patterns and behaviors

surrounding eating, but not the nutritional aspects of the diet itself. By 1990 behavioral

interventions had changed to often include heavier participants, longer treatment times,

and longer follow-up durations with more emphasis placed upon nutrition with calorie

goals, exercise goals and self-monitoring. Weight losses averaged 8.5 kg over 21 weeks

in 1990 and continued to improve so that in 1990 to 2000, the average patient lost 10.4 kg

over five months (Wing, 2008). Wing asserted that this improvement was likely the

result of a focus on strengthening the dietary component, strengthening the exercise

component, and/or strengthening the implementation of the behavioral strategies (longer

treatment time; increased social support and motivation; increasing the audience through

internet and media-based treatments) (Wing, 2008). A similar trend was seen for weight

loss maintenance where later interventions saw less weight regain with an average of 8.2

kg loss maintained at 18 month follow up as compared to a 5.6 kg loss for studies

reported in 1988-1990 (Wing, 2008, p. 229). In a review of behavioral treatments for

obesity, Jones and Wadden (2006) reported that there has been almost a three-fold

increase in the weight losses achieved by behavioral therapy interventions as reported in results of randomized controlled studies from 1974 to 2000. Further, of those who participated in a behavioral therapy program, an average of 80% completed the program as compared to interventions without a behavioral modification focus (Jones & Wadden, 2006).

A review conducted by Powell, Calvin, and Calvin (2007) found that lifestyle interventions for obesity that involved the modification of a variety of behaviors including self-monitoring, modeling, environment restructuring, and group and individual support were all important components of a successful weight loss intervention. These interventions not only produced a statistically significant amount of weight loss in treatment groups as compared to control groups receiving no behavioral modifications, this weight loss also contributed to positive health effects including reduction in diabetes, hypertension, and all cause mortality. These positive health effects were seen even at very modest levels of weight loss (Powell et al., 2007). Another review conducted by Sahay, Ashbury, Roberts, and Rootman (2006) examined effective elements of weight loss interventions in studies published between 1994 and January 2000. Of the 15 studies that were included in this review, key components for successful interventions included theoretical based programs, specifically Social Cognitive Theory and Transtheoretical model; inclusion of family as source of support; and the development and training of people responsible for implementing interventions.

Group sessions have been shown to be one effective means to implement behavioral interventions. Participants in the group lesson can each apply the lesson within his/her own environment. In a controlled study comparing the effectiveness of

group therapy versus targeting individuals for behavioral modifications, Renjilian, Perri, Nezu, McKelvey, Shermer, and Anton (2001) found that even when participants were matched with their preferences for either individual or group therapy, group therapy produced greater weight loss than did individualized therapy. This finding may be due to the effects of social support.

Social support, specifically perceived social support is recognized as a key component of behavioral treatment. Social support in a behavioral weight loss intervention creates an environment where the participant feels safe, supported, and esteemed by their peers, family and others involved. Perceived social support refers to the individual's personal feelings of having access to this safe environment, a sense of belonging to a community, as well as the ability to obtain information and guidance as needed. By involving the family, or significant others in treatment, the likelihood of adopting and sustaining newly acquired health behaviors should be much greater. Lang and Froelicher (2006) found that frequent contact between participants and researchers during the active weight loss phase was an important factor, but maintaining some sort of contact for support after the goal had been reached was equally as important. Social support is often one of a combination of factors in a behavioral weight loss intervention, making it difficult to analyze its unique or specific effects on weight loss. However, the addition of social support to behavioral lifestyle interventions has suggested better outcomes and has been commonly measured by many individuals participating in programs (Verheijden, Bak, Weel, Koelen, & van Staveren, 2005). Wing and Jeffrey (1999) found that participants who were recruited in a group of three friends or family and were assigned to a behavioral weight loss intervention group with a social support

condition experienced greater weight losses at end of a four month intervention, sustained greater weight loss maintenance after ten months, and were more likely to complete the intervention than were those participants who were recruited alone without any friends or family. Therefore when conducting a behavioral weight loss intervention creating an environment that mirrors the comfort level of a friendship where participants feel safe and supported by their peers may be an important aspect of the study design.

Behavioral Weight Loss Maintenance Interventions

While many improvements have been made with regards to increased weight loss response to behavioral weight loss interventions, the maintenance of weight loss remains a challenge. A comprehensive review of non-surgical treatments of obesity conducted by the National Institute of Medicine reported that patients commonly regain some, if not all of the weight lost during an intervention (Thomas & Stern, 1995). Once treatment ends, maintaining contact and providing necessary support for continuing the newly learned health behaviors becomes difficult. Although individuals who participated in behavioral interventions were more likely to maintain weight loss longer term than interventions that did not focus on behavioral strategies, weight regain is still commonly seen (Perri & Corsica, 2002). However, continued weight maintenance classes, contact via phone, mail, or internet can aid in the sustained maintenance of weight loss (Jones & Wadden, 2006). A randomized, controlled trial comparing strategies for weight loss maintenance found that patients who received some sort of follow-up after the termination of a six-month weight loss intervention, whether it was via an interactive website or monthly phone calls, regained significantly less weight at each follow-up visit over 24 months than did those individuals who received no follow-up (Svetkey et al., 2009).

A systematic review conducted on weight loss maintenance studies published between 1931 and 1999 found that diet combined with group behavioral therapy was more successful than programs that focused on diet modifications alone (Ayyad & Anderson, 2000). Additionally, patients who were given an opportunity to continue contact with the clinic for a period of time after the end of the treatment ("active follow-up") had better weight loss maintenance rates than those patients who did not receive contact. The reviewers found that the most effective weight loss maintenance program included a very low calorie diet, behavior modification therapy, and active follow-up (Ayyad & Anderson, 2000). Researchers are also interested in the characteristics of those who succeed with maintaining weight loss as compared to those who are not able to maintain weight loss and newly adopted health behaviors (Phelan et al., 2009). A recent study designed to compare weight loss maintainers (WLM) with the treatment seeking obese (TSO) found that high levels of self regulation set apart the WLM from the TSO groups. WLM were observed to have higher dietary restraint and lower disinhibition (lack of restraint), hunger, and depressive symptoms than the TSO groups (Phelan et al., 2009).

Dietary restraint and inhibition are both characteristics that can be addressed and modified during behavioral interventions. The National Weight Control Registry (NCWR) is the largest prospective investigation of long-term successful weight loss maintenance. A prospective study examining the behavioral and psychological predictors of weight regain in 261 of NCWR participants with a weight loss of at least 10% of their body weight within the past two years found that both changes in behavioral variables (decreases in physical activity and decreases in self weighing frequency) as well as

psychological variables (increases in depressive symptoms, hunger, and disinhibition) were associated with higher levels of weight regain (Wing et al., 2008). While the NWCR only provides information for these participants at a single point in time, and does not follow-up on these self-reports giving little insight into the length of time the weight loss was truly maintained, this data does reflect the need for interventions that not only focus on the weight loss of the participants, but also target the long term development of successful habits to reduce the likelihood of weight regain.

Social Cognitive Theory and Health Promotion

As mentioned, behavioral interventions often use health behavior theories as a basis for development. The Social Cognitive Theory (SCT) was developed by Albert Bandura as a way to understand and predict human health behaviors and motivational thought processes. SCT attempts to explore the way in which individuals experience and interact with personal environment, as well as the way personal beliefs may contribute to motivation for health behaviors. Using SCT constructs allows health behavior researchers to design interventions to maximize potential predictors of success and to understand why someone does or does not follow a suggested behavior (Glanz, Rimer, & Viswanath, 2008). SCT asserts that a core determinant in initializing motivation for health behaviors is the knowledge of the health risks and benefits of these behaviors and practices. Bandura states that without knowledge of the impact of lifestyle habits on an individual's health, he or she will see no reason to make any changes. However, knowledge is only a small step on the path to self-regulation, an important goal for maintenance of health behaviors. There are multiple concepts and constructs in SCT used to explain the complexities of human thought and behavior that exist as motivators or barriers beyond simple knowledge of risks and benefits (Bandura, 2004).

15

Reciprocal determinism, defined as the thought that "environmental factors can influence individuals and groups, but individuals and groups can also influence their behavior and regulate their own behavior" (Glanz et al., 2008), is a key concept in SCT. This concept illustrates the complex relationship between an individual's behavioral choices and his or her environment. While people are influenced by their environment, they are also likely to surround themselves with a non-threatening social or physical environment that they have created to support their current choices (Glanz et al., 2008). Providing guidance and education to make behavioral changes helps the individual to initiate the motivation within the self to adopt healthy behaviors to elicit positive reconstructions of the social and physical environment surrounding him or her to support that change (Bandura 2004).

Self-efficacy, a key construct in SCT, is used widely in weight loss and weight loss maintenance interventions. Measurements of an individual's perceived self-efficacy, or the belief that "one can exercise control over one's health habits" (Bandura, 2004) for specific health behaviors, is an important predictor for successful changes in health behavior. Self-efficacy is not only about having the knowledge to perform a task, but more about an individual's belief in their own ability to succeed. Strong self-efficacy must be developed for a specific health behavior over time through a mastery of experiences that promote self-regulation (Winett, Tate, Anderson, Wojcik, & Winett, 2005). Self-efficacy is important to health behavior interventions because maintenance of these behaviors post-intervention relies on the participant's perceived confidence and control of his/her own actions. If an individual does not feel confident that he or she can maintain a specific behavior without guidance, the likelihood of maintenance of that

behavior is very small. Studies have shown that individuals with higher perceived levels of self-efficacy set higher goals for themselves, and are more likely to follow through on these goals (Abusabha & Achterberg, 1997). Many studies have also shown that participants in nutrition related interventions who display higher levels of self-efficacy are less likely to fall back into previous unhealthy behavior patterns (Glanz et al., 2008).

According to studies of the SCT the empowerment of the individual within given social environments will predict better success. Social support is a related and important aspect of self regulation and the development of self-efficacy for a behavior. The perceived support of peers and professionals had a strong impact on the development of self-efficacy, especially in the development of the strength to overcome barriers to change (Winett et al., 2005). After an examination of SCT and its relationship to health behavior changes, Winett et al. (2005) concluded that "(i)nterventions need to plan for these predictable episodes and be long enough to provide individuals with the self-regulatory tools and supports to effectively problem solve and then deal with minor and major setbacks and learn from those experiences (Winett et al., 2005, p 633)."

Growth of Internet-Based Behavioral Interventions

Predictors of success for weight loss and maintenance include continuous contact. Continual face-to-face support remains a challenge because of a variety of barriers that cause individuals to stop coming to face-to-face meetings over time (Perri & Corsica, 2002; Perri, Foreyt & Anton, 2008). Medical centers or programs that provide behavioral weight loss interventions are not always accessible, and long-term face-to-face weight loss interventions can be expensive both for the participant and the program management. The internet has the potential to be an inexpensive medium by which individuals who may not otherwise have access to behavioral interventions can participate in an

17

intervention. With the internet growing in popularity as a medium for consumer health information, research has examined whether online support can substitute for face-to-face interactions to provide support and accessibility.

According to *The Pew Internet & American Life Project*, 61% of American adults look online for health information. When asked, "Now thinking about all the sources you turn to when you need information or assistance in dealing with health or medical issues, please tell me if you use any of the following sources...," 57% of all adults in 2009 reported using the internet as a source (Fox & Jones, 2009). Further, the internet has become a substitute for group social support as 41% of e-patients have read someone else's commentary or experience about health or medical issues on an online news group, website, or blog and 49% of surveyed Americans said that an online health inquiry has changed the way they think about diet, exercise, or stress management. Pew data reports that the percentage of American adults getting exercise and fitness information online has jumped from 21% in 2002 to 38% in 2009, a more rapid increase than any other health topic covered in the survey (Fox & Jones, 2009).

As a result of the continuous growth of the internet, multiple studies, reviews, and meta-analyses have both documented positive results, as well as lessons for further research, in interventions that utilize the internet as the medium for intervention for health behavior change. As research on the use of the internet for health-related interventions continues to grow, a need has developed to define the field and to formalize the language of internet research. Ritterband and Tate (2009) recognized this need and published a series of papers discussing the beginning stages of defining and researching the "science behind internet interventions." The authors argue that it is now necessary to

standardize the research behind internet interventions as the field continues to grow in

order "to ensure proper discussion, examination, and comparison of these programs."

Without standardized language it becomes difficult to "ensure that reviews and meta-

analyses include the relevant and appropriate studies" as they can impact the conclusions

that are made from these studies and reviews (Ritterband & Tate, 2009). Using multiple

behavioral change theories, the authors proposed the development of an internet-based

behavior change model to help guide development and discussion of future online

interventions. This model includes several steps that mirror SCT constructs where the

individual characteristics and existing beliefs of the user are influenced by his/her

environment. The environment also influences the participants use and adherence to the

website (Ritterband, Thorndike, Cox, Kovatchev, & Gonder-Frederick, 2009) (See Figure

2.1).
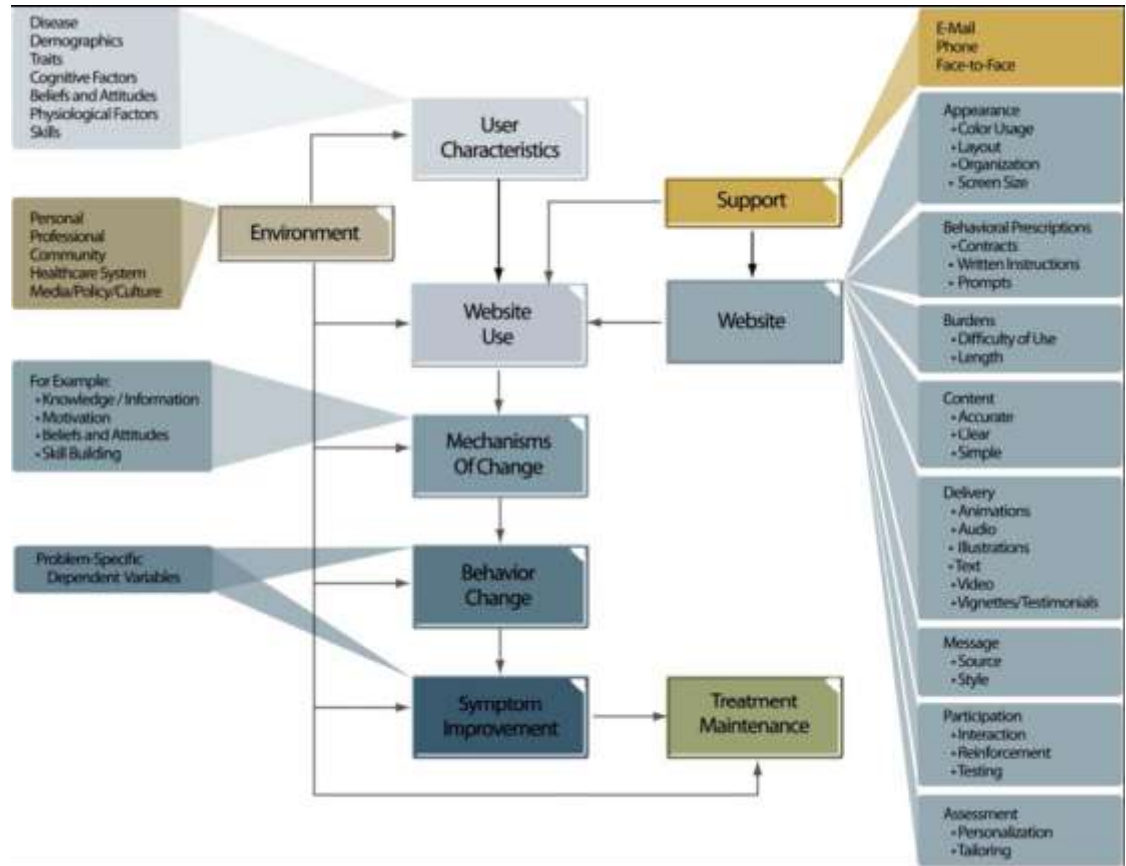
Figure 2.1: Model of Internet Interventions (from Ritterband et al., 2009)

Online Weight Loss Interventions

Many internet-based interventions are conducted with the primary outcome focused on overall weight loss as compared with a control group with no access to the website. The SHED-IT trial examined the efficacy of an internet-based weight loss program for overweight and obese men as compared to a control group with no access to the website (Morgan, Lubans, Collins, Warren & Callister, 2009). Men were randomly assigned to each group and had one baseline face-to-face meeting where both groups were introduced to diet modifications and physical activity guidelines and strategies based on SCT. After the initial meeting there was no further in-person contact for either of the groups. The men in the internet arm of the study were introduced to the free, public website Calorie King (www.calorieking.com) that they were to use for the

20

duration of the study to track their food intake. Weight decreased significantly in both groups from baseline to six months, but the weight losses between groups were not significantly different from each other. There were also no significant differences seen between groups in terms of mean percent weight lost. However, at three months significantly more participants in the Internet group lost >5% of their baseline weight compared to the control group (55.6% versus 28.0% respectively) (Morgan et al., 2009). The Calorie King website provided an interactive tool for self regulation with food diaries to track daily caloric intake, keeping the participants in the internet arm of the study accountable. Significant positive correlations were seen for weight loss in the internet-arm at 3 and 6 months and the number of days of diet entries, number of daily exercises, and number of weekly check-ins. The website also provided feedback and tracked weight loss progress over time. These components likely contributed to the success of the internet arm as the control group with no access to the website were not exposed to these benefits.

Winett et al. (2005) tested the effectiveness of an "Internet-based Guide-to-Health" (GTH) in a 4-year study. The GTH was designed using the SCT constructs of self-regulation, tailoring techniques, social support, and email prompts. This study recruited participants from 14 different churches randomly assigned to the internet only GTH, a social support enhanced group (GTH-Plus), or a control group. The GTH-Plus group utilized in-person social support through the churches with positive reinforcement, recognition of successes, and group-wide activities such as daily step-goals and sharing recipes. At 7-8 months after baseline testing, participants in the GTH conditions (both social support enhanced and standard) lost weight while the control group did not. There

were marginally significant differences between the two GTH and control groups (p<0.10), but significant differences between GTH-plus and control group (p<0.05) (Winett et al., 2005). Significant increases in fruit and vegetable consumption were seen in the internet only GTH group as compared to the control group at seven months (p=0.005) and at 16 months (p=0.038). The GTH-enhanced group also statistically significantly increased steps, fruit and vegetable intake at both 7 and 16 months as compared to the control group (Winett, Anderson, Wojcik, Winnet, and Bowden, 2007) .

Rothert, Strecher, Doyle, Caplan, and Joyce (2006) examined the effects of an internet-based behavioral intervention for weight management program as compared with an information only condition for overweight or obese participants. The internet-based arm used an existing weight management program ("Balance") that utilized software algorithms based on baseline questionnaire information to develop individually tailored weight management plans focusing on healthy diet; behavioral and social cues to eating; physical activity; energy expenditure and food consumption; body image; and social support. The information only arm used the standard Kaiser Permanente website that is available to all Kaiser members and was not tailored to the individual, but did provide comprehensive information to the users about weight loss. The primary outcome for this study was percentage of weight lost, as well as process measures and information regarding the usefulness of the website. Baseline characteristics were similar between groups, and more women than men enrolled (83%) in the program. At both three and six months, a significant difference was noted in percentage weight loss and amount of weight loss between the two conditions. At three and six months participants using the tailored site saw an average of $2.7 \pm 0.3\%$ and $3.0 \pm 0.3\%$ percent weight loss while the

standard arm only saw an average of $1.2 \pm 0.3\%$ and $1.2 \pm 0.4\%$ percent weight loss respectively. The tailored participants also experienced an average of 2.6 ± 0.3 kg and 2.8 ± 0.3 kg overall weight loss and participants in the standard treatment lost 1.2 ± 0.4 and 1.1 ± 0.4 kg overall at three and six months respectively.

Tate, Ring, and Winett (2001) used a structured behavioral intervention in a study that examined the use of web-based technology instead of a face-to-face behavioral weight loss program, arguing that the majority of participants in these programs would prefer not to have to participate in structured face-to-face programs due to the convenience of accessing the intervention at home. This study examined not only the use of the internet as a weight loss tool, but whether using a design previously created for a face-to-face intervention could be translated into a successful internet-based weight loss intervention. Researchers wanted to examine whether this behavioral treatment website would produce greater weight loss as compared to a website that was more educational and information-based than interactive. The 91 participants, all healthy, overweight adults, employed by a large network of hospitals were randomly assigned to the internet education group or the internet behavior intervention group. Participants were followed over six months. Weight, height, and waist circumference was measured at the clinic at baselines, 3 months, and 6 months. The internet education group was provided basic information online related to weight loss and links to specific resources about diet, exercise, self-monitoring, and other behavioral topics related to weight loss. Diet recommendations were given at a one hour lesson at the start of the intervention, and the use of the resources was recommended but the participants were not asked to submit diaries each week. Participants in the internet-based intervention received all of the

recommendations and resources that the internet education group received, but also were required to report self-monitoring information each week via an online diary. The participants were also encouraged to ask questions online, and they also received an email message each week that included a behavioral weight loss lesson and individualized feedback for each participant based on their self-monitoring information. Participants who were not keeping up with the self-monitoring information were sent emails to encourage them to keep going. While there were no baseline differences in terms of age, weight, BMI, waist circumference, or internet experience between groups, the internet behavior group lost significantly more weight than those who were in the education group from baseline to three months, and mean weight losses were still significantly different between the groups at both three and six months. Mean waist circumference reductions were significantly different between the groups as well at both 3 months and 6 months. Further, participants in the behavioral weight loss group logged in significantly more times during the intervention than those in the education group. Frequency of logins was important as there was a significant correlation with logins and weight change for the intervention. Thus the author concluded that the internet can be a successful tool for weight loss if designed in a way that mimics already successful face-to-face interventions focusing on behavioral therapy techniques for weight loss. The structured design of the program is important to the success of the participants. The interaction, feedback, and support tied in with the internet resources predicted the best results (Tate et al., 2001).

A recent online behavioral weight loss intervention was examined by Harvey-Berino et al. (2010) to test three conditions: in-person, hybrid (in-person and internet), or

completely online. Using common behavioral weight loss intervention strategies for all conditions (self-monitoring, stimulus control, problem solving, goal setting, relapse prevention) with identical behavioral lessons and tailored counselor feedback regarding diet and exercise, the groups only differed in the weekly meetings that were either held in person or online in a chat session. The hybrid group had an in-person meeting once a month in place of an online meeting. Weight loss and percent initial body weight lost by participants in the in-person group were significantly greater in than either the internet or hybrid groups (8.0 ± 6.1 versus 5.5 ± 5.6 versus 6.0 ± 5.5 kg). There was no statistical significance between the internet and hybrid groups. There was also no significant difference between any of the three groups in terms of proportion of participants who lost 5% or more of their initial body weight (clinically significant). All groups reported decreased caloric intake, decreased percent of calories consumed as fat and increased energy expended while participating in physical activity. Groups did not differ in the number of meetings attended or in the proportion of journals submitted. The hybrid condition did not differ significantly from in-person or internet for perceived social support, but in-person scored significantly higher than internet only for perceived social support (Harvey-Berino et al., 2010). While the results pointed to the obvious success of an in-person behavioral weight loss program, the author concluded that this did not take away from the fact that the internet only group was still a worthwhile intervention with over half of the internet subjects losing a clinically significant amount of weight (5% baseline weight). Further the lack of significant difference between the hybrid and the online seems to indicate that there may not be an advantage to including a face-to-face meeting as part of an internet-based intervention (Harvey-Berino et al., 2010)

As the internet has the potential to meet the needs of many individuals who may not otherwise have access to weight loss programs, the replication of successful face-to-face programs to an internet-based delivery system has also been studied. In a pilot study, McTigue et al. (2009) hypothesized that the internet could be used to translate the Diabetes Prevention Program (DPP) curriculum, a successful evidence-based lifestyle approach that is traditionally conducted face-to-face, to an online format accessible to physician referred patients in their homes. Patients who completed the 12 month program (n=45) lost 4.79 (8.55) kg while 31% experienced a minimum of a 5% weight loss, and 18% lost at least 7% of their original body weight. The authors concluded that as physicians may have limited face-to-face time with patients, an internet lifestyle modification program has the potential to carry out the recommendations and keep the patients accountable.

A modification of a traditional information-based intervention was studied by Bennet, Gerring, Puleo, Stein, Emmons, and Gillman (2010) to test the effectiveness of an online behavioral weight loss program ("Step Up, Trim Down"). The study was conducted in the primary care setting comparing the behavior-based intervention to a group who received current standard of care offered by an outpatient practice: a copy of healthy weight materials published by the NHLBI. Using an interactive weight loss website that provided participants with a series of behavior change goals, participants in the experimental group experienced significantly more weight loss (the usual care group actually gained weight) and larger reductions in BMI. The experimental group also had significantly greater percent body weight lost s 25.6% of members of the intervention group lost greater than 5% initial body weight versus none in the control group. There

was no significant difference between groups for differences in waist circumference (Bennett et al., 2010).

Womble, Wadden, McGuckin, Sargen, Krauthamer-Ewing and Rothman (2004) examined the effectiveness of popular commercial online weight loss programs (eDiets.com) compared with the use of a widely circulated manual given to individuals seeking weight loss (LEARN for Weight Management). The authors hypothesized that due to the access of unlimited social support online from the use of bulletin boards and support groups, those participants who participated in the online programs would lose significantly more weight. The intervention was a randomized control trial that lasted one year. Both groups attended in-person clinics during the study. The commercial site eDiets.com provided participants with a variety of personalized online programs based on individual weight loss goals as well as food preferences. The site also provided recipes, shopping lists, and interactive weight loss tools. Participants treated by eDiets.com lost significantly less weight at week 16 ($0.9 \pm 3.2\%$ versus $3.6 \pm 4.0\%$) and at week 52 ($1.1 \pm 4.0\%$ versus $4.0 \pm 5.1\%$) than those who received the weight loss manual. However, the authors inferred that it was not necessarily the use of the internet that produced poor results, but that the eDiet participants made minimal use of the web site possibly due to the fact that eDiets did not appear to be as structured as the LEARN program manual which provided 16 weekly behavioral-based weight control lessons. LEARN also required participants to keep records of calorie intake, and eDiets did not. As success has been achieved with structured face-to-face behavioral weight loss interventions, the results of this study indicate that the same structure must be translated into internet interventions as well (Womble et al., 2004).

Another weight loss intervention that used the commercial website eDiets.com was conducted by Gold, Burke, Pintauro, Buzzell, and Harvey-Berino (2007) comparing the effectiveness of a structured behavioral treatment weight loss website (V-Trim) versus eDiets.com. The V-Trim program involved a six-month online weight loss program led by a therapist followed by a six-month on-line weight management program. Results showed the V-Trim group lost significantly more weight than the eDiet group from baseline to six months (8.3 ± 7.9 kg versus 6.2 ± 6.2 kg, p = 0.004), and at 12 months, the V-Trim group maintained a statistically significantly greater amount of weight loss (7.8 ± 7.5 kg versus 3.4 ± 5.8 kg, p=0.002). A greater proportion of participants in the V-Trim group lost 5% or more of initial body weight (65%) as compared to only 37.5% of participants losing 5% or more in the eDiet group at 12 months. These differences illustrated that the internet can be a useful mode for weight loss intervention delivery, but the use of behavioral weight loss intervention techniques that have seen success in face-to-face interventions appeared to be key to the program's success.

Another study using V-Trim was conducted by Krukowski, Harvey-Berino, Ashikiaga, Thomas, and Micco (2007). This was not a controlled study but rather an observational intervention developed to examine common characteristics of successful participants of online weight loss interventions. Participants followed a 12-month weight loss and maintenance intervention using V-Trim that included food and exercise journals, chat rooms, and a bulletin board. Participants also submitted homework assignments and journal where facilitators provided weekly feedback. This website was developed based on formative data collected in focus groups. Midway through the intervention at six

months participants lost an average of 7.5 ± 6.4 kg. At the end of the intervention (12 months) participants lost an average of 6.6 ± 6.6 kg. Participants logged on to the website an average of 190 ± 138.5 times during treatment. When comparing completers with non-completers, the only significant baseline difference was that non-completers were significantly heavier than completers at baseline (93.8 ± 21.9 kg vs 89.7 ± 12.3 kg, p=0.003) (Krukowski et al., 2008).

Tate, Jackvony, and Wing (2006) also utilized an existing commercial website in an internet-based weight loss program to examine weight loss between three groups receiving either 1) personal email counseling or 2) computer-automated tailored counseling or 3) no counseling. All participants were instructed how to use the free-to-the public SLIMFast website which has interactive features including: weekly reporting/graphs, weekly weight loss tips, recipes, and a weight loss online "buddy" network system for peer support. The counseling groups (personal or automated) had access to a separate web site that also offered an electronic diary and message board. The E-counseling groups also received an additional weekly email that included a behavioral lesson and a reminder to complete the online diary. Weight loss for participants between baseline and three months differed significantly between groups. The computer-automated and personal feedback groups lost significantly more weight than the no counseling (-5.3 ± 4.2 kg, -6.1 ± 3.9 kg, and -2.8 ± 3.5 kg, respectively) but did not differ significantly from each other. At six months weight losses were significantly greater in the human counseling group (-7.3 ± 6.2 kg) than in the automated feedback (-4.9 ± 5.9 kg) or no counseling group (-2.6 ± 5.7 kg). At 6-months, the percent of individuals who lost at least 5% of initial body weight differed between groups (27% of participants in no

contact, 34% in computer automated, and 52% in human contact (p=0.001). No treatment by time interaction was found for calorie intake as all participants reported significant reductions in caloric intake. Greater reductions in dietary fat were seen in human contact than no contact. This intervention also had high retention rates of 82% at 3 months and 80% at 6 months (Tate et al., 2006).

Lewis, Williams, Dunsiger, Sciamanna, and Whiteley (2008) examined what aspects of the tailored internet website designed to promote physical activity were perceived most useful to participants assigned to that experimental arm. These researchers predicted that participants in the tailored group would log onto the study website significantly more often than the standard group, and that higher rates of logging on would be related to higher levels of physical activity. The standard internet group was regularly prompted to visit such sites as the American Heart Association, Shape up America, Mayo Clinic Fitness and Sports Medicine Center, American Academy of Family Physicians, American Council on Exercise, and American College of Sports Medicine Health and Fitness Information, as well as to self-monitor on the research study's website. Results showed that participants in the tailored internet arm logged onto the study website significantly more times than the Standard group, and those in the tailored group reported their website to be more useful than reports from the Standard group. For both groups, higher frequency of logins was positively associated with increases in physical activity. The highest rated features of the website in terms of usefulness were those that allowed for self reporting, personalization, and interaction including the physical activity logging feature, the goal setting feature, and the feedback reports (Lewis et al., 2008).

Motivational Interviewing

Motivational interviewing (MI) is a method of dialogue between a clinician and an individual used to enhance motivation by exploring and resolving ambivalences. MI can be a useful part of a behavioral-based intervention. Traditionally conducted face-to-face, MI has also seen success over the internet. Webber, Tate, and Quintiliani (2008) examined the use of motivational interviewing in internet groups as a way to motivate weight loss. Two groups were formed: 1) an online group given basic motivational interviewing, and 2) an online group given basic motivational interviewing plus a discussion on the values of weight loss. Both groups participated in online group discussions where they were guided to discuss pros and cons of change and readiness, as well as confidence for change. At the end of 8-week intervention, both groups lost statistically significant amounts of weight regardless of the inclusion of a values discussion. The study authors therefore concluded that the internet can be a medium not just for weight loss education, as well as for structured guidance via motivational interviewing.

The relationship between motivation interviewing, weight loss, and intrinsic motivation was also examined in an internet-based intervention targeting adult women aged 22-65 with a BMI between 25-40 (Webber, Gabriele, Tate, & Dignan (2010). Eighty participants were randomly assigned to one of two groups. The standard treatment group featured basic weight loss and exercise recommendations where participants were provided with information on self-monitoring, but included no discussion of motivational techniques. The motivational treatment group featured basic weight loss recommendations similar to the standard group but also participated in group

cost/benefit analysis discussions of weight loss and were taught proper goal setting

techniques with journaling activities. Both groups attended baseline face-to-face

meetings while the remainder of the intervention took place on the study website, which

was identical for both groups. Both groups met face-to-face at week four, following

similar formats to the initial baseline meeting. Final analysis showed that both groups

lost a statistically significant amount weight from baseline to 16 weeks, as well as

decreased waist circumference, and body fat percentage, but there were no significant

differences between groups for any of these outcomes, or for changes in caloric intake,

percentage fat intake, or physical activity. Further, there was no difference between

groups for visits to website, completion of weekly diaries, posts to the message board, or

motivational change. However, weight loss was positively associated with higher usage

of the website, increased number of completed diaries, and number of posts to the

discussion board for both groups (Webber et al., 2010). These results displayed that

although differences were not seen between groups with regards to impact of

motivational interviewing, increased participation in the various attributes of a behavioral

weight loss internet intervention increased success of weight loss.

<center>*Online Weight Loss Maintenance Interventions*</center>

Harvey-Berino, Pintauro, Buzzell and Gold (2004) compared levels of weight loss

maintenance following a six month weight loss program using three different conditions:

1) internet support (IS), 2) frequent in-person support (F-IPS), and 3) minimal in-person

support (M-IPS). While the IS group experienced a greater weight loss at 18 months, and

a higher percentage of those in the IS group maintained a long term weight loss of at least

5%, these differences between groups were not statistically significant different. Harvey-

Berino et al. (2004) concluded that the internet was an effective way to "promote the

<center>32</center>

maintenance of clinically significant weight loss," demonstrating that contact is important for weight loss maintenance, but continuing in-person contact can be difficult to sustain over a long period of time. In contrast to this study, in a 2002 study by Harvey-Berino et al. (2002) a similar study design was used but different results were observed. After no significant differences were seen between groups for weight loss, researchers reported increased weight gain in the IS group during the first six months of weight maintenance (p<0.05). Further, significantly more subjects maintained at least a 5% weight loss in F-IPs and M-IPS as compared to the IS. These significant results may have been explained by the lower attendance levels observed in the internet condition over the weight loss maintenance period as compared to the F-IPS condition, and reports of subjects in the IS group being unhappy with their placement during follow-up, stating a preference for meeting in person. However, subjects in the IS group still reported significantly more peer support contacts than the F-IPS conditions. These results indicate that personal feelings towards the internet may predict an individual's success in an internet-based intervention. If personal perception of the internet is negative, resulting feelings of the likelihood of success using a web-based intervention might also be negative, possibly leading to poor outcomes.

Cussler et al. (2008) conducted a study of weight loss maintenance in a population of middle-aged women (48±4.4 years old) over a 12-month period of maintenance following a 4-month weight loss treatment. Two groups were examined: one with internet support and one with only self-direction. While the internet support had constant contact with staff and group members during the 12-month intervention, the self-directed group had no contact with staff after the 4-month weight loss program concluded. The

self-directed could meet with other participants if desired, but were not required to do so. Weight change, energy expenditure (EE), or energy intake (EI) were similar between groups at the end of the initial 4-month weight loss intervention. The groups also maintained significant and similar losses after the follow-up (Cussler et al., 2008). This study did not show a significant impact of internet use versus self-regulation. The authors' explanation was that a significant number of the participants did not feel comfortable using the internet, something that needs to be addressed in any intervention that uses web-based designs. Further, the authors noted that the self-regulated group continued to meet and support each other, as they felt a sense of competition against the internet users leading to bias, something that may not be reflected in real life situations (Cussler et al., 2008). This may have been why there were no differences observed between the self-directed group as compared to the internet group. The formation of a "team" environment with friendly competition of one group against another can lead to a feeling of social support increasing motivation and collective self-efficacy.

Table 2.2 displays a summary of the aforementioned weight loss and weight loss maintenance interventions conducted over the internet.

Table 2.2: Summary of Internet-Based Weight Loss and Weight Loss Maintenance Interventions.

Study	Subjects	Intervention Conditions	Internet Component	Face-to-Face Component	Outcome Measure
Tate et al. (2001)	91 healthy, overweight adult hospital employees with BMI 25-36, mostly women.	Internet-based education intervention versus internet-based behavioral intervention.	Education only website versus education plus behavioral intervention guidance website.	All participants attended initial introduction session.	**Weight loss:** Behavior group lost more weight (p=0.005); greater changes in waist circumference (p=0.001). **Internet Usage:** Behavior group logged-in more often (p<0.001), login frequency correlated with weight change in behavior group (p=0.003) and education group (p=0.03).

Table 2.2: Summary of Internet-Based Weight Loss and Weight Loss Maintenance Interventions.

Study	Subjects	Intervention Conditions	Internet Component	Face-to-Face Component	Outcome Measure
Harvey-Berino et al. (2002)	122 healthy overweight adults, mostly female (85%).	3 conditions: 1) Internet support (IS), 2) Frequent in-person support (F-IPS), 3) Minimal in-person support (M-IPS).	Behavioral intervention based website with bi-weekly meetings were held in form of an internet chat session.	All groups attended initial introduction session. In-person support met in person bi-weekly, Minimal support- met in person monthly for first six months of 12 month weight maintenance. No contact for months 7 to 12.	**Weight loss and maintenance**: No difference between groups for weight loss, IS gained significantly more weight than F-IPS in first six months (p<0.05), saw smaller weight loss at 1 yr as compared to other groups (p<0.05). **Peer support:** IS + more peer support contact compared to F-IPS (p = 0.02).
Womble et al. (2004)	47 women	Internet versus printed weight loss manual.	Internet group used commercial website, eDiets.com.	Both groups met with psychologists at baseline and four other weeks for 20 min/visit.	**Weight Loss:** Manual group lost significantly more weight (p<0.05). **Cardiovascular Health:** No significant differences.
Harvey-Berino et al. (2004)	255 healthy overweight and obese adults, mostly women (82%).	3 conditions: 1) Internet support, 2) Frequent in-person support, 3) Minimal in-person support.	Behavioral intervention based website with bi-weekly meetings were held in form of an internet chat session.	All groups attended initial session. In-person met bi-weekly, Minimal support met in person monthly for first 6 months of 12 month maintenance. No contact for months 7 to12.	**Weight loss and maintenance:** No significant difference. **Adherence to treatment goals:** IS group submitted self-monitoring diaries more frequently (p<0.01) and reported more peer support (p <0.01).
Rothert et al. (2006)	2862 overweight and obese, mostly female (83%).	Tailored versus Information only.	Tailored used "Balance" a 6 week self help weight management program that tailors based on baseline entries.	No	**% Weight Loss** Significant effect for tailored compared with info only for percent weight loss over 3 and 6 month (p<0.0004). **Perceived usefulness and relevance of website:** Tailored reported reading weight management info more than info only, also more likely to report usefulness and relevance (p<0.0001).

Table 2.2: Summary of Internet-Based Weight Loss and Weight Loss Maintenance Interventions.

Study	Subjects	Intervention Conditions	Internet Component	Face-to-Face Component	Outcome Measure
Tate et al. (2006)	192 overweight or obese adults, mostly female (84%).	3 conditions: 1) No counseling (NC) 2) Computer automated email feedback (AF) 3) Human email counseling (HC).	E-counseling groups either received pre-programmed response to their self-monitoring diaries or email from a human weight loss counselor they had never met. All groups used SlimFast website, e-counseling groups also had access to website with interactive tools.	Baseline, 3, and 6-months for bodyweight and questionnaires.	**Weight Loss:** Computer automated and human email groups saw more weight loss than no counseling (p=0.005 and p=0.001), but they did not differ from each other. **Physical Activity and Dietary Intake:** All groups reported ss reductions in caloric intake (p<0.001) but no difference between groups. No difference between groups for PA. **Frequency of Login:** NC and HC groups logged in more often than AF group. Total login frequency associated with weight loss (p=0.04).
Gold et al. (2007)	124 overweight and obese adults, mostly female (81%).	Structured online-based behavioral design versus commercial online diet program.	Behavioral design taught strategies such as self management skills with new lessons featured each week via an online meeting weekly for an hour. Online diet program was self-guided.	Orientation only.	**Weight Loss:** Vtrim group lost more weight than Ediets from baseline to 6 months (p=0.004) and maintained greater loss at 12 months (p=0.002).
Krukow-ski et al (2008)	123 obese and overweight adults, mostly female (83%).	No control.	Received behavioral weight loss lessons online with weekly group web chat sessions offered from 0-6 months, and monthly from 7-12 months.	Orientation only.	**Weight Loss:** Mean weight loss 7.5(6.4) kg. Non-completers significantly heavier than completers at baseline (p=0.003). **Web Components:** Utilization of features categorized as motivational support modest predictor of weight loss (p<0.05) and "feedback" (p<0.01) with shared variance.

Table 2.2: Summary of Internet-Based Weight Loss and Weight Loss Maintenance Interventions.

Study	Subjects	Intervention Conditions	Internet Component	Face-to-Face Component	Outcome Measure
Cussler et al. (2008)	135 peri-menopausal women.	Internet support for weight loss maintenance versus self-direction.	Password protected website that included host tools such as private mail, group mail, bulletin boards and chat rooms.	Orientation only.	**Weight loss and maintenance:** Both groups lost significant weight ($p<0.001$), maintained significant losses after follow-up ($p<0.001$). Range of wt regain in internet group(-20.9 to 12.2 kg). **Use of website:** Correlations with log entries and change in body weight ($p<0.05$), change in EEE ($p<0.01$). **Peer contacts:** Correlations with EEE and peer e-mail contacts, EEE and articles posted ($p<0.05$).
Webber et al. (2008)	20 adult overweight and obese females.	Online motivational interviewing versus online motivation interviewing with values discussion.	Received a new lesson each week mail, discussed online.	No	**Weight Loss** Both groups lost a significant amount of weight from baseline to 8 weeks ($p<0.01$) with no difference between groups. **Autonomous motivation:** No differences between groups. Avg. number of self-motivational statements made during online sessions correlated with change in autonomous motivation during the study ($p=0.05$), and motivation at follow up was associated with greater weight loss ($p<0.05$).
Morgan et al. (2009)	65 overweight or obese males.	Internet versus self-guided.	Internet group used Calorie King website (www.calorieking.com).	One baseline face-to-face meeting with no further in-person contact for either of the groups.	**Weight loss:** Both groups had significant weight loss ($p<0.001$). No significant differences between groups. Significant correlations found between weight loss at 3 months and number of days of diet entries ($p<0.001$), number of daily exercise entries ($p=0.002$), and weekly check-ins ($p=0.01$). Similar results seen at six months.
McTigue et al. (2009)	50, mostly female (76%), mean BMI: 36.4.	No control.	Adapted 12 week DPP curriculum to online format to see if translated with same success.	No	**Weight Loss** Mean: -4.79 kg **% Weight Loss** 31% of group lost at least 5% 18% of group lost at least 7% **Blood Pressure** Systolic -7.33 mm Hg Diastolic: No sig changes.

Table 2.2: Summary of Internet-Based Weight Loss and Weight Loss Maintenance Interventions.

Study	Subjects	Intervention Conditions	Internet Component	Face-to-Face Component	Outcome Measure
Harvey-Berino et al. (2010)	481 healthy overweight adults, mostly female (93%).	Internet versus in-person versus hybrid.	Internet group met weekly in online chat room. Hybrid and internet group used Calorie King (www.calorieking.com).	In-person group met weekly. Hybrid group met monthly.	**Weight loss:** Wt loss In person greater than other two conditions (p<0.05) InPerson: -8.0(6.1) kg Internet: -5.5(5.6) kg Hybrid: -6.0(5.5) kg **Percent subjects with 5 and 7% weight loss:** No sig difference 56.3% In person 37.3% Internet 44.4% Hybrid **Social Support:** In-person greater compared to internet (p <0.02). Hybrid did not differ between the two.
Webber et al. 2010	80 overweight or obese females.	Standard treatment group without motivational techniques versus motivational treatment group.	Identical website online for both groups: weekly weight loss tips, weekly lesson postings, weekly recipes, message board, links to self help diet, exercise, and behavioral modification resources on the web.	Baseline, 4 and 16 weeks. Groups met separately given different guidance (motivational versus informational).	**Weight loss:** Significant weight loss in both groups (p<0.001), no differences between groups. **Caloric intake:** No differences btn group in change in caloric intake, % fat intake, or PA. **Website usage:** No difference btn groups for visits to website, diaries completed, or # posts to website. **Motivation:** Weight loss was negatively associated with baseline controlled motivation in the sample. Subjects with high controlled motivation were less likely to lose weight than those with low controlled motivation (p=0.01).
Bennet et al. (2010)	101 adult participants, (52.5% male, 47.5% female)	Standard treatment offered by outpatient practice versus internet-based behavioral intervention "Step-Up Trim Down".	Interactive, tailored website with behavior change goals.	No	**Weight Loss** Intervention mean wt loss -2.21vs usual care + 0.28 (mean difference CI: -3.60, -1.53) 25.6% intervention lost >5% baseline body weight versus 0% control group. **Frequency of Login s** Mean 48.58 per participant. Highest versus lowest quartile of logins showed significant greater weight loss – mean difference -4.16 kg, CI: -1.47, -6.84.

The Use of Theory in Behavioral Internet Interventions

Although the benefit of using the internet as a basis for interventions has the potential to reach many, unreliable websites have joined the movement leading to an abundance of sites with poor information that do not include research-proven constructs or do not use theoretical models (Rothert et al, 2006). Simply putting health behavior information on a website without using a theoretical base for behavioral change will not necessarily lead to behavioral changes, even if the potential ability to reach more people is significantly greater than face-to-face interventions. A recent systematic review examining internet-based health behavior change interventions looked at the relationship between the use of theory, behavior change techniques, mode of delivery and their relationships to the success of the participants using the website (Webb, Joseph, Yardley, & Michie, 2010). Websites that extensively used theory as a basis for the design of the website were associated with larger effect sizes. The three most common theories were the Social Cognitive Theory (SCT), the Transtheoretical Model (TTM), and the Theory of Planned Behavior (TPB). Further, interventions that used a larger combination of behavior change techniques, such as stress management, communication skills training, and modeling, saw greater effects than those websites that used fewer of these techniques. Finally, those websites that also featured what the author called "communicative functions" or aspects of the website/intervention that promoted personalized feedback and attention from advisors, experts, or peers proved to be more effective than those that did not support interaction. This was true regardless if the communication was on the website in a discussion board, or via text message or email (Webb et al., 2010).

Behavioral Interventions and SCT Constructs in Online Interventions

There are several key constructs from SCT that are often cited in behavioral interventions including Reciprocal Determinism, Outcome Expectancies, Self-efficacy, Collective Efficacy, and Self-regulation. SCT constructs can be applied to web-based social networking sites in numerous ways. Reciprocal Determinism states that the environmental factors surrounding an individual or a group can have influence but those individuals or groups can also influence their own environment and therefore regulate their own behavior (Glanz et al., 2008). Participants in an online-based behavioral intervention can be influenced to adopt and maintain new health behaviors by interacting and accessing health information online from the home. The influence of an online social environment can also add to the likelihood of maintenance of behaviors even after the intervention has ended if the website is maintained and remains a source of support (Cussler et al., 2008). The internet also exemplifies the construct of "facilitation" or providing the tools and resources necessary to make new behaviors more likely to occur. An appropriately designed website can provide a medium to facilitate behavior change by giving individuals the tools to succeed and providing additional support and resources in the home for ongoing self-regulation.

Outcome Expectancies or the "beliefs about the likelihood and value of the consequences of behavioral choices" includes social outcome expectations where participants may already be motivated and perceive the intervention to be of value (Glanz et al., 2008) but participating in an online social community may increase outcome expectations. If participants feel that the online aspect of the intervention will positively affect them, and that other participants are using it, they will be more likely to use and/or

benefit from its use. Again, an online community remains sustainable even when the intervention is over, and the participants will know they can continue to use it for maintaining behaviors.

The key construct in SCT, self-efficacy, can be supported in online interventions by adding an extra layer of support, building confidence both for the adoption and maintenance of health behaviors. This level of web support can be accomplished with such web features as linking to an educational site, providing an interactive message board, or a space to communicate between members. Using the web as a tool for health education may increase the self-efficacy of participants more than those who are sent home without further guidance. Collective Efficacy, the belief about the ability of a group to succeed in desired outcomes (Glanz et al., 2008), is also addressed by creating a "team" environment online, a feeling that everyone is working together to achieve this goal, can increase likelihood of behavior adoption or change. An online community can be there to support participants to make these changes. A community also provides a medium for observational learning through "exposure to interpersonal or media displays, particularly through peer modeling (Glanz et al., 2008)." A website can provide an abundance of observational learning tools for health education: videos, blogs, photos. Further, online communication with other team members exemplifies peer modeling: *'If she can do this/goes through this/also feels this way but succeeds, so can I.'*

Finally the internet provides a medium to support self-regulation, the overarching goal of any health behavior change. Self-regulation requires an individual to learn how to identify the necessary actions to successfully attain goals over time. If the goal of an intervention is to create behavior changes that will last, to "transform" unhealthy

behaviors and thoughts, then self-regulation is the ultimate goal. Web forums, blogs, and social support online allows a person to process information. Providing access to science-based nutrition information and self-monitoring tools can help participants choose what and how often materials are reviewed or when monitoring occurs in order to achieve the goal.

Many of the previously mentioned internet-based programs have used SCT as a basis for the design. As mentioned, Rothert et al. (2006) examined a tailored website as compared to an information only web-based program. The tailored program design based the website elements on behavioral constructs instead of a prescriptive caloric intake. The design focused on social cues to eating, social support, body image, and a better understanding of relationship between food consumption and energy expenditure. Using these constructs in the design of the website proved to bring forth positive weight loss results (Rothert et al., 2006). Bennet et al. (2010) followed a similar guided tailored behavioral-based intervention design providing guidance to participants in the beginning of the intervention through a health coach. The health coach helped participants choose four obesogenic behavior change goals to focus on over the course of the intervention. Choices were based on an algorithm that noted with which goals the participant had high self-efficacy and low barriers to change. Morgan et al. (2009) also used SCT as a basis for their intervention, initiating with an informational session discussion behavior change strategies based on SCT including self-monitoring, goal setting, and social support (Morgan, 2009). Tate et al. (2006) reported that it was likely that the introduction to methods of behavioral weight loss interventions in both groups prior to randomization led to greater weight losses in both groups. Further, the computer automated feedback group

used feedback algorithms based on cognitive-behavioral theory that focused on specific behavior changes weekly to improve adherence and weight loss (Tate et al., 2006).

Gold et al. (2007) also incorporated various constructs of SCT in the design of the structured online intervention including self-management skills with specific behavioral modification lessons featured each week and weekly online meetings. The structured group participants were given energy intake goals that were modeled after the U.S. Dietary Guidelines for Americans. Participants in this group also tracked intake in an online food journal, used homework assignments, and included access to a discussion board to encourage social support among participants. The group randomized to the standard commercial online diet program, eDiets.com, also were encouraged to exercise, as well as access part of the site called "support central" where participants had access to chat rooms, professional online meetings, discussion boards, and a mentor section (Gold et al., 2007). Wangberg, Bergmo, and Johnsen (2008) evaluated attrition related to three internet-based health interventions and observed that higher self-efficacy for making a behavior change may predict higher use of the website. Tailoring content -- whether it was on the website itself, sending personal emails, or following up with reminders -- all increased adherence in this study (Wangberg et al., 2008). Lewis et al. (2008) used the Transtheoretical Model and Social Cognitive Theory, incorporating stage of motivational readiness, decision making, and self-efficacy in the design of the tailored internet group. As mentioned, this group logged onto the study website more often than the standard group. Logins had a positive association with increases in physical activity (Lewis et al., 2008).

In their analysis of the Guide-to-Health intervention Anderson, Winett, Wojcik & Williams (2010) examined the effects of SCT constructs and showed that self-efficacy and self-regulation both acted as statistically significantly mediators for treatment effects on physical activity and nutrition behaviors. Additionally, self-efficacy acted as a statistically significant mediator for self-regulation, important for significant positive changes in intake of fat, fiber, and fruit and vegetables as well as monitoring and planning physical activity. Increased social support also was a mediator for post-intervention increases in physical activity as participant perception of familial social support increased activity levels (Anderson et al., 2010).

When designing their intervention Tate et al., (2001) concluded that the majority of the weight loss programs and resources found online lacked the important aspects of structure and professional contact that are seen in a free face-to-face behavioral weight loss program. Therefore, the researchers hypothesized that better weight loss outcomes could be achieved by participants who were part of a structured behavioral weight loss program that uses key constructs of behavioral weight loss interventions including self-monitoring, weekly lessons, social support, and weekly recommendations from a therapist. As hypothesized, the behavioral intervention group lost significantly more weight than the education only group (Tate et al., 2001).

Utilization of Specific Constructs in Intervention Development

With a wide variety of research showing mixed results for online interventions, examining research that successfully translates the use of these constructs to website program features is necessary. Looking closer at the various aspects of these successful interventions they have several important constructs in common.

Face-to-face orientation

While the internet continues to grow in popularity, there are some people who may not be as comfortable working online. The goal of internet lifestyle and weight loss interventions is to expand the reach to a wide variety of populations. Many interventions reviewed begin with a face-to-face orientation to teach participants how to use the website and associated software. Losing a participant who does not feel comfortable using the internet defeats the purpose of the study. McTigue et al. (2009) began an intervention with a two hour orientation training participants in the software as well as verbalizing the goals of the study including the importance of regular communication with their physician to address any changes that may occur warranting the need for medication adjustments. An initial technical orientation was held for participants in the Internet Support group in Harvey-Berino et al.'s interventions (2002, 2004) where participants were taught how to access self-monitoring forms online, and how to use chat rooms and bulletin boards. Face-to-face orientation have also been used to introduce concepts of behavioral weight loss theory (Tate et al., 2006; Morgan et al., 2009) as well as provide technical orientation to internet condition groups (Krukowski et al., 2008; Morgan et al, 2009). In a study of an internet support site for weight loss maintenance versus self-guided weight loss maintenance, two classes were offered at the beginning of the intervention to teach navigation of website and entering self reported data and logs (Cussler et al., 2008). The participants were encouraged to practice what they had learned in between classes, and 18% required house calls to aid in correct installation of the program software. Gold et al. (2007) required participants to take part in what the authors referred to as a "technology check" to make sure all participants knew how to use

and access the tools used in the study before randomization into the two groups. All computer issues were taken care of before randomization to decrease any chances of between group differences due to technology problems. Once randomized into a group, another orientation was held for each group to discuss information about use of the assigned website. Interventions held also held multiple face-to-face sessions over the course of the study as seen in the research of Bennet et al. (2010) where participants were provided a health coach (a registered dietitian trained to use principles of motivation interviewing) for two, 20-minute in-person sessions at baseline and week 6, as well as two, 20 minute biweekly sessions over the phone to discuss behavior change skills and review self-monitoring data.

Organized Group Discussions

Several studies have used organized online chat-room discussions as a way to promote social interaction and support between members to replace face-to-face support groups or meetings. Harvey-Berino (2002, 2004) used biweekly organized chats for the internet support arm of the study in two weight loss maintenance studies. Subjects were given a prearranged time to enter the chat room and join a facilitated discussion led by a group therapist (Harvey-Berino et al., 2002; Harvey-Berino, Pintauro, Buzzell, & Gold, 2004). Harvey-Berino et al. (2010) again used weekly organized chats to discuss behavioral weight loss lessons in her most recent study comparing internet-only, face-to-face only, and a hybrid group. McTigue et al. used organized 1-2 weekly chat room sessions a week as an opportunity not just for social support and sharing experiences between participants, but also as a place for participants to ask any questions they may have had to a moderator who could then answer the question immediately (McTigue,

2009). Cussler et al. allowed the participants to organize and run their own online

support groups, encouraging online participant-driven meetings once a week, while the

staff occasionally provided online meetings as well (Cussler et al., 2008). Krukowski et

al. (2008) offered weekly group web chat sessions from 0-6 months, and monthly web

chats from 7-12 months.

While most interventions sought to hold discussion completely online, others used

hybrid interventions where the majority of the intervention took place online, with the

exception of several organized face-to-face sessions. Bennett et al. (2010) used this

method with the two face-to-face and phone call sessions with the registered dietitian.

Womble et al. (2004) had participants in both the treatment condition as well as the

control group meet with a psychologist at baseline and weeks 8, 16, 26, and 52 for

twenty-minutes to discuss goals, recommendations, and progress with the program.

Self-monitoring

Self-monitoring is an important aspect of behavioral weight loss therapy and

helps to keep participants accountable and aware of their progress. Because of the

importance of self-monitoring many interventions translated this aspect into the online

component of their intervention. Participants are often prompted to weigh themselves

and record their weight on the website (Cussler et al., 2008; Gold et al., 2007; McTigue et

al., 2009; Morgan et al., 2009), report number of calories consumed, and macronutrient

breakdown (Harvey-Berino et al., 2002; Cussler et al., 2008; Gold et al., 2007; McTigue

et al., 2009; Morgan et al., 2009) and to record time spent participating in physical

activity (Harvey-Berino et al., 2002; Cussler et al., 2008; McTigue et al., 2009; Morgan

et al., 2009; Harvey-Berino et al., 2010). Tate et al. (2006) reminded their e-counseling

groups to access and report intake into an online diary and either automated or tailored feedback was given based on the entries to increase motivation for self-monitoring. Womble et al. (2004) also found that the number of food records kept by participants during first sixteen weeks of their intervention correlated positively with weight loss at week 16 and at week 52 (Womble et al., 2004). Significant correlations were also found by Morgan et al. (2009) between weight loss at three months and number days of diet entries (p<0.001), number of daily exercise entries (p=0.002) and number of weekly check-ins (p=0.001). Similar results were also seen for weight loss at six months.

Several interventions included sophisticated software that allowed meal planning or activity planning for the week where participants could keep themselves accountable by recording calories consumed or minutes participating in physical activity online (McTigue et al., 2009). Monitoring also increased the likelihood of a participant logging into the website. Self- monitoring was also an important aspect of Harvey-Berino and colleagues intervention (2004) that looked at the effects of an online behavioral-based intervention on weight loss and weight loss maintenance. The Internet Support (IS) group submitted self-monitoring diaries more often that the Frequent-In Person Support (F-IPS) condition. While F-IPS had a better attendance rate than IS, the researchers believed that the internet group was more likely to continue to self-monitor their eating and physical activity (Harvey-Berino et al., 2004) because of the consistent submissions by the IS group during the intervention. As self-monitoring habits have been consistently related to long term weight loss maintenance but it is known that adherence decreases over time, therefore Bennet et al. (2010) provided what was believed to be a dynamic, easy-to-use self-monitoring tool online to track goal progress over time. This study also

provided incentives, such as $50 gift certificates, as raffle prizes. Entries were automatically given to any participants who logged in.

Self reporting was an important aspect of both groups in Tate et al.'s (2001) intervention where participants were instructed on the importance of self-monitoring for their success. Participants were encouraged to use self-monitoring resources online to keep track of both diet and exercise, but only the behavioral therapy group submitted self-monitoring diaries to a therapist each week. Diary submissions represented 46% of total logins for the behavioral-based group. As total number of diaries submitted was significantly correlated with weight loss, self-monitoring may have been part of the reason for the success of the behavioral group (Tate et al., 2001).

Tailoring and Feedback

Feedback, whether automated or tailored has also been tested for effect on attrition, perceived support, and increases in successful weight loss outcome in internet interventions. Based on what a participant reports regarding dietary intake or physical activity a motivational response was generated either by a person or by a computer algorithm. For example, using the recommendations from the DPP, McTigue and colleagues (2009) assigned each participant a "nurse educator lifestyle coach" who monitored progress and provided support and suggestions to participants. Cussler et al. (2008) had staff who answered emails and posted bulletins to provide personalized feedback. Kelders, Gemert-Pijnen, Werkman, and Seydel (2010) evaluated an existing web-based intervention designed to help achieve and maintain a healthy body weight using the responses from 431 participants. A main suggestion for improvement within the site was a feature that provided feedback to the participants regarding self-reported

entries, as well as graphics to visualize any progress to goals (Kelders et al., 2010).

Participants in the behavioral therapy condition in Gold et al.'s (2007) intervention were provided weekly feedback on journal entries to increase motivation and perceived support. Participants in the behavioral therapy group in Tate et al.'s (2001) intervention were not only able to submit their online journals for feedback, they were also able to ask any questions or comment to a therapist during the course of the study. The participants in this group received an e-mail message each week that included a behavioral lesson on such topics as nutrition, exercise, or behavioral self-regulatory strategies as well as individualized feedback to their submissions that included recommendations and strategies for improvement (Tate et al, 2001). Participants in the tailored arm of Lewis et al.'s (2008) logged in significantly more often than the non-tailored group, important as logins are correlated with better program success.

Rothert et al. (2006) found significantly greater weight loss at follow-up in the tailored group than the information only condition (1.2% ± 0.4 versus 3% ± 0.3 change from baseline weight). Further, a greater proportion of participants in the tailored condition reported reading the weight management information than the information only condition, and were also more likely to report that the info was helpful, easy to understand, personally relevant, and would recommend the program to a friend (Rothert et al., 2006). Tate et al. (2006) saw similar results in an intervention that was based upon the effect of tailoring feedback and counseling in an online intervention. For both counseling groups, either in the computer automated or human counselor group, tailored feedback was given based on weight self-monitoring, caloric intake, and exercise. A tailored summary was provided based on self reported monitoring providing ongoing

support, praise, or motivation with suggested next steps. As mentioned, retention was high with this intervention, and both counseling feedback groups lost significantly more weight than the no counseling group, highlighting the importance of feedback and tailoring to the participant (Tate et al, 2006).

Several studies have sought to examine not a primary outcome based solely on weight loss or weight loss maintenance, but also to statistically analyze what features of the website were perceived most useful and resulted in positive correlations with weight loss maintenance, as well as suggested improvements. In addition to weight loss, Krukowski et al. (2008) examined specific features of a website and their relationship to weight loss was conducted during the 12 month weight loss and maintenance intervention. Twenty-four different components were included on a website accessible to 123 participants over a 12 month period. The components were broken down into seven factors: education/skill building; promote treatment compliance; promote self-monitoring; promote calorie goal compliance; promote exercise goal compliance; feedback; and social support. Of these factors, the feedback factor (included progress charts, journal feedback, BMI and W to H ratios, and target heart rate calculators) were the best predictors of success during the weight loss treatment. Study authors concluded that any web features that feature visual dynamic, interactive representations tailored to the individual displaying progress and self-monitoring feedback predict success in a weight supporting website (Krukowski et al., 2008).

Adherence, Logins, and Attrition

Whether it is in person or over the internet, adherence and continued participation is key to the success of participants. Many researchers addressed this in their

51

interventions. As attendance is a common variable to track in a face-to-face intervention, internet-based interventions often track attendance through frequency of logins to a website. McTigue and colleagues (2009) used this method by having the coach send a reminder message. Follow-up phone calls were also used if a participant had not logged-in for 21 consecutive days, with a follow-up protocol for those remained inactive (McTigue et al., 2009). Bennet et al. (2010) gave participants a goal to use the website at least three times a week, and provided incentives to keep participants on track. This was important because compared to the lowest quartile of website logins, those in the highest quartile showed greater weight loss (mean difference -4.16 kg over 12 weeks). Participants who met the login goal for at least 50% of the study also had greater weight loss (-3.30 ±3.78 kg) than those who met the goal for less than six weeks (-0.42 ± 1.87) (Bennet et al., 2010). Harvey-Berino et al. (2002) saw lower attendance in the internet condition over the 12 month intervention as compared to the in-person condition (39% vs. 54%) and concluded that as positive correlations are noted between attendance and weight loss, the lower attendance helped to explain the weight regain seen in the internet group. In the follow-up study, Harvey-Berino and colleagues (2004) saw similar results with a higher attrition rate seen with the Internet Support group. An additional analysis was conducted on the internet group to see if there were differences between those who completed assessments and those who did not. Subjects in the internet group who did not complete assessments lost less weight during the first six months of treatment (5.5 kg ± 4.3 vs. 9.3kg ± 6.3, p < 0.05) (Harvey-Berino et al., 2004).

Cussler et al. (2008) noted that the variation of weight maintenance within 12 months of the internet group (-20.9-12.2 kg within group) also suggested that the amount

of weight loss maintained could be related to how often a subject accessed the site. Significant correlations were seen between email use and articles posted and change in exercise energy expenditure, but not with change in weight or energy intake over maintenance period (Cussler et al., 2008).

A Scandinavian study sought to research the effect of a population-based, publicly accessible weight loss "club" online where participants paid to be a part of an online weight loss community that offered self-monitoring features including weekly weigh-ins, electronic food diaries and meal planning components, online interaction with experts, and personalized encouragement via email. After six months, participants who utilized the site with regards to regularly recording their weight, as well as those who logged in more often lost a significantly higher amount of weight. However, the biggest barrier for this study was attrition; of an initial sample size of 37,000 website subscribers, 21,000 dropped out before six months (Jonasson, Linne, Neovius, & Rossner, 2009). This data shows the ability of a website to obtain significant weight losses in the participants if attempts to understand compliance and attrition are also a part of the design.

That adherence to weight loss programs wanes over time is well known, therefore Steele, Mummery, and Dwyer (2007) sought to examine the association between amount of program exposure and changes in physical activity behavior and to identify predictors of program exposure in comparing a face-to-face delivery mode versus a web-based program. The researchers were interested in the characteristics of individuals who maintained a high exposure to the program and who were therefore more likely to make health behavior changes. Participants in the study were randomly assigned to one of three groups: a face-to-face group (FACE) that received weekly 1 hour in-person

sessions; a hybrid group (IM) who received the same content delivered over the internet but also participated in two additional face-to-face sessions; and an internet-only group (IO) who received everything over the internet with no in person contact. The program focused on behavioral strategies to increase daily physical activity. Outcome measures included self reported physical activity, self-efficacy for physical activity, social support for physical activity, and program exposure define by logins or attendance at in-person sessions. Weekly program exposure declined in all three groups each week. Use of nutritionist email contact for online groups was minimal (4 emails) and no emails were received by the exercise physiologist. Significant differences were found between those who were exposed to at least 75% of the program, with the FACE group showing the lowest exposure to the program out of all the groups (28%), followed by the IM group (51%) and finally the IO group showing the highest exposure to the program (53%). This was important because a significant association was found between 75% program exposure and mean minutes of physical activity from baseline to follow-up with a mean difference of approximately 124 minutes of physical activity per week between participants with and without at least 75% program exposure. Further, participants in the IO group were 2.96 times more likely to reach 75% program exposure and participants in the IM group were 2.40 times more likely to reach 75% as compared to the FACE group. Higher physical activity self-efficacy was a predictor for 75% program exposure for the group as a whole. Those participants in the FACE group were less likely to attend at least 75% of the sessions if they were classified as obese (Steele et al., 2007).

Tate et al. (2006) reported that total login frequency was associated with weight loss at 6 months in a study comparing automated-counseling, no-counseling, and human-

counseling. Further, greater use of the web-site used for the duration of the study was correlated with weight loss in the no-counseling group. The no-counseling group was not receiving any counseling or private websites, therefore all support came from the use of this website. Increasing numbers of online diary submissions for the two e-counseling groups were positively and significantly associated with weight loss as well (Tate et al., 2006). Tate et al. (2001) also discovered that logins decreased between months 3 and 6 for both groups, but participants in the behavioral therapy intervention still logged in significantly more often during the period than the education only group. Again, login frequency was significantly correlated weight change between baseline and six months in both groups (Tate, 2001). Krukowski et al. (2008) also concluded that overall website usage was strongly correlated with weight loss success, and that higher rates of logging in were a possible predictor of higher weight losses experienced in this particular study (Krukowski et al., 2008). Gold et al. (2007) found similar results: increased logins were positively significantly correlated to weight change, concluding that the higher login frequency in the behavioral group may have accounted for the increased weight loss seen in that group (Gold et al., 2007).

Lewis et al. (2008) examined differences in use patterns and perceived website usefulness between two internet condition attempting to determine if use patterns and perceived usefulness of the intervention websites predicted physical activity behavior change. Participants were randomly assigned to one of three groups: a tailored internet; tailored print; or standard internet with participants blocked to groups based on gender and stage of change. Participants in the tailored arm logged onto the study website significantly more than the standard arm. Regardless of the group, the higher number of

logins correlated positively with increased physical activity. The higher the number of times a participant set a goal, the greater the odds of meeting physical activity guidelines. Further, higher usefulness ratings of website features were associated with greater increases in physical activity (Lewis et al., 2008).

Social Support

As previously mentioned, social support is a potentially positive construct of health behavior change techniques. The web provides a medium for social support between individuals who may not otherwise receive support for health behavior changes at home or at work. While current research is still mixed in the role social support plays in the success of internet-based health interventions, this field is still a growing topic. A review of the effects of online peer interactions within virtual online communities agreed with these mixed results, but also asserted that this mixed evidence did not imply that virtual communities have no effect, but that with this initial research studies have been underpowered and difficult to control (Eysenbach, Powell, Englesakis, Rizo, & Stern, 2004). Further it is difficult to analyze the success of peer-to-peer interactions alone as most interventions use social support as part of a larger intervention.

McTigue et al. (2009) and Womble et al. (2004) both used the moderated chat room not only as a time to answer participants questions, but also to allow participants to share experiences with each other. Many interventions also use forums or bulletin boards to allow for participant to participant interaction in a less structured way than an organized chat (Harvey-Berino et al., 2002; Bennet et al., 2010; Webber et al., 2010). Forums allowed participants to log on and leave a message or question and return later to see if anyone had responded. Rothert et al. (2006) offered participants the option to

enroll a supportive "buddy" into the program. The "buddy" was sent email messages regarding the participant's weight loss efforts and encouraged support for the participant. Womble et al. (2004) also used a buddy program allowing members to email with other members of the eDiets.com website. Some interventions encouraged emailing between participants to promote social support (Harvey-Berino et al., 2002; Harvey-Berino et al., 2004) and participants were offered incentives for initiating contact with group members (Harvey-Berino et al., 2004). This often resulted in higher levels of perceived social or peer support. For example, Harvey-Berino et al. reported that the Internet Support condition reported statistically significantly more peer support contacts than the in-person groups (Harvey-Berino et al., 2004). Tate et al. (2006) provided a website to the two e-counseling conditions where participants could post on a message board to communicate with each other in the same condition (Tate et al., 2006). This concept was also seen in Tate et al. (2001) where participants in the behavioral weight loss group had access to an electronic bulletin board to facilitate social support between participants (Tate, 2001). Gold et al. (2007) also used a discussion board to promote interaction between participants. This intervention also found that changes in perceived social support were two times higher for the V-Trim structured behavioral condition than the eDiets.com public, unstructured internet program (Gold et al., 2007).

As mentioned, Krukowski et al. (2008) concluded that personalized feedback features on a website were most important for initial weight losses but that it was the social support factor (including online chats, biographical info and email addresses of other participants, the bulletin board) that was the best predictor of success during the weight maintenance period. Further, internet weight loss programs that use behavioral

therapy in the design of the intervention can increase perceived social support

(Krukowski et al., 2008) Cussler et al. (2008) also listed social support as a key

component of the intervention in order to "create new social support opportunities for

participants based on healthy habits, positive role models, and health-conscious role

modeling." This was accomplished by not only including the participant run support

groups, but also with the addition of a space on the site that allowed for open-ended

comments by participants to share their experiences. This "your week" section was

tracked for entries but the comments themselves were kept confidential so the

participants did not feel that their comments were being moderated (Cussler et al., 2008).

Hwang et al. (2010) wanted to examine the characteristics of social support for

weight loss experienced among members of Sparkpeople.com, a free, public online

weight loss support community. Using a mixed methods analysis consisting of surveys

and questionnaires to assess demographics, clinical characteristics, and social support

information, researchers also reviewed discussion forum messages for analysis of social

support themes. Sparkpeople.com participants included in the study reported using the

forums often for such activities on a daily basis as reading messages related to weight

loss on forums (56.8%), replying to messages (36.1%), and posting a message to start a

discussion related to weight loss (18.5%). Participants rated users as available,

responsive, empathetic, and welcoming. Researchers concluded that the major social

support themes included information and advice, encouragement and motivation, and

shared experiences. Subthemes included testimony/personal accounts, recognition for

success, accountability, friendly competition, and humor. All of these themes ranked by

participants were listed due to their perceived importance to website user. Reasons why

participants valued the use of this online website for support included as anonymity, non-judgmental interactions with other participants, convenience of use, and reciprocal support (Hwang et al., 2010).

Table 2.3: Summary of Theory-Based Constructs Used in Internet Interventions.

Study	SCT Constructs as Utilized in Web Interventions					
	Face-to-Face Component	Organized Discussions	Self-monitoring	Tailor and Feedback	Adherence/ Attendance	Social Support
Johnson et al. (2001)						X
Tate et al. (2001)	X		X	X	X	X
Harvey-Berino et al. (2002)	X	X	X		X	X
Harvey-Berino et al. (2004)	X	X	X		X	X
Womble et al. (2004)	X	X	X			X
Rothert et al. (2006)				X		X
Tate et al. (2006)	X		X	X	X	X
Gold et al. (2007)	X	X	X	X	X	X
Lewis et al. (2007)			X	X	X	
Jonasson et al. (2008)			X		X	X
Wanberg et al. (2008)					X	
Cussler et al. (2008)	X	X	X	X	X	X
Krukowski et al. (2008)	X	X	X	X	X	X
Morgan et al. (2009)	X		X			X
McTigue et al. (2009)	X	X	X	X	X	X
Harvey-Berino et al. (2010)	X	X	X		X	X
Bennet et al. (2010)	X	X	X	X	X	X
Kelders et al. (2010)			X	X		
Webber et al. (2010)	X		X		X	X
Hwang et al. (2010)						X

Summary

The TCOC was designed to promote social support and self-efficacy in adult women participating in a twelve-week behavioral lifestyle intervention. The TCOC was created to be an online adjunct to support the Transformation Challenge. Internet-based interventions have the ability to expand the reach of an intervention to populations who may not otherwise have access, or may provide additional support when face-to-face contact is no longer feasible.

Research has pointed to the successes of behavioral-based interventions focusing on the teachings of such strategies as self-monitoring, stress-management, goal setting, and relapse prevention (Powell et al., 2007). Behavioral interventions with a theoretical basis such as the Social Cognitive Theory can further these successes (See Table 2.3) (Sahay, Ashbury, Roberts, & Rootman, 2006). The design of the TCOC focused on these key components of a successful intervention in its design and implementation as it is important to translate the research of face-to-face interventions onto web-based designs in order to obtain similar successes.

The following hypotheses were tested to measure the effect of an online social network (TCOC) on perceived social support and perceived self-efficacy for adoption and maintenance of health behaviors as part of an existing behavioral-based lifestyle intervention:

Hypothesis 1: Perceived social support scores will be statistically significantly different (at the 0.05 probability level) among the female participants enrolled in the Transformation Challenge with an 'online community' website after completion of the

12-week behavioral lifestyle intervention as compared to perceived social support scores before participation.

Hypothesis 2: Perceived self-efficacy scores to adopt and maintain health behaviors will be statistically significantly different (at the 0.05 probability level) among the female participants enrolled in the Transformation Challenge with an 'online community' website after completion of the 12-week behavioral lifestyle intervention as compared to perceived self-efficacy scores before participation.

Sub-Hypothesis: Greater usage of the TCOC website by TC participants will be statistically significantly associated with improved outcomes in a dose-response manner with higher usage associated with higher perceived self-efficacy for adoption and maintenance of health behaviors; with higher perceived social support; and with improved eating and coping patterns.

Chapter 3

Materials and Methods

The Transformation Challenge Online Community (TCOC) was developed to examine the effectiveness of an online, theory-based website on the perceived social support and self-efficacy of women participating in a twelve-week behavioral lifestyle intervention: The Transformation Challenge. The Transformation Challenge (TC) was designed to be an annual twelve-week lifestyle modification program targeting women over the age of eighteen. TC is hosted by Equilibrium Fitness, a for-profit women's health club in San Luis Obispo, CA. The goal of the TC is to progress as a dynamic annual program that adapts its methods based on the evaluation and assessment of program successes and failures, thereby allowing participants to participate in the creation of a program that is tailored to their needs. The addition of web-based support (TCOC) to this program is the focus of this research.

Formative Data

In June 2009, following the conclusion of the pilot 12-week TC, a focus group was conducted by a Cal Poly research team with that cohort of participants to determine what aspects of the program had worked well and what factors were lacking. Strengths of the program identified by these pilot participants included the structured nature of the program where participants were required to attend boot camps, as well as the social/team environment. Small teams of participants were formed to encourage interaction and to provide social support to teammates during workouts and other activities at the gym. Participants pointed to both the teams and the structure as successful points of the program due to the accountability provided both through team support, as well as staff

support. Weaknesses identified included a perceived low level of emotional support specifically while the women were away from the gym. Additionally, several participants felt that the nutrition information was adequate, but support for emotions associated with making changes to diet was missing. *"The exercise part was really good but there's all the nutrition and all the emotions which is a whole other piece. The emotions, I was really surprised. I went through a whole lot of emotions….because there's such an emotional piece to what you're eating, to keep me on track I felt that I needed to connect with people more to keep making good choices."*   Statements such as, *"I felt that I needed to connect with people more to keep making good choices"* or *"…a lot of the meetings we were addressed by the experts which gave us a lot of information but we just need to talk to people"* indicated a need for further structured avenues for social support. Self-efficacy to adopt and maintain the behaviors after the program had concluded was lacking for some participants who noted that they did not feel that they could keep up with the workout schedule and healthy eating pattern without the guidance of a professional and was reflected through statements such as *"…I just don't know if I can keep this up for the rest of my life…"* and *"…that was my biggest fear and I asked my group…if anyone else was freaked out about the fact that, because we don't have to be there anymore, I'll stop making myself a priority because it's too easy…"* (Equilibrium Fitness: Transformation Challenge Focus Group, 2009).

The 2010 TC program incorporated activities based on summative evaluations from the pilot including: mandatory boot camps; nutrition and fitness educational seminars; food journals; attendance at weekly Weight Watchers meetings; and homework assignments highlighting health topics such as stress, overtraining, and nutrition basics.

Additionally, participants had access to the TCOC as an additional source of information and communication outside of the gym. In order to track results TC members had mandatory pre and post blood work, body circumference measurements, weight change, and Dual-emission X-ray Absorptiometry (DEXA) scans to assess body composition.

Program Background

The intent of the current research project was to determine whether an online website could provide the social support and self-efficacy components identified as missing from the 2009 TC. Transformation Challenge Online Community (TCOC) was developed to investigate the effect of an online social community as a way to extend the success the TC while addressing the noted missing components related to self-efficacy and social support. The goal of TCOC was to use the web as an innovative tool to offer support away from the face-to-face aspect of the TC program by providing a venue where participants could communicate both with each other and program staff to discuss the emotions involved during the 12-week program. The site was also designed to act as a resource for legitimate web-based information on diet and physical activity. As Weight Watchers was the primary source of dietary guidance for the participants, the TCOC focused on behavioral aspects of nutrition and weight loss.

Participants

The subjects of this study were adult women who signed up to participate in the TC at Equilibrium Fitness in San Luis Obispo. Fifty-eight women ages 18 to 70 initially responded to participation advertisements that ran for seven weeks on local radio, television and print media (see Appendix A for sample advertisement). Recruitment for the TC was conducted by Equilibrium Fitness through advertisements in local newspapers and on the gym website. Forty applications were received and initial

64

interviews were conducted by Equilibrium staff. Participants were scored according to interview questions on measures of perseverance, overall happiness, satisfaction with life, and satisfaction with work by Equilibrium staff. The program was free for the three women with top scores following their interviews and all other participants paid $1000 to participate in the program. In addition to the three sponsored positions, ten additional participants signed up for a total of 13 subjects for this pilot of the TCOC. Approval for this study was granted by the members of the Human Subject Committee at California Polytechnic State University at San Luis Obispo in January, 2010. See Appendix B for approved consent forms and Appendix C for approved questionnaires.

Website Design

Initial meetings were conducted between the director of the TC, the graduate researcher and the research advisor to collaborate on ideas for ideal design of the website to support program goals and facilitate online social support. Using the SCT theory as a basis, six separate sections were chosen for the website format: Homepage; The Locker Room; Ask the Expert; Food for Thought; Recipe Swap; and Videos (See Figure 3.1 and Appendix D for images of web sections).

Title	Purpose
Homepage	Updated weekly with announcements for upcoming week using TC staff manual as a guide for dates of speakers and events, weekly handouts, homework, bootcamp meetings, and weight watchers meetings to include for reminders. Also an area where participants communicated if they had missed an assignment or handout, or had questions about various aspects of the program that needed clarification.
The Locker Room	Designed to encourage social support. Updated with weekly questions to prompt online discussion, but was promoted as a place where participants could discuss any topic amongst each other, regardless if it was directly connected to the question of the week. Questions were not created ahead of time but chosen each week based what the participants were learning, and any comments or questions that were mentioned the week before. Using relevant discussion topics helped to generate discussion on the website.
Ask the Expert	An area where participants could ask nutrition and fitness questions to be answered by either the website administrator or by a Equilibrium Fitness trainer. This section also prompted activity from other participants who would join the discussion to add personal experiences and advice.
Food for Thought	The website administrator added weekly posts addressing behavioral weight loss strategies and motivational articles based off of answers to pre questionnaire questions.
Recipe Swap	An area where participants and staff shared healthy recipes with each other or asked for ideas in using different types of ingredients.
Videos and Media	As requested by the director of the Transformation Challenge, this section was designed to be a place for how-to videos, informational videos, and inspirational images to motivate the participants.

Figure 3.1: Summary of TCOC content.

Wordpress.com, a free blogging platform, was used to develop the TCOC website. The graduate researcher worked directly with Equilibrium Fitness' web-master to ensure that the Equilibrium Fitness server and domain name were used in the development in order to keep the location and link within the TC/Equilibrium Fitness control. A link to the TCOC website was put onto Equilibrium Home Page for easy access for participants. As part of data collection, each unique visit to the website, time spent online, and individual page visits was recorded. This was achieved using the free "Wassup" Wordpress plugin as part of the website design.

Questionnaire Development

Questionnaires were developed to assess social support, self-efficacy, health knowledge, food and coping skills before and directly after the intervention (see

Appendix C for pre – and post-intervention questionnaires). Questions included in the questionnaires were taken or derived from instruments that had been previously validated in other literature.

Perceived social support was measured pre- and post-intervention using questions adapted from a study of internet-based support interventions for diabetes self management (Barrera, Glasgow, McKay, Boles, and Feil, 2002). These questions focused on perceived peer and professional support, and contacts available to the participants during the first week of the intervention and at the end of the third month. The question was prompted with the statement "Consider the contacts you have had with people *during the past three months* and then tell us how much you agree or disagree with the statements below". Responses were scored based on a four point scale ranging from "strongly disagree" to "strongly agree" with higher scores given to the more desirable response.

Self-efficacy for adoption and maintenance of health behaviors was measured using questions from the Nutrition and Physical Exercise Self-efficacy scales (Schwarzer and Renner, 2000). Responses were scored based on a four point scale ranging from "Not at all confident" to "Very Confident" with higher scores correlating to higher perceived self-efficacy.

Knowledge questions were focused on the Dietary Guidelines for Americans. Zero points were given for all incorrect answers and one point was given for each correct answer. Additionally, eating and coping patterns were measured using Kushner's "Lifestyle Patterns Approach" which has been previously validated (Kushner, Mytko, Kushner, 2002). Examples of measured constructs include meal skipping, low fruit and

vegetable intake, poor body image, and emotional eating. Participant responses were coded using a four-point scale ranging from "Strongly disagree" to "Strongly agree." Questions that specifically asked about website use, preferences, and online comfort were derived from other questions previously used in "Computer Self-efficacy, Computer Anxiety, and Attitudes toward the Internet" (Sam, Ekhsan, Othman, and Nordin, 2005), "User Attitudes towards physical activity website in a randomized controlled trial" (Lewis, Williams, Dunsiger, Sciamanna, and Whiteley, 2008) and "Social Support in an Internet weight loss community" (Hwang et al., 2010).

Post-intervention the evaluations included open-ended questions to collect qualitative data. Participants were asked to share (in their own words) where they found support during the TC, what factors they felt were most effective in their success, and what features they would like to see in future TCOC versions.

<p style="text-align:center">Intervention</p>

A face-to-face introduction to the website and the project was provided to the participants during the first week of the TC. Pre-intervention questionnaires and Informed Consent were also administered at this time. Participants were told to answer the questions based on their personal feeling and experiences at that time. An overhead projector was used to explain the individual sections of the website. To familiarize participants with the website and to lower initial barriers to use, the session was interactive. Questions were asked such as, "What might you post here?" or "What would this section be useful for?" In addition, all participants were provided a handout that listed instructions for registration and accessing the website (see Appendix E for instruction handout). The following day an email was sent out to all participants

thanking them for their enthusiasm and interest in the TCOC and reminding them to register if they had not already done so.

TC online was only accessible to the participants after registration and approval by the graduate researcher. Participants were required to register with an email and identifiable user name. This registration was sent directly to the principal investigator's email inbox and the user could not sign into the website until approval was granted. Approval was granted to the 13 participants within 24 hours of registration. Individuals who attempted to register and sign in and who were not part of the 13 participants were sent an email thanking them for their interest, and informing them the website was currently only available to current participants and that it might open to the public in the future. Equilibrium staff and personal trainers were also granted access to the website. As part of the standard protocol, participants who lost their passwords were able to password reset using the automated system. There were several instances where the system did not work and the site administrator had to change the password manually after an email request was sent from a participant.

All communication between the site supervisor and the participants was conducted via email. Aside from the initial informational meeting there was no face-to-face contact between the researcher and the participants until the 12th week of the TC when post-intervention questionnaires were administered.

Beginning the sixth week, email prompts were sent to each participant with information on any updates or new posts on the website. These emails were sent each week and were personalized with the recipient's name to promote accountability and response.

TCOC was updated and maintained on a regular basis by the site administrator. While some TCOC pages were updated weekly, others were updated less frequently. These updates were participant driven based on interest and discussions. Table 3.1 displays each section of TCOC and the weeks that it was updated.

Table 3.1: Frequency of Weekly Updates Related to TCOC Sections.

Section	Week											
	1	2	3	4	5	6	7	8	9	10	11	12
Homepage	X	X	X	X	X	X	X	X	X	X	X	X
Ask the Expert	X	X	X		X	X		X	X	X		
Food for Thought	X		X	X	X	X	X	X	X	X	X	
Recipe Swap	X	X	X	X				X				
The Locker Room	X	X	X	X	X	X	X	X	X	X	X	
Videos and Media	X				X			X				

As noted on Table 3.1, "Homepage", "Food for Thought" and "The Locker Room" were the most frequently updated sections of the TCOC. While a basic outline of updates was developed before the initiation of the intervention, the content of these sections was primarily based on participant feedback and discussion on the website. Being responsive to participant interests and needs was an important part of the social support component of the intervention, as participants were not only able to interact with each other, but they were also supported by the site that was updated based on comments or questions. Much of the content for "Food for Thought" was based on common responses to the pre-intervention questions regarding eating and coping behaviors. Figure 3.2 displays the weekly content for "Food for Thought" and "The Locker Room.

Week	Food for Thought Theme	Locker Room Question
1	*Introduction:* Introductions and goal setting.	General introduction
2	*Goal Setting:* Continue discussions on goal setting and familiarizing with the program.	"How do/did you feel during your first week of bootcamp? Emotionally? Physically?"
3	*The Nighttime Nibbler*: Strategies for limiting overeating at night, a common barrier cited by nearly all the participants in the pre-intervention questionnaires.	"What did you think of Jean (Steel, motivational speaker) and/or Julian's (TC Director) talk on Saturday? How can you apply the concepts to your own life?"
4	*Are you Disconnected?:* Strategies for limiting overeating when not hungry, another common barrier to weight loss cited by the participants.	"Where have you found the most support away from the gym helping you to make this commitment? Or has all your support come from your TC friends and trainers?"
5	*Planning for Better Health:* Strategies for shopping and meal planning to encourage new habits and structure.	"After reading "I'd Like to Run Wild" please share your thoughts on how you it applies to your life. How might this help you in the future?"
6	*Eat Well – Move Well Follow-Up:* A follow up discussion to a holistic nutrition and chiropractic guest speaker to answer some questions regarding organic produce and food labeling as such.	"After attending "Eat Well – Move Well" last Saturday, was anything discussed that surprised you or contradicted what you already know? Share here and let's start a discussion!"
7	*Pushing Through:* Motivational article about maintaining the progress while facing plateaus.	"What is the smallest change you've made so far that has made the biggest difference?"
8	*Weighing in on Health Clubs:* Promoting discussions about comfort levels in health clubs for overweight or non-active individuals.	"Did you read "Food for Thought" this week? What do you think of the results of the study mentioned? How did you feel about health clubs before you joined the TC?"
9	*Emotional Eating:* Promoting awareness and discussion on the concept of emotionally-based eating behavior.	"After attending Liz's presentation on nutrition, did you think of any more questions after you left? Or were there any questions you weren't able to ask? Share them here!"
10	*Model Behavior:* The influence of others in your life on health behavior	"As you near the end of the Transformation Challenge how are you feeling? Are you excited, nervous, confident?"
11-12	*Documenting Success:* Information about successful weight loss via the national weight control registry.	"Speak up and tell your story! Share anything that's running through your mind on these last few days of the Transformation Challenge!"

Figure 3.2: Weekly "Food for Thought" and "Locker Room" Content Details.

Data Coding/Collection

Pre- and post-intervention questionnaire data collection was conducted on site at Equilibrium Fitness by the graduate researcher who coded and entered data into Microsoft Excel spreadsheets. All 13 participants completed the intervention and submitted both pre- and post-intervention questionnaires. Confidentiality was protected by keeping all identifying information in a locked cabinet. After all data was coded with unique identification codes the files that could link any personal information to specific data were destroyed. Averages were created when two numbers were circled on a response by the participant.

Definition of new variables

For the internet-based data, the following variables were defined: a visit; time spent online; active web user; passive web user; and non-user.

1. Visit: A "visit" to the website was defined as simply logging in to the site, regardless of time spent online.

2. Time Spent Online: "Time spent online" was collected via the Wassup statistical platform, but as the total time per participants was not automatically calculated, it was entered into excel to be calculated. Therefore for the purpose of this study minutes are the metric used for this variable. Seconds spent online were rounded up or down to the nearest whole minute if under, or over 30 seconds respectively. 30 seconds exactly was rounded up to the nearest whole minute.

3. Active Web-Users: An "active" website user was one who visited the website at least twice and commented more than 5 times throughout the course of the intervention.

4. Passive Web-Users: A "passive" website user was one who went visited the website at least twice but rarely commented or participated in any discussions (five or less

72

times). A passive user may have had a high number of visits to the TCOC but may never have commented.

5. Non-Users: A "non-user" was defined as any user who spent less than two minutes total time on the website, or never requested TCOC website registration.

Statistical Analysis

Data were first assessed to determine the normality distribution of the data for each variable. Mean, median and mode were calculated. Paired t-tests were used to test statistical significance for change in the variable mean between pre- and post-intervention scores. A paired t-test was chosen for analysis because the data consisted of dependent pairs with pre- and post-data inherently linked and specific to each individual. Paired t-tests are typically utilized based on the assumption that the data presented is from a normal distribution or that the sample size is larger than 30. Without these assumptions, the formulas have the potential to give improper results and lead to a type II error (failing to find a statistically significant difference when a true difference really does exist). However, given the small sample size the likelihood of committing a type 2 error was high regardless of the test for normality. Because of the need to test the difference between mean scores, regardless of data assumptions, paired t-tests were calculated to determine if statistical significance was achieved.

Null Hypotheses:

Hypothesis 1: Perceived social support scores will not be statistically significantly different at the 0.05 probability level among the female participants enrolled in the Transformation Challenge with an 'online community' website after completion of the 12-week behavioral lifestyle intervention as compared to perceived social support scores before participation.

- Hypothesis 1 was tested using the paired t-test using reported pre- and post-intervention data from each participant.

Hypothesis 2: Perceived self-efficacy to adopt and maintain health behaviors will not be statistically significantly different at the 0.05 probability level among the female participants enrolled in the Transformation Challenge with an 'online community' website after completion of the 12-week behavioral lifestyle intervention as compared to perceived self-efficacy scores before participation.

- Hypothesis 2 was tested using the paired t-test using reported pre- and post-intervention data from each participant.

Sub-hypothesis: Greater usage of the TCOC website by TC participants will be statistically significantly associated with improved outcomes in a dose-response manner with higher usage associated with higher perceived self-efficacy for adoption and maintenance of health behaviors; with higher perceived social support; and with improved eating and coping patterns.

- Sub-hypothesis was test by calculating change scores (post minus pre) for groups created by TCOC website usage (passive, user, non-user). Descriptive statistics were used to examine this association rather than inferential statistics because of sample size.

Chapter 4

Results

Baseline characteristics

Thirteen adult women who provided informed consent participated in this pilot study to determine the effects of an online community on perceived social support and self-efficacy as an addition to an existing behavioral lifestyle intervention. Participants had a mean age of 43 (±10.92) years, 85% of the women were married or partnered (11 yes, 2 no), and 54% had at least one child under the age of eighteen living at home at the time of the study (See Table 4.1).

Table 4.1: Transformation Challenge Online Community Participant Demographics at Baseline

Variable	N	Mean	Range	SD
Age (years)	13	43	(25-63)	10.92
Number children at home	13	1.154	(0-4)	1.405

The majority of the TC participants were educated as 85% had at least some form of education (including technical school) after high school, and 61% had at least an associate's degree (See Table 4.2).

Table 4.2: Transformation Challenge Online Community Participant Education Levels

N	Less Than High School	High School Graduate	Technical School and/or some college	Two Year College (Associate's Degree	Four Year College (Bachelor's Degree)	Graduate School (Masters or Doctorate)
13	0	2	3	3	2	3

Questions were also asked with regards to online comfort and previous use of an online health community. All but one of the participants scored herself as being comfortable using the internet for basic activities, and 80% scored themselves as being

"very comfortable" online. 54% of the participants reported a past use of a health program that offered online tool(s): of those who reported a past use, 57% had used the online tools occasionally while 29% reported using the tools often (See Table 4.3).

Table 4.3: Transformation Challenge Online Community Participant Previous Use of Internet

Variable	N	Mean	Range	SD
Online comfort[a]	13	3.692	(2-4)	0.630
	N	Yes	No	-
Previous online community use[b]	13	7	6	
	N	Never	Occasionally	Often
Previous use of online discussions[d]	7	2	5	0
Previous use of online tool[d]	7	1	4	2

[a]Coded on a scale of 1-4 (1= not at all comfortable, 4= very comfortable).

Self-efficacy

Descriptive statistics (mean, standard error, standard deviation) were calculated for each self-efficacy question asked at baseline and post-intervention. Mean difference scores were then measured using a paired t-test with probability set at ≤ 0.05 level (See table 4.4). Self-efficacy to maintain a health behavior "even if I do not have a professional helping me" was the only statistically significantly different response (p = 0.02). Self-efficacy to maintain a health behavior "even if my family has not made those changes with me," if "I feel stressed and busy," and if "I am tired" were all non-significantly different from baseline at follow-up. None of the questions regarding perceived self-efficacy to adopt a new behavior were statistically significantly different between pre- and post-intervention. Confidence specifically in the TCOC to aid in adoption and maintenance of health behaviors was also addressed. Confidence in TCOC to "help me make healthy lifestyle changes" significantly decreased between pre and post-intervention (p=0.046). This reduction may have been due to those participants who

were initially interested in the website but did not actually visit the TCOC or did not

understand how the website would complement the face-to-face elements of the TC

program.

Table 4.4: Comparison of Mean Scores Pre- and Post-Intervention and Paired-T Tests for Self-Efficacy to Adopt and Maintain Healthy Behaviors as Reported from Participants of the Transformation Challenge Online Community[a]

I feel confident that I can adopt a new behavior even if…	Pre-Mean (SD)	Post-Mean (SD)	Mean Difference (SD)	CI Range 95%	P-value
it takes a long time to get used to a new routine.	3.231 (0.439)	3.462 (0.660)	0.231 (0.725)	(-0.669, 0.207)	0.273
I have to make a lot of changes to what I usually eat.	2.923 (0.641)	3.308 (0.630)	0.385 (0.768)	(-0.849, 0.079)	0.096
I don't receive a lot of support from those close to me.	2.462 (0.877)	2.846 (0.899)	0.385 (0.870)	(-0.910, 0.141)	0.137
I need to create my own eating plan to follow.	3.154 (0.555)	3.346 (0.747)	0.192 (1.109)	(-0.863, 0.478)	0.544
I feel confident that I can stick with new healthy behaviors even if…	**Pre-Mean (SD)**	**Post-Mean (SD)**	**Mean Difference (SD)**	**CI Range 95%**	**P -value**
My family has not made those changes with me.	2.692 (0.855)	3.077 (0.494)	0.385 (0.870)	(-0.910, 0.141)	0.137
I do not have a professional helping me.	2.385 (0.768)	3.231 (0.599)	0.846 (1.144)	(-1.537, -0.155)	**0.020**[*]
I feel stressed and busy.	2.692 (0.855)	3.077 (0.760)	0.385 (0.961)	(-0.965, 0.196)	0.175
I am tired.	2.769 (0.725)	3.000 (0.816)	0.231 (0.832)	(-0.734, 0.272)	0.337
In general, I feel confident that I can…	**Pre-Mean (SD)**	**Post-Mean (SD)**	**Mean Difference (SD)**	**CI Range 95%**	**P -value**
keep up with an exercise program after I've been guided through the basics.	3.308 (0.480)	3.538 (0.519)	0.231 (0.832)	(-0.734, 0.272)	0.337
Make 'smart' food choices at the grocery store.	3.538 (0.660)	3.692 (0.630)	0.154 (0.555)	(-0.489, 0.181)	0.337
Prepare a healthy meal at home.	3.538 (0.660)	3.615 (0.506)	0.077 (0.760)	(-0.054, 0.382)	0.721
Continue the healthy lifestyle changes I learned after the Transformation Challenge is over.	3.308 (0.855)	3.615 (0.506)	0.308 (1.032)	(-0.931, 0.316)	0.303
In general I feel confident that… (n=12)	**Pre-Mean (SD)**	**Post-Mean (SD)**	**Mean Difference (SD)**	**CI Range 95%**	**P -value**
The transformation challenge online community will help me make healthy lifestyle changes	3.385 (0.506)	2.833 (0.835)	-0.583 (0.900)	(0.011, 1.155)	**0.046**[*]
Being able to continue using the TCOC after the challenge will help me maintain a healthy lifestyle.	3.308 (0.480)	3.083 (0.900)	-0.250 (1.055)	(-0.420, 0.920)	0.429

[a]Scale : 1-4 (1= not at all confident, 2= somewhat unconfident, 3= somewhat confident, 4 = very confident. *p $\leq$ 0.05

Social Support

Mean difference scores were also calculated for pre- and post-intervention questions regarding perceived social support using a paired t-test (probably set at ≤ 0.05). Statistically significant results were found for five of the six social support questions. Perceived social support scores increased after the intervention (see Table 4.5). This data reflected statistically significant increases in perceived emotional support (perceived ability to contact others with same struggles, $p = 0.018$; perceived ability to contact others who have similar concerns, $p = 0.035$), perceived support through advice (perceived ability to find others who could offer advice, $p < 0.001$), and perceived support through information (perceived ability to find others to obtain credible information, $p = 0.018$; perceived accessibility to others with current information about ways to make healthy changes, $p = 0.009$).

Table 4.5: Comparison of Mean Scores Pre- and Post-Intervention and Paired-T Tests for Perceived Social Support as Reported from Participants of the Transformation Challenge Online Community[a]

Question	Pre-Mean (SD)	Post-Mean (SD)	Mean Difference (SD)	CI Range 95%	P-value
I didn't really have people I could contact to express some of my personal feelings about making changes to my diet (SS Feel).	3.462 (0.660)	3.769 (0.439)	0.308 (0.855)	(-0.824, -0.209)	0.219
It was hard for me to find people I could contact who personally understood what it's like to struggle with weight issues (SS Struggle).	3.077 (1.038)	3.846 (0.376)	0.769 (1.013)	(1.381, -0.157)	**0.018**[*]
I could contact people who are also trying to lose weight just to express some of the concerns I had about my own problems (SS Concern).	2.769 (1.092)	3.538 (0.877)	0.769 (1.166)	(-1.474, -0.065)	**0.035**[*]
I had people I could contact to get information about understanding how to make healthy lifestyle changes (SS Info).	2.846 (0.555)	3.615 (0.870)	0.769 (1.013)	(-1.381, -0.157)	**0.018**[*]
It was easy for me to find people who could make personal suggestions about what has worked for them in losing weight and making healthy lifestyle changes (SS Suggest).	2.615 (0.650)	3.538 (0.660)	0.923 (0.641)	(-1.310, -0.536)	**0.001**[*]
I didn't have access to other people with weight issues who had current information about healthy ways to make changes (SS Access).	2.769 (0.927)	3.615 (0.506)	0.846 (0.987)	(-1.443, -0.250)	**0.009**[*]

[a]Social Support measured on scale of 1-4 (1= Strongly Agree, 2= Agree, 3= Disagree, 4 = Strongly Disagree)
*P < 0.05

To determine if website usage moderated the social support perception in TCOC, participant responses were further broken down into groups based on website activity: Active User, Passive User, or Non User (see Table 4.6). While statistical significance could not be tested due to small sample size, the average change score based on use category between Active User, Passive User, and Non-User suggested that those individuals who were either actively participating on the TCOC or accessing the site on a regular basis experienced better outcomes in perceived social support as compared to

Non-Users (0.805 for Active Users, 0.79 for Passive Users, and 0.39 for Non-Users).

The average change score for perceived social support in Active Users was nearly a 1

unit change between pre- and post-intervention.

Table 4.6: Social Support Reponses Pre- and Post-Intervention with Mean Difference by Level of Website Usage. Scores are Created by Subtracting the 'Pre' Score from the 'Post' Score[a].

Question	Change score by user vs. non user		
	Passive (n=4)	User (n=6)	Non (n=3)
I didn't really have people I could contact to express some of my personal feelings about making changes to my diet.	0.00	0.50	0.00
It was hard for me to find people I could contact who personally understood what it's like to struggle with weight issues.	0.75	1.17	0.00
I could contact people who are also trying to lose weight just to express some of the concerns I had about my own problems.	1.00	0.83	1.00
I had people I could contact to get information about understanding how to make healthy lifestyle changes.	0.50	0.83	0.67
It was easy for me to find people who could make personal suggestions about what has worked for them in losing weight and making healthy lifestyle changes.	1.00	0.83	0.67
I didn't have access to other people with weight issues who had current information about healthy ways to make changes.	1.5	0.67	0.00
Average change score based on use category	**0.79**	**0.805**	**0.39**

[a]Social Support measured on scale of 1-4 (1= Strongly Agree, 2= Agree, 3= Disagree, 4 = Strongly Disagree)

Post-intervention several additional social support questions were asked. These

questions were derived from questions asked at the TC focus group in 2009. In response

to the question of maintenance of support, 85% of the participants (11 of 13) reported that

they were very likely to continue contacting their group members for support following

the end of the TC, 8% (1 of 13) stated she was somewhat likely, and 8% (1 of 13) said

she was somewhat unlikely to continue contacting her group members for support.

Knowledge

Knowledge of the Dietary Guidelines for Americans was measured to examine changes in nutrition knowledge before and after the intervention. While there were small increases in correct answers for most of the questions, only the number of correct responses regarding the recommended daily maximum intake of sodium increased significantly (p=0.001) (see Table 4.7). Further, there was no change in the number of participants who could list the correct number of servings of vegetables recommended per day as both pre and post-questionnaires reflected no correct answers for this question.

Table 4.7: Mean Differences, Standard Deviation, and 95% Confidence Interval for Knowledge of Dietary Guidelines for Americans as Reported from Participants of the Transformation Challenge Online Community

Variable	N	Mean Difference	SD	CI Range 95%	P value[*]
Protein	12	0.250	0.622	(-0.645, 0.145)	0.191
Vegetable	13	0.000	0.000	--	--
Carbohydrate	12	0.167	0.577	(-0.167, 0.200)	0.339
Daily PA	13	0.154	0.555	(-0.489, 0.181)	0.337
Sodium	13	0.615	0.506	(-.921, -0.309)	**0.001**

[*]p≤0.05

Food, Eating, and Coping Behaviors

The food, eating, and coping behaviors questionnaire was included pre- and post-intervention to guide underlying themes for website content as well as to test differences in perceptions of eating behaviors and perceived barriers to health behavior changes. Three of the seven measures of eating patterns (mindless eating, overeating, and swing eating) displayed statistically significantly positive changes from pre- to post-intervention indicating improved perceptions of healthy eating patterns (see Table 4.8). Four of the seven measures of coping patterns improved (p≤0.05: emotional eater, body shame, procrastinator, and people pleaser) indicating improved coping with perceived barriers to healthy lifestyle changes.

Table 4.8: Comparison of Mean Scores Pre- and Post-Intervention and Paired-T Tests for Food, Eating, and Coping Patterns as Reported from Participants of the Transformation Challenge Online Community[a].

Variable	Pre-Mean (SD)	Post-Mean (SD)	Mean Difference (SD)	CI Range 95%	P value*
Meal Skipper	2.692 (1.032)	3.250 (0.452)	0.500 (0.957)	-1.079, 0.079	0.084
Nighttime Nibbler	2.615 (1.121)	3.308 (0.751)	0.692 (1.182)	-1.407, 0.022	0.056
Convenience Food	2.846 (0.689)	3.231 (0.927)	0.385 (0.870)	-0.910, 0.141	0.137
Fruitless Feaster	2.615 (0.961)	3.077 (0.954)	0.462 (1.330)	-1.265, 0.342	0.235
Mindless Eater	2.231 (0.832)	3.385 (0.650)	1.154 (1.345)	-1.966,-0.341	**0.009**
Overeater	2.154 (0.801)	3.192 (0.855)	1.038 (0.877)	-1.568, -0.508	**0.001**
Swing Eater	2.615 (0.870)	3.231 (0.725)	0.615 (0.870)	-1.141, .0090	**0.025**
Emotional Eater	1.615 (0.768)	2.308 (0.855)	0.692 (0.751)	-1.146, -0.238	**0.006**
Body Shame	1.231 (0.439)	2.154 (1.144)	0.923 (1.038)	-1.550, -0.296	**0.008**
Procrastinator	2.000 (0.816)	3.385 (0.650)	1.385 (1.193)	-2.105, -0.664	**0.001**
People Pleaser	1.923 (0.760)	2.538 (0.776)	0.615 (0.870)	-1.141, .0090	**0.025**
Busy Life	1.846 (0.899)	2.154 (0.899)	0.308 (0.947)	-0.880, 0.265	0.264
Doubt	3.308 (0.630)	3.692 (0.480)	0.385 (0.650)	-0.778, 0.008	0.054
High Expectations	2.154 (0.689)	2.615 (0.768)	0.462 (0.877)	-0.992, 0.068	0.082

[a] Coping behavior score measured on a scale of 1-4 (1= Strongly Disagree, 4= Strongly Agree)
* $P < 0.05$

Website Usage

The mean time spent online for all participants was 95.6 minutes (± 102.4) (See Table 4.9). The mean unique daily site access was 14.46 days (±16.16), meaning that throughout the 3 month intervention participants accessed the website on average 14.46 days. This number is defined by at least one login per day. The average number of posted comments was 7.38 (±9.35), with a range of 0 to 27 comments throughout the intervention.

Table 4.9: Summary of Transformation Challenge Online Community Usage: Means, Standard Deviations, and Ranges for Time Spent Online; Unique Number of Daily Visits; and Number of Posted Comments

Variable	N	Median	Range
Time Spent Online (Minutes)	13	66	0-287
Unique Daily Visits	13	9	0-53
Total posted Comments Over Twelve Weeks	13	4	0-27

Both website usage and website participation decreased over time during the intervention. Of the total number of comments posted throughout the intervention, 67% were posted in the first month of the intervention, 20% in the second month, and only 13% were posted in the final month. Of the total time spent on the website throughout the intervention, 57% occurred in the first month while 17% occurred in the final month (See Appendix F for total posted comments and time spent online by user and by month).

Ten of the thirteen participants accessed the website at least once during the intervention. Non-users listed reasons for not accessing the website such as: "I'm just not a computer person" and "Not Enough Time." When those who accessed the site (n=10) were asked about their activity while logged in, 73% reported posting or commenting, 55% read content thoroughly, and 18% skimmed the content. Based on levels of activity participants were split into three groups: Active users, Passive Users, or Non-Users (See Table 4.10).

Table 4.10: Total Comments, Total Time Spent Online and Level of Website Usage[a] by Participant ID Number:

ID#	Active	Passive	Non-User	Total Comments	Total Time Spent Online (Minutes)
1	X			26	261
2	X			9	88
3			X	0	0
4			X	0	2
5		X		5	85
6	X			18	71
7		X		1	107
8	X			27	287
9	X			6	244
10		X		2	20
11		X		0	26
12	X			7	53
13			X	0	0

[a]Active: visited the website and posted more than five comments; Passive: visited the website and posted less than five comments; Non-user: Never visited the website or spent two or less minutes online.

Website Perceived Usefulness

Ten of the thirteen participants filled in a written response to the statement: "I felt that the TC online provided me with support when I was away from the gym." Two participants never visited and left the question blank, and one participant stated she did not feel she visited often enough to answer the question (less than one minute spent online). Of the ten who answered, six participants agreed with the statement, two disagreed with the statement, one circled both "Agree" and "Strongly Agree" (a positive

response), and one circled both "Disagree" and "Agree" (a neutral or ambivalent response).

Participants were also asked if the email prompts that were sent beginning the second half of the program caused them to visit the website. Responses ranged from "Never" (23%), "Some of the time" (31%), "Most of the Time" (38%), and "Everytime" (8%).

The post-intervention questionnaire included questions on the "usefulness" of the various sections of the website. Twelve of the thirteen participants provided answers for this section. The "Videos and Media" section was perceived as being the least useful part of the website, while the "Homepage" was perceived as the most useful section. "The Locker Room" and "Food for Thought" were also perceived as being useful. Table 4.11 displays the perceived usefulness as reported on the post-questionnaire.

Table 4.11: Perceived Usefulness of Transformation Challenge Online Community Sections as Rated by Participants Post-Intervention (n=12).[a]

Web Section	Not at all useful	Somewhat useful	Useful	Very useful	Never accessed
Homepage	0%	18%	27%	45%	9%
Locker Room	0%	27%	18%	45%	9%
Food for Thought	0%	27%	18%	45%	9%
Recipe Swap	0%	45%	18%	27%	9%
Videos/Media	9%	36%	27%	0%	27%
Ask the Expert	0%	36%	27%	18%	18%

[a]Row totals equal 100%, individual cells equal percent out of 12 respondents.

An open-ended question was asked regarding web features participants would be likely to use on a future version of TCOC. Six responses were listed by participants. Of these, "Information" was listed the most often (six times), followed by "Recipes" (five times), "Chat" (three times), "Ask the Expert" (two times), "The Locker Room" (one time), and "Food for Thought" (one time).

Social Cognitive Theory Constructs from TCOC Comments

Comments that participants posted on the TCOC website were analyzed for Social

Cognitive Theory constructs. Of those who commented the following constructs were

noted: social support, barriers to weight loss, modeling success, request for information,

and skill building. "Other" was included for comments that were a short

acknowledgement or response to another participants comment and did not belong in any

of the other categories (See Table 4.12).

Table 4.12: Social Cognitive Theory Constructs Analyzed from Participant Posted
Comments on the Transformation Challenge Online Community.

Constructs	Total	% of Total posted comments (100 posts)
Social Support	47	47%
Barriers	15	15%
Modeling Success	35	35%
Information Request	15	15%
Skill Building	8	8%
Other	5	5%

Nine people posted a comment at least once during the intervention. Of the total 100

comments, social support was the most common construct. Examples of social support

included:

- "I don't know how you girls do it, but each one of the women in the TC inspire me."

- "I think I am still embarrassed sometime, but Equilibrium staff make me feel so welcome, that it helps alot(sic)! As well as the rest of the transformation challenge participants."

- "I am so glad to have to have a major support system and a team to be accountable to"

- "I have to say I am very tired trying to get used to my new lifestyle but it is a satisfying feeling knowing I'm doing this and having a bunch of other people on this journey with me."

Of the nine people who commented or posted throughout the intervention, 89% of the posted comments included modeling success as a construct. This included such comments as:

- "Journaling everything from the food I eat, water I drink, what type and duration of exercise, and my feelings or thoughts of the day have been my biggest change. I am aware of everything I eat and the positive feeling at the end of the day motivates me to get up at 4:30 a.m. to conquer another day."

- "Although it was difficult for me, I am proud that I went the distance. Hope I can walk, brush my hair, or any other daily activities. I'm crazy enough to look forward to the next boot camp."

- "I realized yesterday when I squatted down to pick something up off the floor at home that I could get back up without holding onto something. This is only after one week of boot camp and two weeks of cardio. I'm going to love seeing what I can do after three months!"

- "I have found that the most amazing thing has happened to me as a result of this challenge. Before I even received info about the challenge, I thought about my weight every single day, several times a day. Every time I saw my reflection in a mirror or a window, I cringed and felt very depressed…But alas, I only talked about it and really didn't even know where to start…Now, I have noticed that when I see my reflection or when I put on something that doesn't fit…I don't have that hopeless, defeated attitude…I know I'm the same person in the mirror (well, minus 3.6 pounds) but my attitude is different."

Social Cognitive Theory Constructs from Post-Intervention Questionnaires

As mentioned, open-ended qualitative questions were included to allow participants to share their feelings about available social support. One person did not answer these questions (n=12). When asked where they found social support during the TC, 85% of the respondents listed their teammates or other TC participants as a source of support. Family or friends outside of the TC and the EQ trainers or staff were listed by 31% of the respondents. The highest ranked source of social support by users of the

website, both active and passive, was teammates and/or other TC participants. Table

4.13 displays the breakdown of responses to the question "Where did you find social

support during transformation challenge?" based on TCOC usage groups. More than one

response may have been identified for each participant.

Table 4.13: Type and Number of Sources of Social Support as Reported on Post-
Intervention Questionnaires Based on Website Usage[a]. (Multiple answers accepted).

Listed Source of Support	Total number of times listed (%)	Active	Passive	Non-user
Teammates/TC Participants	11 (85%)	6 (55%)	3 (27%)	2 (18%)
Family or friends outside TC	4 (31%)	2 (50%)	1 (25%)	1 (25%)
Trainer or EQ Staff	4 (31%)	2 (50%)	2 (50%)	0
Emailing	1 (8%)	1 (100%)	0	0
Myself	1 (8%)	0	0	1 (100%)

[a]Active: visited the website at least twice and posted more than five comments; Passive: visited the website
at least twice and posted five or less comments; Non-user: Never visited the website or spent two or less
minutes online.

When asked what factors of the TC were most effective for success, "connecting

with others/team support" was mentioned most often with 56% of respondents reporting

this as important. Other factors listed were "Accountability/Discipline" (46%), "Weight

Watchers" (23%), "Boot Camp Class" (23%), and "Trainers" (15%). This was again an

open-ended question where participants could list more than one factor.

Participants were exactly split into groups of three with regards to the question

"How likely are you to continue contacting your group members for support after the TC

ends?" One participant did not answer this question. Of those who answered, 23% (3 of

12) reported that they were very likely to continue to use the TCOC for support after the

TC ended, and 23% (3 of 12) stated they were somewhat likely to use the TCOC site for

support after the end, 23% (3 of 12) stated they were somewhat unlikely, and 23% stated

they were very unlikely to use the TCOC for support after the TC ended.

Chapter 5

Discussion and Conclusions

The TCOC was a pilot study examining the effect of an added online social network and informational website on perceived social support and self-efficacy to adopt and maintain health behaviors within a currently existing fitness program for women. Perceived self-efficacy to maintain a health behavior "even if I do not have a professional helping me" was found to have increased significantly different pre and post-intervention. Confidence in the ability of the TCOC website to aid in adoption and maintenance of health behaviors decreased significantly between pre and post-intervention. While not expected, this is similar to the findings of Harvey-Berino et al. (2002) as the researchers concluded that some of the participants in the internet-arm of the study reported being unhappy with group placement as compared to those placed in the two face-to-face groups. Cussler et al. (2008) also reported that a significant number of participants in the internet-arm did not feel comfortable using the internet and this affected outcomes. Participants in a web-based intervention who may feel negatively towards use of the internet in general, or who may not feel comfortable using the internet may not feel confident in the use of a web-based community for support and guidance. Early enthusiasm for the TC overall and lack of understanding of the specific and separate role of the TCOC versus the TC may have influenced initial responses to questions.

Self-efficacy, a key-construct in the Social Cognitive Theory, has been found to be an important predictor of success in weight loss interventions (Sahay, Ashbury, Roberts, and Rootman, 2006; Bandura, 2004). Self-efficacy has also been demonstrated to be a mediator for self-regulation, an important component of successful weight loss

(Anderson, Winett, Wojcik, and Williams, 2010). As a result, an individual's perceived

self-efficacy for specific health behaviors may in fact approximate the likelihood for

success (Glanz et al., 2008).

Perceived social support also increased significantly for five of the six questions

between pre- and post-intervention. Three constructs were represented in these

questions: 1) perceived emotional support; 2) perceived support through available advice;

and 3) perceived support through access to information. These results point to the

potential ability of an online venue to support a behavioral intervention that is designed

using constructs from the Social Cognitive Theory. As researchers such as Lang and

Froelicher (2006) and Wing & Jeffrey (1999) found, perceived social support is also an

important predictor of success for weight loss and maintenance. Further, perceived social

support can impact the development of self-efficacy and the likelihood that an individual

can maintain the behavior despite facing barriers (Winett, Tate, Anderson, Wojcik, and

Winett, 2005).

In support of the basis of one of the hypotheses studied, social support remained a

key construct for the participants. In addition to questions regarding perceived social

support, the concept of support through peer relationships was also consistently noted as

responses to the open-ended questions in the post-questionnaire, as well as reflected

through website usage. The more often an individual was commenting and using the

website, the more likely other participants were to join in and use the site. Usage of

TCOC remained higher when more people were chatting, commenting, or actively

participating on the site. This supports the research of Webb et. al, (2010) which found

that website features that included activity from advisors, experts, or peers were more

effective than websites that did not include these interactions. Additionally, Krukowski et al. (2008) concluded that dynamic and interactive features on websites predict successful outcomes. Future website built to support programs should create dynamic, interesting content that will provide conversation and usage.

The sample size for this research was smaller than anticipated and therefore compromised the ability to detect statistically significant differences. In early discussions of the development of the TCOC, the expectation, based on the previous year's enrollment, was for 40-50 participants in this cohort. After the three sponsored positions were announced following the interview process, many potential participants chose not to sign up, perhaps due to the recession of 2009 having a significant impact on financial decisions. As a result, the sample size decreased to only 13 women. A sample size analysis was conducted using results from the current research showed that a sample size of at least 23 participants would have been needed to obtain 80% power for perceived social support and a sample size of 80 participants would have been needed to obtain 80% power for perceived self-efficacy to adopt and maintain health behaviors. Working with an existing program did not allow for any control of sample-size.

Further, the participants came from a convenience sample. Women not only self-selected to sign-up for the Transformation Challenge, but also most of the participants paid $1000 to be a part of the program. Therefore, the results of this study are not generalizable to the general public as the participants in the TC may have greater financial resources and may be more motivated to make lifestyle changes. A younger group of participants may have also interacted or utilized the TCOC differently than the current population. However, the findings in the current research may be translated to a

specific demographic of educated females who have financial resources and are therefore more likely to have access to and be comfortable with the use of a computer and the internet.

Analysis showed that there were no significant differences in basic knowledge of the Dietary Guidelines after completion of the TCOC. However, participants were successful in losing weight (combined total weight lost: 188.95 pounds; mean weight lost: 14.5 pounds; range: 1 – 28.2 pounds, see Appendix H) through a mixture of physical activity and nutrition behavioral modifications. No specific nutrition education was included as part of the TC program. Instead, the TC relied on Weight Watchers for dietary modifications. This was also a program change from the prior year when all nutrition education and modifications was provided by TC program managers. In the current program, neither the Weight Watchers program nor the TC focused on nutrition education to aid in the dietary changes. Weight Watchers instead uses a point system that reflects calories, fat, and fiber intake where participants learned to value high fiber, low fat food choices. As a result, changes in nutrition knowledge scores were not expected. While the Weight Watchers point system did have an impact on the dietary choices of the TC participants, familiarity of basic healthful knowledge such as recommended servings of fruits and vegetables a day also has the potential to affect dietary choices and should be considered as an additional focus in future TC programs. Future versions of the TCOC could include a fact-based, nutritional informational section in addition to the motivation format of "Food for Thought" in order to test the effectiveness of a web-based platform in improving knowledge scores if this is a goal of the program. Providing links or access to diet analysis sites could also empower participants in dietary self-regulation.

Although initially included in the pre- and post-questionnaire as a guide for content to include on the TCOC, significant differences were observed from pre to post-intervention in many of the coping and eating behavior questions. Responses to questions regarding personal feelings towards fruit and vegetable intake, portion sizes, and intake convenience food items significantly improved between pre and post-intervention. Responses to these questions may be indicative of positive behavioral changes that in-turn will lead to healthier diets and weight loss. Further, while this intervention focused on self-efficacy and social support, the topic of body image as it relates to health continued to remain an issue with these participants. This may be an important barrier to address. Coping and eating behavior scores for perceived "Body Shame" continued to be low both pre and post-intervention. Embarrassment about one's body, and expectancy that these feelings will no longer be an issue with a lower weight can have an effect on self-efficacy and perceived support as well as weight loss maintenance. While participating in the 12-week program a participant is surrounded by women who may share similar feelings, but once the program ends if the body shame is not addressed she may not feel confident to continue the behaviors on her own. She may also feel intimidated to go to the gym without the support of her teammates. Future interventions may want to include a body image component that in turn could positively affect self-efficacy and social support scores.

There were several areas for improvement with regards to data collection. As the TCOC was developed as an adjunct to an already existing program, the Transformation Challenge, the TCOC did not have control of the schedule or manner in which data was collected. The pre-intervention questionnaire was administered on the third day of the

94

introductory week instead of the first day. This day choice was based on the schedule provided by the TC program manager. By the third day participants had already been influenced positively by the excitement and anticipation of the challenge beginning. Potential bias and influence were noted on the day of pre-intervention data collection when participants asked the graduate researcher such questions as, "Do I answer this question for the way I felt before the TC started, or how I feel now?" Participants may have wanted to appear to have positive and willing attitudes towards the TC therefore influencing responses to questions regarding their feelings towards the TCOC. This was reflected by several participants who stated they felt strongly that the TCOC would provide them support on the pre-questionnaire, but who on the post-questionnaire stated that they were not computer people and never intended to visit the website. Overall lack of interest in using a computer and the internet could have been the reason for the significantly lower score for the self-efficacy question: "The Transformation Challenge Online Community will help me make healthy lifestyle changes." Further, the post-test was on the very last day of the intervention, following 45 minutes of testing for body fat percentages, weight loss, and circumferences. By the time participants were handed the post-test questionnaire many were expressing an interest to leave and hurried through the questions. To avoid this in the future pre-questionnaires should be administered prior to the launch of the TC, before any introductions or kick-off parties have an opportunity to bias the participants. Post-test questionnaires should be administered with ample time given to the participants to fill out their responses.

While participants were not explicitly told that their activity would be tracked on the TCOC, if a participant felt that she was being observed online she may have been less

likely to utilize the site due to discomfort of being monitored. Oppositely, a participant who knew she was being tracked may have wanted to appear enthusiastic for the program therefore commenting and utilizing the site more often than if she did not feel she was being monitored. As online research develops these are both situations that should be taken into consideration when collecting data to avoid bias.

Without a control group the study lacked the ability to differentiate between effects caused by the TC program in general versus effects due to TCOC participation. A future intervention could examine two groups: TC participants with no access to the TCOC as a control versus an experimental group who followed the same TC program but also had access to the TCOC. Analysis could then be performed between the two groups to examine significant differences in perceived social support and self-efficacy. Due to this limitation, an attempt was made to create a proxy control group separating participants into groups of "active users," "passive users", and "non-users" and then comparing scores in perceived social support. The small sample size again limited performing inferential statistics due to a lack of necessary power. However, seven participants did state that they felt that the TCOC supported them while they were away from the gym. This translates to just over half of the total participants in the TC (7 of the 13 participants) who actually visited the site at least once. Further, 6 of the 13 participants reported being somewhat likely or likely to use TCOC for support in the future. If the website was maintained after the conclusion of the face-to-face component of the TC as a place for the participants to continue communicating, the longer term impact of using a website in conjunction with an existing program could be investigated. This is in support of the Harvey-Berino et al. (2002) intervention that found that

participants in the internet-support group reported significantly more peer-support contacts than the frequent in-person group during the weight loss maintenance phase of the intervention. After the highly scheduled weeks of meetings and bootcamps that had kept the participants accountable during the face-to-face phase of the TC end, participants might turn to the website more for support and to continue contact with other participants.

Website Features and Use

As much research has shown, self-monitoring and feedback are predictors for successful behavioral interventions, both online and face-to-face (Cussler et al., 2008; Gold et al., 2007; McTigue et al., 2009; Krukowski et al., 2008,). Additionally, as Lewis et al. (2008) concluded, the most utilized and highest rated features of a website designed for a behavioral-based weight loss intervention were those that allowed for self-regulation, personalization, and interactive goal setting with feedback reports. Krukowski et al. (2008) saw similar results and concluded that any web features that display visual representations of progress, self-monitoring feedback, and included dynamic venues for social support were predictors of success. This pilot study was unable to provide these options due to budget constraints. The TCOC software was not sophisticated enough to provide these functions. Providing such features as online food journals, chat rooms, calorie counters, physical activity logs could not only help to refine future versions of the TCOC, but could also generate more participant activity on the website as was seen with Tate et al. (2001) where 46% of total logins for the behavioral-based online weight loss groups were due to online diary submissions. Further, a more sophisticated graphics-oriented website would have the ability to be more dynamic and appealing to the participants. Due to the inexpensive platform used for this study, some

of the pages may have appeared unchanged because of lack of new and interesting

graphics although comments and content had actually been updated. Site pages rated

highly by users were also those with the most frequent updates, perhaps reflecting the

importance of consistent updates and dynamic content ("Homepage," "Food for

Thought," and "The Locker Room"). As total number of visits to a website has been

shown to be significantly correlated with weight loss, keeping participants motivated to

visit the website could predict better outcomes (Tate et al., 2001; Harvey-Berino et al.,

2002, 2004, 2006, 2010; McTigue et al., 2009; Bennet et al., 2010). However, health

care organizations with limited budgets do have the ability to create an inexpensive, user-

friendly online community with very limited resources as was demonstrated in the current

research. Although a more sophisticated website is desirable, participants were still able

to utilize the site and actively support each other. This may increase the ability to

generalize the conclusions of the TCOC pilot to organizations that may not have the

financial resources to purchase and develop sophisticated software and website platforms

as the TCOC was created with virtually no budget.

As in many other weight loss studies (Perri and Corsica, 2002; Ayyad and

Anderson, 2000), whether online or in-person, participation decreased over time.

Because this particular study included a sample of participants who had paid to be a part

of the program, participants may have had more motivation at baseline than individuals

who did not join the program. Yet even those participants who actively commented and

used the website in the first month dramatically dropped in usage by the second month,

and were almost non-existent by the final month. Total time spent online for all

participants in the first month was 714 minutes, 319 minutes in the second month, and

down to 211 minutes by the third month. Of the total comments, 67 comments were

posted on the website in the first month, 20 in the second month, and only 13 in the final

month (see Appendix F). This decline in participation mirrors other weight loss

programs and likely also mirrors the natural loss of motivation seen over time in weight

loss regardless of the weight loss program. Future versions of the TCOC could focus on

analyzing what motivates users, perhaps collecting data half-way through the intervention

to continue updating the most popular items and refining the elements that are not being

utilized.

While the focus of the current research was primarily on perceived social support

and self-efficacy for nutrition-related behaviors, exercise was an important part of the

Transformation Challenge and likely influenced not only the weight and percent body fat

changes achieved by the participants, but also feelings of self-efficacy for making

behavior change. Future versions of the TCOC could also consider the importance of

exercise for behavioral weight loss interventions and the role it plays in the adoption and

maintenance of health behavior change. This could be achieved by providing online self-

monitoring tools that included both food journals but also physical activity tracking.

Weekly behavioral-based content could be tailored, based on results to address not only

nutrition-related weight loss topics but also motivational strategies to overcome barriers

for participation in physical activity.

Another focus for future versions of TCOC could be on greater utilization

"Recipe Swap" component. For this study, "Recipe Swap" remained participant driven

and not updated by the site administrator. However, on post-questionnaires participants

listed this as a high ranking feature for future versions. Updating this regularly could also promote more sharing between the participants.

Conclusion Statement

Online social networking and informational sites may support lifestyle modification programs but the current research was not able to demonstrate this. Small sample size, a convenience sample, constraints working with an existing fitness program, and an unsophisticated website are all potential reasons for the current findings. Future research could use sophisticated software to provide a dynamic educational site that includes self-monitoring with tailored messaging feedback using tailoring and include appealing content based on the components of a structured behavioral weight loss program. Other uses of social networking sites in the health field might include websites to support healthy dietary habits for children and families; support sites for chronic diseases such as diabetes and heart disease; and even employee wellness sites used in the workplace to promote positive health behavior changes. More research is also needed to determine the characteristics of those individuals who achieve successful outcomes using online support sites for weight loss.

The current research did document positive responses towards an online community that increased social support through an inexpensive, blog-platform based website. As internet use continues to grow, with more individual's accessing web-based resources for sources of health information support, the role of the online social community will continue to remain an area that is filled with opportunity for research.

References

Abusabha, R., & Achterberg, C. (1997). Review of self-efficacy and locus of control for nutrition-and health-related behavior. *Journal of the American Dietetic Association*, 97(10), 1122-1132.

Anderson, J, & Konz, E. (2001). Obesity and disease management: effects of weight loss on comorbid conditions. *Obesity Research*, 9(4), 326S-334S.

Anderson, E.S., Winett, R.A., Wojcik, J.R., & Williams, D.M. (2010) Social cognitive mediators of change in a group randomized nutrition and physical activity intervention: social support, self-efficacy, outcome expectations, and self-regulation in the guide-to-health trial. *J Health Psychology*, 15 (1), 21-32

Ayyad, C, & Andersen, T. (2000). Long term efficacy of dietary treatment of obesity: a systematic review of studies published between 1931 and 1999. *International Association for the Study of Obesity*, 1(2), 113-9

Bandura, A. Health promotion by social cognitive means. *Health Education and Behavior*. (2004) 31(2), 143-164.

Barrera, M., Glasgow, R.E., McKay, H.G., Boles, S.M., & Feil, E.G. (2002). Do internet-based support interventions change perceptions of social support?: An experimental trial of approaches for supporting diabetes self-management. *American Journal of Community Psychology*, 30(5), 637-654.

Bennett, G. G., Herring, S. J., Puleo, E., Stein, E. K., Emmons, K. M., & Gillman, M. W. (2010). Web-based weight loss in primary care: a randomized controlled trial. *Obesity*, 18(2), 308-313

Carpenter, K.M., Haisin, D.S., Allison, D.B., & Faith, M.S. Relationships between obesity and DSM-IV major depressive disorder, suicide ideation, and suicide attempts: results from a general population study. (2000) *American Journal of Public Health*, 90(2), 251-257.

Center for Disease Control and Prevention (2009). About BMI for adults. Retrieved May 4, 2010 from http://CDC.gov/healthyweight/assessing/bmi/adult_bmi/index.html

Cramer P, & Steinwert T (1998). Thin is good, fat is bad: how early does it begin? *J Appl Devel Psychol*, 19, 429–451

Cussler, E. C., Teixeira, P. J., Going, S. B., Houtkooper, L. B., Metcalfe, L. L., Blew, R. M., et al. (2008). Maintenance of weight loss in overweight middle-aged women through the internet. *Obesity*, 16(5), 1052-1060.

Dattilo, A.M., & Kris-Etherton, P.M. (1992). Effects of weight reduction on blood lipids and lipoproteins: a meta-analysis. *Am J Clin Nutr*, 56, 320-8

"Equilibrium Fitness: Transformation Challenge focus group" (2009). Unpublished Focus Group, California Polytechnic State University, San Luis Obispo.

Eysenbach, G, Powell, J, Englesakis, M, Rizo, C, & Stern, A. (2004). Health related virtual communities and electronic support groups: systematic review of the effects of online peer to peer interactions. *British Medical Journal*, 328, 1-6.

Filiault, S.M. (2008). Exercise for obesity treatment and prevention: current perspectives and controversies. In E.M. Blass (Ed.). *Obesity: causes, mechanisms, prevention, and treatment* (pp. 243-280). Sunderland, MA: Sinauer Associates, Inc.

Finkelstein, E. A., Fiebelkorn, I. C., & Wang, G. (2003). "National medical expenditures attributable to overweight and obesity: How Much, And Who's Paying." *Health Affairs*, W3 - 219-226.

Flegal, K. M., Carroll, M. D., Ogden, C. L., & Johnson, C. L. (2002). Prevalence and trends in obesity among US adults, 1999-2000. *JAMA*, 288(14), 1723-1727.

Flegal, K., Graubard, B., Williamson, D., & Gail, M. (2005). Excess deaths associated with underweight, overweight, and obesity. *Journal of the American Medical Association*, *293*(15), 1861-1867.

Fox, S. & Jones, S. (2009). *The social life of health information*. Pew Internet and American Life Project Retrieved August 2009 from http://www.pewinternet.org/Reports/2009/8-The-Social-Life-of-Health-Information.aspx

Glanz, K., Rimer, B.K., & Viswanath, K. (2008). *Health behavior and health education: theory research, and practice*. San Francisco, CA: Jossey-Bass.

Gold, C., Burke, S., Pintauro, S., Buzzell, P., & Harvey-Berino, J. (2007). Weight loss on the web:a pilot study comparing a structured behavioral intervention to a commercial program. *Obesity*, *15*(1), 155-164.

Harris, M. I., Flegal, K. M., Cowie, C. C., & Eberhardt M.S. (1998). Prevalence of diabetes, impaired fasting glucose, and impared glucose tolerance in U.S. adults. *Diabetes Care* 21(4), 518-524.

Harvey-Berino, J., Pintauro, S., Buzzel, P., Gold, E.C., DiGiulio, M., Moldovan, C. et al. (2002). Does using the internet facilitate the maintenance of weight loss? *International Journal of Obesity*, *26*, 1254-1260.

Harvey-Berino, J., Pintauro, S., Buzzel, P., & Gold, E.C. (2004). Effect of internet support on the long-term maintenance of weight loss. *Obesity Research*, 12(2), 320-329.

Harvey-Berino, J., West, D., Krukowski, R., Prewitt, E., VanBiervliet, A., Takamaru, A., et al. (2010). Internet delivered behavioral obesity treatment. *Preventative Medicine.*5, 123-128.

Hwang, K. O., Ottenbacher, A. J., Green, A. P., Cannon-Diehl, M. R., Richardson, O., Bernstam, E. V., et al. (2010). Social support in an internet weight loss community. *Int J Med Inform*, 79(1), 5-13.

Jonasson, J., Linne, Y., Neovius, M., & Rossner, S. (2009). An internet-based weight loss programme: a feasibility study with preliminary results from 4209 completers. *Scandinavian Journal of Public Health*, *37*, 75-82.

Jones, L., & Wadden, T. (2006). State of the Science: behavioural treatment of obesity. *Asia Pac J Clin Nutr*, 15(Supp1), 30-39.

Kelders, S.M., van Gemert-Pijnen., J.E.W.C., Werkman, A., Seydel, E.R. (2010). Evaluation of a web based lifestyle coach designed to maintain a healthy bodyweight. *Journal of Telemedicine and Telecare*, 16(1), 3-7.

Klaczynski, P.A.(2008). There's something about obesity: culture, contagion, rationality, and children's responses to drinks "created" by obese children. *J Exp Child Psychology*, 99(1):58-74.

Krukowski, R., Harvey-Berino, J., Ashikiaga, T., Thomas, C., & Micco, N. (2008). Internet-based weight control: the relationship between web features and weight loss. *Telemedicine Journal and E-health*, *14*(8), 775-782.

Kushner, R.F., Kushner, N.K., & Blatner, D.J. (2009). *Counseling overweight adults: the lifestyle patterns approach and toolkit*. Chicago, IL: American Dietetic Association.

Kushner RF, Mytko JJ, Kushner N (2002): Using a new symptom pattern approach for management of obesity: development of an introductory questionnaire [Abstract]. *American Journal of Clinical Nutrition.*75: 368S,

Lang, A, & Froelicher, E. (2006). Management of overweight and obesity in adults: behavioral intervention for long-term weight loss and maintenance. *European Society of Cardiology*, 5(2), 102-114.

Lewis, B., Williams, D., Dunsiger, S., Sciamanna, C., & Whiteley, J. (2008). User attitudes towards physical activity websites in a randomized controlled trial. *Preventative Medicine*, 47, 508-513.

Makris, A.P., Foster G.D., & Astrup, A. (2008). Diet composition and weight loss. In G.A. Bray, & C. Bouchard (Eds.), *Handbook of obesity: clinical applications* (pp269-290).New York, NY: Informa Healthcare USA, Inc.

McTigue, K. M., Conroy, M.B., Hess, R., Bryce, C.L., Fiorillo, A.B., Fischer, G.S., et al. (2009). Using the internet to translate an evidence based lifestyle intervention into practice. *Telemedicine journal and e-health*, 15(9), 851-858.

Mokdad, A. H., Bowman, B. A., Ford, E. S., Vinicor, F., Marks, J. S., & Koplan, J. P. (2001). The continuing epidemics of obesity and diabetes in the United States. *JAMA*, 286(10), 1195-1200.

Morgan, P., Lubans, D., Collins, C., Warren, J., & Callister, R. (2009). The Shed-It randomized controlled trial: evaluation of an internet-based weight-loss program for men. *Obesity*, *17*(11), 2025-2032.

National Heart, Lung and Blood Institute. (1998). Clinical guidelines on the identification, evaluation, and treatment of overweight and obesity in adults. *Obes. Res.* 6, 51S-210S

National Institutes of Health. (2007). Statistics Related to Overweight and Obesity. Retrieved December 13, 2009 from http://www.win.niddk.nih.gov

National Institutes of Health. (2008). Understanding Adult Obesity. Retrieved December 14, 2009 from http://win.niddk.nih.gov/publications/understanding.htm

Ogden, C. L., Carroll, M. D., Curtin, L. R., McDowell, M. A., Tabak, C. J. & Flegal, K. M. (2006). "Prevalence of overweight and obesity in the United States, 1999-2004." *JAMA* 295(13): 1549-55.

Ogden, C. L., Carroll, M. D., McDowell, M. A., & Flegal, K. M. (2007). Obesity among adults in the United States--no statistically significant chance since 2003-2004. *NCHS Data Brief*(1), 1-8.

Park, J.H., Schaller, M., Crandall, C.S. Pathogen-avoidance mechanism and the stigmatization of obese people. (2007). *Evolution & Human Behavior*, 28(6), 410-414.

Perri M.G. & Corsica J.A. Improving maintenance of weight lost in behavioral treatment of obesity. In: Wadden TA, Stunkard AJ, eds. *Handbook of obesity treatment*. NewYork: Guilford Press, 2002; 357-379

Perri, M.G., Foreyt, J.P., & Anton, S.D. (2008). Preventing weight regain after weight loss. In G. Bray & C. Bouchard (Eds.) *Handbook of obesity: clinical applications* (pp. 249-268). New York, NY: Informa Healthcare USA, Inc.

Phelan, S., Liu, T, Gorin, A, Lowe, M, Fava, J., Wing, R. et al. (2009). What Distinguishes weight-loss maintainers from the treatment-seeking obese? analysis of environmental, behavioral, and psychosocial variables in diverse populations. *The Society of Behavioral Medicine*,

Powell, L. H., Jones III, C., & Jones Jr.,C. (2007). Effective Obesity Treatments. *American Psychologist*. 62(3), 234–246.

Renjilian D.A., Perri M.G., Nezu A.M., McKelvey W.F., Shermer R.L., & Anton S.D. (2001). Individual Versus Group Therapy for Obesity: Effects of matching participants to their treatment preferences. *Journal of Consulting and Clinical Psychology*. 69(4), 717-21.

Rexrode K.M., Hennekens C.H., Willett W.C., Colditz G.A., Stampfer M.J., Rich-Edwards J.W., et al. (1997). A prospective study of body mass index, weight change, and risk of stroke in women. *JAMA*. 277(19), 1539-45.

Ritterband, L, & Tate, D. (2009). The science of internet interventions. *Annuals of Behavioral Medicine*, *38*, 1-3.

Ritterband, L, Thorndike, F, Cox, D, Kovatchev, B, & Gonder-Frederick, L. (2009). A behavior change model for internet interventions. *Annuals of Behavioral Medicine*, *38*, 18-27.

Rothert, K., Strecher, V., Doyle, L., Caplan, W., & Joyce, J., Jimison, H. et al. (2006). Web-based weight management programs in an integrated health care setting: a randomized, controlled trial. *Obesity*, *14*(2), 266-272

Roehling, M.V. (1999) Weight-based discrimination in employment: Psychological and legal aspects. Personnel Psychology Blackwell Publishing

Sahay, T., Ashbury, F., Roberts, M., & Rootman, I. (2006). Effective components for nutrition interventions: a review and application of the literature. *Health Promotion Practice*, 5(4), 418-427.

Sam, H.K., Othman, A.E.A., & Nordin, Z.S. (2005). Computer self-efficacy, computer anxiety, and attitudes toward the internet: a study among undergraduates in unimas. *Educational Technology and Society*, 8(4), 205-219.

Schwarzer, R. & Renner, B. (2000). Social-cognitive predictors of health behavior: action self-efficacy and coping self-efficacy. *Health Psychology*, 19(5), 487-495.

Simkin-Silverman, L, Wing, R, Boraz, M, & Kuller, L. (2003). Lifestyle intervention can prevent weight gain during menopause: results from a 5-year randomized clinical trial. *Ann Behav Med*, 26(3), 221-220.

Staffieri J.R. (1967). A study of social stereotype of body image in children. *J Pers Soc Psychol* 7, 101–104

Steele, R. M., Mummery, W. K., & Dwyer, T. (2007). Examination of program exposure across intervention delivery modes: face-to-face versus internet. *Int J Behav Nutr Phys Act*, 4, 7.

Svetkey, L.P., Stevens, V.J., Brantley, P.J, Appel, L.J., Hollis, J.F., Loria, C.M. et al. (2008) Comparison of strategies for sustaining weight loss: the weight loss maintenance randomized controlled trial. *Journal of the American Medical Association.* 299(10), 1139-1148

Tate, D., Wing, R., & Winett, R.. (2001). Using internet technology to deliver a behavioral weight loss program. *Journal of the American Medical Association*, *285*(9), 1172-1177.

Tate, D., Jackvony, E., & Wing, R. (2006). A randomized trial comparing human e-mail counseling, computer-automated tailored counseling, and no counseling in an internet weight loss program. *Arch Intern Med*, *166*, 1620-1625.

The Social Life of Health Information. (2009). *The Pew internet and american life project*. Retrieved (2009, November 28) from http://www.pewinternet.org/Reports/2009/8-The-Social-Life-of-Health-Information.aspx?r=1

Thoits, PA. (1982). Conceptual, methodological and theoretical problems in studying social support as a buffer against life stress. *J Health Soc Behav*, 23:145-59.

Thomas, P.R. & Stern S.S. (1995). Weighing the options: criteria for evaluating weight-management programs. Washington: National Academy Press, 1995.

Verheijden, M.W., Bak, J.C., van Weel, C., Koelen, M.A., and van Staveren, W.A. (2005) Role of social support in lifestyle-focused weight management interventions. *European Journal of Clinical Nutrition*. 59, Suppl 1, S179–S186.

Wang, Y., Beydoun, M, Liang, L, Caballero, B, & Kumanyika, S. (2008). Will all Americans become overweight or obese? estimating the progression and cost of the us obesity epidemic. *Obesity*, *16*(10), 2323-2330.

Wangberg, S.C., Bergmo, T.S., and Johnsen, J.K. (2008). Adherence in internet-based interventions. *Patient Preference and Adherence*, 2, 57-65.

Webb, T., Joseph, J., Yardley, L., & Michie, S. (2010). Using the internet to promote health behavior change: a systematic review and meta analysis of the impact of theoretical basis, use of behavior change techniques, and mode of delivery on efficacy. *J Med Internet Research*, *12*(1), e4.

Webber, K., Tate, D., & Quintiliani, L. (2008). Motivational interviewing in internet groups: a pilot study for weight loss. *Journal of the American Dietetic Association*, *108*(6), 1029-1032.

Webber, K., Gabriele, J., Tate, D., & Dignan, M. (2010). The effect of a motivational intervention on weight loss is moderated by level of baseline controlled motivation. *International Journal of Behavioral Nutrition and Physical Activity*, *7*(4).

Winett, R.A., Anderson, E.S., Wojcik, J.R., Winett, S.G., Bowden, T. 2007. Guide-to-Health: nutrition and physical activity outcomes of a group-randomized trial of an Internet-based intervention in churches. *Ann Behav. Med.* Jun: 33(2): 251-61.

Winett, R., Tate, D., Anderson, E., Wojcik, J, & Winett, S. (2005). Long-term weight gain prevention: A theoretically based Internet approach. *Preventative Medicine*. 41, 629-641.

Wing, R. (2008). Behavioral approaches to the treatment of obesity. In G. Bray & C. Bouchard (Eds.) *Handbook of obesity: clinical applications* (pp. 227-248). New York, NY: Informa Healthcare USA, Inc.

Wing, R. R. & Hill, J.O. (2001). Successful weight loss maintenance. *Annual Review of Nutrition.* 21, 323-341.

Wing, R. & Jeffrey, R. (1999). Benefits of recruiting participants with friends and increasing social support for weight loss and maintenance. *Journal of Consulting and Clinical Psychology.* 67 (I), 132-138

Wing, R., Papandonatos, G., Fava, J., Gorin, A., McCafferey, J., Tate, D., & Phelan, S. (2008). Maintaining large weight losses: the role of behavioral and psychological factors.. *Journal of Consulting and Clinical Psychology*, 76(6), 1015-21.

Wolf, A.M., Colditz, G.A. Current estimates of the economic cost of obesity in the United States. (1998). *Obesity Research*, 6(2), 97-106.

Womble, L., Wadden, T., McGuckin, B., Sargent, S., Krauthamer-Ewing, S., & Rothman, R. (2004). A Randomized controlled trial of a commercial internet weight loss program. *Obesity Research*, *12*(6), 2004.

Appendices

Appendix A

Advertisement for Transformation Challenge Recruitment

Appendix B

Informed Consent

INFORMED CONSENT TO PARTICIPATE IN:

Transformation Challenge Online Community

A research project on the benefit of using the internet as an enhancement to the Transformation Challenge is being conducted by Caitlin Leff in the department of Nutrition at Cal Poly, San Luis Obispo, California. The purpose of this study is to examine the effect of an online social community on adoption of healthy behaviors while participating in the Transformation Challenge, as well as the intent to maintain those behaviors after the program has ended.

You are being asked to take part in this study by using the Transformation Challenge Online Community Website as additional support while being a part of the Transformation Challenge, as well as after the 12-week program (should you find it helpful). You may use the website at your convenience as often or as little as you want. The website is designed to support your participation but your use of the website is not required as a part of the Transformation Challenge.

You will be asked to complete surveys both before and after the Transformation Challenge program. These questions ask about your feelings, attitudes, and confidence about health behaviors, nutrition knowledge, and using the internet. Questions will also be asked online to promote discussion and social support. Please be aware that you are not required to participate in this research and you may discontinue your participation at any time. You may also choose not to answer any questions you prefer not to answer.

The possible risks associated with participation in this study are minor but may include psychological stress from completing survey questions or from participating in online discussion groups. If you should experience any discomfort with the questions, please be aware that you may contact Caitlin Leff, Study Director, at (805) 756-2195 (email ckleff@calpoly.edu), or Dr. Lisa Nicholson, Cal Poly Nutrition Associate Professor, at (805) 756-7383 (email lmnichol@calpoly.edu).

Your confidentiality will be protected by keeping all identifying information in a locked cabinet. Participants will only be identified by code number on data sheets or other paperwork. After all data has been coded with unique identification codes the files that link any personal information to specific data will be destroyed. Only project coordinators will have access to the information. Your responses will remain private and only presented as anonymous or group data.

Potential benefits associated with this program include: increased nutrition knowledge, increased communication with other participants, increased confidence for making healthy lifestyle choices, and continued support during and after the Transformation Challenge.

☐ **YES,** *I give permission for my photo and video to be taken for presentations and media use.*

☐ **NO,** *I do not give permission for my photo and video to be taken for presentations and media use.*

If you have questions regarding this study or would like to be informed of the results when the study is completed, please feel free to contact Caitlin Leff at (805) 756-2195. If you have questions or concerns regarding the manner in which the study is conducted, you may contact Dr. Steve Davis, Chair of the Cal Poly Human Subjects Committee, at (805) 756-2754, sdavis@calpoly.edu, or Dr. Susan Opava, Dean of Research and Graduate Programs, at (805) 756-1508, sopava@calpoly.edu.

If you agree to voluntarily participate in this research project as described, please indicate your agreement by signing below. Please keep one copy of this form for your reference, and thank you for your participation in this study.

_____

Name of Participant

_____

Participant Signature   Date

_____

Participant Phone Number   Participant E-Mail Address

_____

Signature of Researcher   Date

Appendix C

TCOC Questionnaire

i.   Pre-Intervention Questionnaire

ii.   Post-Intervention Questionnaire

Transformation Challenge Online Community Questionnaire

A little bit about you:

1. Age _____

2. What is the highest level of education you completed? (check only one answer)
      ___Less than high school
      ___High school graduate
      ___Technical school and/or some college
      ___Two year college (Associate's degree)
      ___ Four year college (Bachelor's degree)
      ___Graduate school (Master's or Doctorate)

3. Are you married or partnered   ___Yes   ___No

4. Do you live alone?   ___Yes   ___No

5. How many children less than 18 years of age live in your household? _____

6. How comfortable are you in using the internet for various activities such as accessing information, emailing, or using discussion boards?

Not at all comfortable	Somewhat comfortable	Comfortable	Very comfortable

7. In the past, have you participated in a **health** program that offers optional online tools for support (ex: Weight Watchers Online, Spark People, Daily Burn, etc.)?
      ____Yes   _____No

    7b. If yes, did you personally use any of the online tools?
      ____Often   _____Occasionally   _____Never

    7c. If yes, did you participate in any web-based discussion or support groups?
      ____Often   _____Occasionally   _____Never

What do you already know about nutrition and exercise? The following questions (8-13) all concern current recommendations.

8. How many cups of fruits should a person eat each day?
   ___1 cups   ___2 cups   ___3 ½ cups ___4 cups

9. How many cups of vegetables should a person eat each day?
   ___1/2 cup   ___2 ½ cups ___3 cups   ___5 cups

10. How many ounces of whole grains should a person eat each day?
    ___4 ounces   ___6 ounces ___9 ounces ___12 ounces

11. How many minutes of total **daily** physical activity may be required to prevent weight gain?
    ___10 minutes ___30 minutes   ___45 minutes   ___60 minutes

12. What percent of your total calories should come from fat?
    ___10% or less ___15% or less   ___30% or less   ___50% or less

13. What is the maximum amount of sodium (in milligrams) that you should eat each day?
    ___1200 mg   ___2400 mg   ___3600 mg   ___4800 mg

The next 5 sections ask how you feel about healthy lifestyle changes. Please circle the answer that most closely represents you.

I feel confident that I can adopt a healthy diet…:

14. … even if it takes me a long time to get used to a new routine.

Not at all confident	Somewhat unconfident	Somewhat confident	Very confident

15. ….even if I have to make a lot of changes to what I usually eat.

Not at all confident	Somewhat unconfident	Somewhat confident	Very confident

16. …even if I don't receive a lot of support from those close to me.

Not at all confident	Somewhat unconfident	Somewhat confident	Very confident

17. …even if I need to create my own eating plan to follow.

Not at all confident	Somewhat unconfident	Somewhat confident	Very confident

I feel confident that I can stick with new healthy behaviors…:

18. …even if my family has not made those changes with me.

Not at all confident	Somewhat unconfident	Somewhat confident	Very confident

19. …even if I do not have a professional helping me.

Not at all confident	Somewhat unconfident	Somewhat confident	Very confident

20. …even if I feel stressed and busy.

Not at all confident	Somewhat unconfident	Somewhat confident	Very confident

21. …even when I am tired.

Not at all confident	Somewhat unconfident	Somewhat confident	Very confident

In general I feel confident that I can…

22. …keep up with an exercise program after I've been guided through the basics.

Not at all confident	Somewhat unconfident	Somewhat confident	Very confident

23. …make 'smart' food choices at the grocery store.

Not at all confident	Somewhat unconfident	Somewhat confident	Very confident

24. …prepare a healthy meal at home.

Not at all confident	Somewhat unconfident	Somewhat confident	Very confident

25. … continue the healthy lifestyle changes I learned after the Transformation Challenge is over

Not at all confident	Somewhat unconfident	Somewhat confident	Very confident

In general, I feel confident that …

26. …the Transformation Challenge **online community** will help me make healthy lifestyle changes.

| Not at all confident | Somewhat unconfident | Somewhat confident | Very confident |

27. …being able to continue using the Transformation Challenge **online community** once the challenge has ended will help me maintain a healthy lifestyle.

| Not at all confident | Somewhat unconfident | Somewhat confident | Very confident |

Consider the contacts you have had with people *during the past three months* and then tell us how much you agree or disagree with the statements below:

28. I didn't really have people I could contact to express some of my personal feelings about making changes to my diet.

| Strongly disagree | Disagree | Agree | Strongly Agree |

29. It was hard for me to find people I could contact who personally understood what it's like to struggle with weight issues.

| Strongly disagree | Disagree | Agree | Strongly Agree |

30. I could contact people who are also trying to lose weight just to express some of the concerns I had about my own problems.

| Strongly disagree | Disagree | Agree | Strongly Agree |

31. I had people I could contact to get information about understanding how to make healthy lifestyle changes.

| Strongly disagree | Disagree | Agree | Strongly Agree |

32. It was easy for me to find people who could make personal suggestions about what has worked for them in losing weight and making healthy lifestyle changes.

Strongly   Disagree   Agree   Strongly
disagree   Agree

33. I didn't have access to other people with weight issues who had current information about healthy ways to make changes.

Strongly   Disagree   Agree   Strongly
disagree   agree

Please read the following descriptions and circle the answer that best describes you:

34. I don't plan my meals or eat on a set schedule, and I often end up skipping meals.

Strongly   Disagree   Agree   Strongly
disagree   agree

35. I eat little during the day, and have most meals and snacks from dinnertime onward.

Strongly   Disagree   Agree   Strongly
disagree   agree

36. I eat foods that are convenient, ready-made, packaged, frozen, and microwavable; many of these foods are ordered-in or taken out from a restaurant.

Strongly   Disagree   Agree   Strongly
disagree   agree

37. I eat few fresh fruits and vegetables.

Strongly   Disagree   Agree   Strongly
disagree   agree

38. I mindlessly snack on foods throughout the day, whether I am hungry or not.

Strongly   Disagree   Agree   Strongly
disagree   agree

39. I eat too much food too fast; I don't know when to stop eating until it's too late and I feel stuffed.

Strongly   Disagree   Agree   Strongly
disagree   agree

40. I swing between eating "good" foods in public and overeating "bad foods in private, and this diet leaves me never feeling satisfied.

Strongly   Disagree   Agree   Strongly
disagree   agree

41. I turn to food for comfort when I'm stressed, anxious, lonely, or depressed.

     Strongly   Disagree   Agree   Strongly
     disagree   agree

42. I feel ashamed of my body and can be my own worst enemy in terms of thinking negative thoughts about myself.

Strongly   Disagree   Agree   Strongly
disagree   agree

43. I keep putting off losing weight and can never seem to get started.

Strongly   Disagree   Agree   Strongly
disagree   agree

44. I keep saying yes to everyone else, which keeps my own needs at the bottom of my "to-do" list.

Strongly   Disagree   Agree   Strongly
disagree   agree

45. I am juggling so many things in my hectic pace of life and don't know how to slow down and take time for myself.

Strongly   Disagree   Agree   Strongly
disagree   agree

46. I doubt that any new weight loss approach will work because nothing has helped in the past.

Strongly   Disagree   Agree   Strongly
disagree   agree

47. I feel disappointed even when I'm making progress, and I have a hard time living up to my own high expectations.

Strongly   Disagree   Agree   Strongly
disagree   agree

Thank you for taking the time to complete this questionnaire!

Transformation Challenge Online Community Questionnaire

What do you know about nutrition and exercise? The following questions (8-13) all concern current recommendations.

1. How many calories are in one gram of protein?
    ___2 calories ___4 calories ___6 calories ___10 calories

2. How many cups of vegetables should a person eat each day?
    ___1/2 cup ___2 ½ cups ___3 cups ___5 cups

3. How many calories are in one gram of carbohydrate?
    ___4 calories ___6 calories ___10 calories ___12 calories

4. How many minutes of total **daily** physical activity may be required to prevent weight gain?
    ___10 minutes ___30 minutes ___45 minutes ___60 minutes

5. How many calories are in one gram of alcohol?
    ___4 calories ___6 calories ___7 calories ___12 calories

6. What is the maximum amount of sodium (in milligrams) that you should eat each day?
    ___1200 mg ___2400 mg ___3600 mg ___4800 mg

The next 5 sections ask how you feel about healthy lifestyle changes. Please circle the answer that most closely represents you.

I feel confident that I can adopt a healthy diet…:

7. … even if it takes me a long time to get used to a new routine.

| Not at all confident | Somewhat unconfident | Somewhat confident | Very confident |

8. .…even if I have to make a lot of changes to what I usually eat.

| Not at all confident | Somewhat unconfident | Somewhat confident | Very confident |

9. …even if I don't receive a lot of support from those close to me.

| Not at all confident | Somewhat unconfident | Somewhat confident | Very confident |

10. …even if I need to create my own eating plan to follow.

Not at all confident	Somewhat unconfident	Somewhat confident	Very confident

I feel confident that I can stick with new healthy behaviors…:

11. …even if my family has not made those changes with me.

Not at all confident	Somewhat unconfident	Somewhat confident	Very confident

12. …even if I do not have a professional helping me.

Not at all confident	Somewhat unconfident	Somewhat confident	Very confident

13. …even if I feel stressed and busy.

Not at all confident	Somewhat unconfident	Somewhat confident	Very confident

14. …even when I am tired.

Not at all confident	Somewhat unconfident	Somewhat confident	Very confident

In general I feel confident that I can…

15. …keep up with an exercise program after I've been guided through the basics.

Not at all confident	Somewhat unconfident	Somewhat confident	Very confident

16. …make 'smart' food choices at the grocery store.

Not at all confident	Somewhat unconfident	Somewhat confident	Very confident

17. …prepare a healthy meal at home.

Not at all confident	Somewhat unconfident	Somewhat confident	Very confident

18. … continue the healthy lifestyle changes I learned after the Transformation Challenge is over

Not at all confident	Somewhat unconfident	Somewhat confident	Very confident

In general, I feel confident that …

19. …the Transformation Challenge **online community** helps me make healthy lifestyle changes.

| Not at all confident | Somewhat unconfident | Somewhat confident | Very confident |

20. …being able to continue using the Transformation Challenge **online community** once the challenge has ended will help me maintain a healthy lifestyle.

| Not at all confident | Somewhat unconfident | Somewhat confident | Very confident |

During the past three months **consider the contacts you have had with people and then tell us how much you agree or disagree with the statements below:**

21. I didn't really have people I could contact to express some of my personal feelings about making changes to my diet.

| Strongly disagree | Disagree | Agree | Strongly Agree |

22. It was hard for me to find people I could contact who personally understood what it's like to struggle with weight issues.

| Strongly disagree | Disagree | Agree | Strongly Agree |

23. I could contact people who are also trying to lose weight just to express some of the concerns I had about my own problems.

| Strongly disagree | Disagree | Agree | Strongly Agree |

24. I had people I could contact to get information about understanding how to make healthy lifestyle changes.

| Strongly disagree | Disagree | Agree | Strongly Agree |

25. It was easy for me to find people who could make personal suggestions about what has worked for them in losing weight and making healthy lifestyle changes.

| Strongly disagree | Disagree | Agree | Strongly Agree |

123

26. I didn't have access to other people with weight issues who had current information about healthy ways to make changes.

Strongly   Disagree   Agree   Strongly
disagree   agree

Please read the following descriptions and circle the answer that best describes you:

27. I don't plan my meals or eat on a set schedule, and I often end up skipping meals.

Strongly   Disagree   Agree   Strongly
disagree   agree

28. I eat little during the day, and have most meals and snacks from dinnertime onward.

Strongly   Disagree   Agree   Strongly
disagree   agree

29. I eat foods that are convenient, ready-made, packaged, frozen, and microwavable; many of these foods are ordered-in or taken out from a restaurant.

Strongly   Disagree   Agree   Strongly
disagree   agree

30. I eat few fresh fruits and vegetables.

Strongly   Disagree   Agree   Strongly
disagree   agree

31. I mindlessly snack on foods throughout the day, whether I am hungry or not.

Strongly   Disagree   Agree   Strongly
disagree   agree

32. I eat too much food too fast; I don't know when to stop eating until it's too late and I feel stuffed.

Strongly   Disagree   Agree   Strongly
disagree   agree

33. I swing between eating "good" foods in public and overeating "bad foods in private, and this diet leaves me never feeling satisfied.

Strongly   Disagree   Agree   Strongly
disagree   agree

34. I turn to food for comfort when I'm stressed, anxious, lonely, or depressed.

| Strongly
disagree | Disagree | Agree | Strongly
agree |

35. I feel ashamed of my body and can be my own worst enemy in terms of thinking negative thoughts about myself.

| Strongly
disagree | Disagree | Agree | Strongly
agree |

36. I keep putting off losing weight and can never seem to get started.

| Strongly
disagree | Disagree | Agree | Strongly
agree |

37. I keep saying yes to everyone else, which keeps my own needs at the bottom of my "to-do" list.

| Strongly
disagree | Disagree | Agree | Strongly
agree |

38. I am juggling so many things in my hectic pace of life and don't know how to slow down and take time for myself.

| Strongly
disagree | Disagree | Agree | Strongly
agree |

39. I doubt that any new weight loss approach will work because nothing has helped in the past.

| Strongly
disagree | Disagree | Agree | Strongly
agree |

40. I feel disappointed even when I'm making progress, and I have a hard time living up to my own high expectations.

| Strongly
disagree | Disagree | Agree | Strongly
agree |

The following questions are specifically about the Transformation Challenge (TC) Online Community. Please circle/check the answer that best describes your experience:

41. Did you access the TC Online Community at least once during the past twelve weeks?

        ____Yes   _____No

    41b. If yes how would you describe your activity on the site (Check all applicable):

        ____ Posted/Commented   _____Read thoroughly   _____Skimmed

  41c. If no, why not?

      _____

42. I felt that the TC online provided me with support when I was away from the gym.

    Strongly   Disagree   Agree   Strongly
    disagree   agree

43. In other research regarding online social networking, the following terms have been used to describe reasons why people used a website. How/why did you use the TCEQ website? Please rank the following with:

1 = the most personally important reason you used the website and 9 = the least important.

    _____   Information

    _____   Encouragement and Motivation

    _____   Shared /stories experiences with other participants

    _____   Outlet for emotions and feelings

    _____   Humor

    _____   Helped keep me accountable

    _____   Giving support to other participants

    _____   Getting supporting from other participants

    _____   Convenient

    _____   Other (please specify)_____

    _____   I never used the website

44. Half-way through the Transformation Challenge you were sent weekly email prompts giving you updates. How often did these prompts cause you to visit the website (please circle one)?

       Never   Some of the time   Most of the time   Every time

The following 6 questions are about *the usefulness* of the various sections of the TC website. Please circle one answer for each question.

45. The homepage with weekly updates

Not at all useful   Somewhat Useful   Useful   Very Useful   Never Accessed

46. The Locker Room

Not at all useful   Somewhat Useful   Useful   Very Useful   Never Accessed

47. Food for Thought

Not at all useful   Somewhat Useful   Useful   Very Useful   Never Accessed

48. Recipe Swap

Not at all useful   Somewhat Useful   Useful   Very Useful   Never Accessed

49. Videos and Media

Not at all useful   Somewhat Useful   Useful   Very Useful   Never Accessed

50. Ask the Expert

Not at all useful   Somewhat Useful   Useful   Very Useful   Never Accessed

51. Did you regularly attend the Weight Watchers meetings?
    ____Yes   _____No

52. Did you use the Weight Watchers online tools?

  Yes in conjunction with   Instead of   Did not
      TC Online   TC Online   use either

53. Did you use any other online health support/communities during the Transformation Challenge (ie: Spark People, Weight Loss Buddy, etc)?

        ____Yes   ____No

54. How likely are you to continue contacting your group members for support after the TC ends?

    Very unlikely   Somewhat unlikely   Somewhat likely   Very Likely

55. How likely are you to continue to use the TC website for support after the TC ends?

    Very unlikely   Somewhat unlikely   Somewhat likely   Very Likely

56. Where did you find social support during the Transformation Challenge?

_____
_____
_____
_____
_____
_____
_____
_____

57. In your own words please describe what factors of the TC were the most effective in helping you to succeed?

_____
_____
_____
_____
_____
_____
_____
_____

58. If you had access to the TC Online in the future, what features would you use (ie: recipe search, chat, information, other)?

_____
_____
_____
_____
_____
_____
_____
_____

59. Anything you would like to add about TC Online or the TC in general?

_____
_____
_____
_____
_____
_____
_____
_____

Thank you for taking the time to complete this questionnaire!

Appendix D

Example Screen Images of Transformation Challenge Online Community

Food For Thought Week 1

February 27th, 2010

by Caitlin

Welcome to week 1 of the Transformation Challenge. This week is dedicated to getting you tested, evaluated and ready to go. This week is also a good time to think about what you are hoping to gain from this experience. The next 12 weeks are all about transforming your life while providing you with the tools and resources to be successful.

The best part? You aren't alone. You are surrounded by personal trainers, weight loss coaches, nutritionist, doctors, and health experts who are dedicated to seeing you succeed. Not only that, you have 29 other new friends to turn to when things get tough, or when you want to share a personal achievement. Your fellow participants are a resource for you too, and you will be equally helpful to them. Use your resources whether they are experts in the field, or friends who understand what you are going through. All will be keys to your future success.

Food for Thought is a page dedicated to get you thinking and commenting in a positive, supportive environment. Each week a new post will be added to give you extra tips, strategies, and discussions to keep you motivated.

The Locker Room Week 1 Archives

February 27th, 2010

by Caitlin

Congratulations! You are on your way to a new healthier you!

The Locker Room is a place where you can communicate with your fellow TC participants, even when you are at home or work. It is a place where you can discuss anything you have been learning, your ups and downs, your emotions and frustrations, and your successes with each other.

So speak up and tell your story! You may surprised how much sharing your experiences can help someone else.

It's your community.

Transformation Challenge Community at EQclubs.com

Welcome to TC Testing Week

February 27th, 2010

by Caitlin

Workout Week #12 – Testing Week

Here you are, twelve weeks after you began your first workout.

Be proud of what you have accomplished. All that you have learned has equipped you with the tools for success. Just because the TC is ending does not mean the work is ending. But now you know that you have the ability, motivation, and drive to succeed.

You accomplished what many wish they could. Congratulations!

Posted in **Uncategorized** | **Comments (13)** | Edit

Check out the "Triple Threat" ladies getting active over the weekend! Aside from supporting each other to keep moving, they had a fun hike full of laughs, ticks, and a fake tarantula…? We'll let them tell you that story.

Recipe Swap

February 27th, 2010

by Caitlin

Need help coming up with some healthy creativity in the kitchen? Ask for recommendations from other TC participants!

Have a recipe that tastes good AND is good for you? Share it here for everyone to try!

Comments (20) | Edit

Appendix E

Participant Instructions for Registering and Accessing the
Transformation Challenge Online Community

Registering and Accessing Transformation Challenge Online Community

Two ways to access the website:

- **From the Equilibrium Club home page:** http://eqclubs.com
- **Directly at** http://eqclubs.com/TCblog

How to Register as a new user:

1. **Click "Register" at bottom left of login box:**
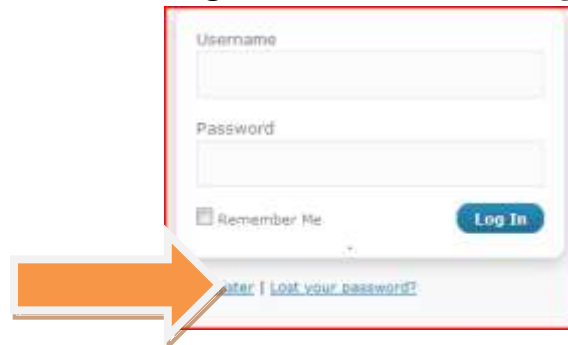
2. **Fill out registration form. Please use your real name as your user name. Click Register.**

3. **Check your email, you should receive confirmation shortly thanking you for registering, confirming your user name, and letting you know that approval is needed to complete registration.**

4. **Once you are approved, you will receive another confirmation email prompting you to login.**

ANY QUESTIONS/PROBLEMS: Contact Caitlin Leff: Caitlin@eqclubs.com

Appendix F

Posted Comments and Time online by Month and User

ID #	March Posts	March Time	April Posts	April Time	May Posts	May Time		*Total Posts*	*Total time*
1	20	190	0	34	6	37		*26*	*261*
2	9	56	0	15	0	17		*9*	*88*
3	0	0	0	0	0	0		*0*	*0*
4	0	0	0	0	0	6		*0*	*6*
5	5	83	0	0	0	2		*5*	*85*
6	13	48	5	21	0	2		*18*	*71*
7	1	40	0	47	0	20		*1*	*107*
8	11	118	11	86	5	79		*27*	*287*
9	2	112	3	107	0	25		*5*	*244*
10	2	20	0	0	0	0		*2*	*20*
11	0	26	0	0	0	0		*0*	*26*
12	4	21	1	9	2	23		*7*	*53*
13	0	0	0	0	0	0		*0*	*0*
TOTALS	*67*	*714 min*	*20*	*319 min*	*13*	*211 min*		*100*	*1248 min*
	67% Posts in March	**57% Time March**	**20% Posts in April**	**26% Time April**	**13% Posts May**	**17% Time May**			

Appendix G

TC Participant Final Physical Measurement Results

ID #	Location	Circumference Inches Lost	Pounds Lost	%BW Lost
#2	**Chest**	**0**	**-11**	**-0.05**
	Waist	-3		
	Hip	-1.25		
	Thigh	-3.25		
#3	**Chest**	**-1.5**	**9.3**	**-0.04**
	Waist	-0.5		
	Hip	-1.75		
	Thigh	-1		
#4	**Chest**	**-3.25**	**-26**	**-0.12**
	Waist	-4		
	Hip	-5		
	Thigh	-4.25		
#5	**Chest**	**-4.5**	**-11.5**	**-0.07**
	Waist	-3.25		
	Hip	-2.75		
	Thigh	-1.75		
#6	**Chest**	**-3**	**-17**	**-0.10**
	Waist	-4.5		
	Hip	-4.5		
	Thigh	-4.25		
#7	**Chest**	**-2.75**	**-2**	**-0.01**
	Waist	15		
	Hip	-0.5		
	Thigh	0.5		
#8	**Chest**	**-2**	**-10**	**-0.05**
	Waist	-2.5		
	Hip	-0.75		
	Thigh	-2		
#9	**Chest**	**-4.5**	**-25.25**	**-0.10**
	Waist	-3.5		
	Hip	-3.25		
	Thigh	-2.5		
#10	**Chest**	**-3**	**-20.05**	**-0.10**
	Waist	-5.5		
	Hip	-2.5		
	Thigh	-2.5		
#11	**Chest**	**-1.5**	**-9.65**	**-0.06**
	Waist	-1.5		
	Hip	-1.5		
	Thigh	-2.5		
#12	**Chest**	**-1.25**	**-1**	**0.00**
	Waist	-3.5		
	Hip	-2		
	Thigh	-2.5		
#13	**Chest**	**-1.5**	**-28.2**	**-0.10**
	Waist	-0.5		
	Hip	-1.75		
	Thigh	-1		
#14	**Chest**	**-3.5**	**-18**	**-0.04**
	Waist	-5		
	Hip	-2.5		
	Thigh	-1		

Appendix H

Food For Thought Weekly Content

Food For Thought Week 1

February 27th, 2010
by Caitlin

Welcome to week 1 of the Transformation Challenge. This week is dedicated to getting you tested, evaluated and ready to go. This week is also a good time to think about what you are hoping to gain from this experience. The next 12 weeks are all about transforming your life while providing you with the tools and resources to be successful.

The best part? You aren't alone. You are surrounded by personal trainers, weight loss coaches, nutritionist, doctors, and health experts who are dedicated to seeing you succeed. Not only that, you have 29 other new friends to turn to when things get tough, or when you want to share a personal achievement. Your fellow participants are a resource for you too, and you will be equally helpful to them. Use your resources whether they are experts in the field, or friends who understand what you are going through. All will be keys to your future success.

Food for Thought is a page dedicated to get you thinking and commenting in a positive, supportive environment. Each week a new post will be added to give you extra tips, strategies, and discussions to keep you motivated.

So take this first week as a chance to set goals for yourself.   What do you hope to learn? What are your weaknesses?   What current habits are you hoping to change, and what new healthy habits are you hoping to create?

And finally, what personal support do you feel will help you the most? Taking a look inside yourself to answer these questions is a great first step to making changes.

Share your goals below! Putting them out there is a great way to not only keep yourself motivated, but also help inspire your fellow TC peers!

Food for Thought Week 2

March 14th, 2010
by Caitlin

The Nighttime Nibbler

As mentioned last week each week on Food for Thought new posts will be added to give you extra tips, strategies, and discussions to keep you motivated throughout the TC.

This week we are focusing on strategies for those of you who consider yourselves "Nighttime Nibblers". If you are a "Nighttime Nibbler" you eat most of your calories starting at dinnertime, and continue snacking over the course of the night. This is a viscous cycle because when you wake up, you don't have much of an appetite for breakfast, or maybe even lunch, and then you arrive famished to dinner and can't seem to fill up until you go to bed.

Or, maybe you just don't feel a need to snack until you get home from work, or after you put the kids to bed, sit down in front of the television, and something prompts you to feel that nighttime = snacktime.

So what can you do about it? Here's your first tip:

TIP: Spread your meals and snacks evenly throughout the day.

This will probably require planning ahead, but that's a good thing. You want to be conscious of what you are eating. You are already doing this with Weight Watchers and your food journals.   Retraining the body and mind to pick up new habits takes practice!

*If you never eat breakfast, and occasionally eat lunch make the effort to eat lunch and a healthy, lower calorie and lower ww point, higher fiber midafternoon snack. This will reduce the likelihood that you will be starving when dinner rolls around. This is especially important now that you are doing morning workouts as you will feel even hungrier. Some afternoon snack ideas include:

- ½ cup low fat cottage cheese and an apple

- 100 calorie bag of popcorn and a 1 ounce portion of string cheese.

- ¼ cup hummus and baby carrots.

- 1 tablespoon peanut butter with apple slices.

- 6 ounces of low fat yogurt with high fiber cereal like Kashi.

*Start making time for breakfast even if you just don't feel hungry. Even eating a piece of fruit can help. Any of the above snacks can be used as starters for getting in the habit of eating a healthy breakfast.

Nighttime Nibbler Part 2

Now that you know the first step for taking control of your nighttime cravings, here is another tip to help you to adjust your eating habits:

Tip: Remove unhealthy food from the house.

Keeping unhealthy food in the house, even if it's hiding in the back of your cupboards, makes it much too easy to grab when those late night cravings come around. When trying to break a habit, it is so important to eliminate the things that may tempt you to move off track. So conduct a pantry makeover. Take out those cookies, chips, salty crackers, ice cream, candy and stop buying them. Replace those items with health snacks.

Here are some ideas for snack replacements. Take this list to the grocery store with you as a helpful reminder:

Fruits: Apple slices, bananas, berries, grapes, frozen 100% fruit bars, fruit cups packaged without syrup or added sugar.

Vegetables: Peapods, carrots, grape tomatoes (with low fat dip), low sodium vegetable juices, salsa.

Low-fat protein: Sliced turkey, hummus, low-fat bean dip, pre-portioned nuts

Low-fat dairy: String cheese, nonfat or low-fat yogurt or cottage cheese

Remember that small changes really add up to create lifelong habits.

SHARE:

If you are someone who doesn't eat much in the morning or afternoon, what are the reasons? Are you usually starving when dinner time approaches?

OR

What is your late night food craving? Share and maybe we can help you find a way to modify it to make a healthier version!

(VIEW PREVIOUS WEEK FOOD FOR THOUGHT ARCHIVES HERE)

Food for Thought Week 3

March 26th, 2010
by Caitlin

Are you Disconnected?

A problem cited by many people who have struggled with their weight is that they just can't stop eating. If this sounds like you, you are not alone.

I have heard a variety of reasons for this, from a childhood that was lacking food, to an overwhelming emotional response to food, to an unyielding portion distortion that exists at every restaurant in America. Whatever the reason, many people have lost the ability to register satiety. The mind body connection is no longer there.

But don't despair because this can be changed, you just need to retrain your body to listen to its signals. We are born with the ability to register fullness and you can teach your body and brain to connect again. It just takes some practice. By using the weight watchers point system, and writing down all your food you are already on the way to becoming aware. Here are a few more tips you can use to rewire your satiety signals*:

1. Slow down your eating: Since your goal is to become more mindful of how much you are eating, and how quickly you are eating it, limit your distractions so you are paying attention to what goes into your mouth. This does not mean you need to sequester yourself in a corner by yourself, but turn off the TV, put down your cell phone, step away from the computer, and enjoy your food whether it is with yourself and with someone else. Eat it slow, pay attention to the way it tastes and also to how your body is responding. Chew your food, put your fork down in between bites, and take a sip of water, and pay attention to any first signs of fullness. If full to you has always meant a feeling of discomfort after overeating, this first sign of fullness will feel very subtle to you like a slight pressure against your stomach. Fatigue, bloating, or feeling so stuffed that you need to lay down after eating are not normal signs of fullness.

2. Eat more food for fewer calories (or points): Fill 50% of your plate with fruits or vegetables, 25% of your plate with whole grains or starches, and 25% of your plate with lean protein. The fiber in fruits and vegetables will help fill you up with less calories so pile those on!

Soups (such as the Weight Watchers recipes that Liz mentioned) are also a great way to start the meal to help you fill up on lower calorie/point foods.

3. Have a plan for high risk portion traps: Places like buffets, grocery stores, and restaurants can sometimes be difficult places to keep control of your eating. Here are some strategies:

- **Buffets:** Avoid them or use the two-plate rule – fill your first plate with fruits and vegetables only and use the second plate for small amounts of only three of your favorite choices.
- **Grocery stores:** Don't go hungry; shop from a list; and choose two-for-one deals only if they are for healthy items, such a fruits, vegetables, whole grains (such as brown rice or whole wheat pasta), or lean proteins (such as fish or chicken).
- **Bread or chips on the table:** Take one piece of bread or 10 chips and send the rest back; or keep them out of reach on the opposite side of the table.
- **Family-style meals:** Keep food in the kitchen, not on the table, to help cut back on second helpings. Keep fruit and vegetable side dishes on the table to encourage seconds.

Retraining yourself to recognize when you are full as well as recognizing situations where you may be likely to overeat is all about awareness. By being a part of the Transformation Challenge, you have already made the decision to make healthy changes and with time these changes will become daily habits. If you want something to become a habit, you will have to practice. Practicing awareness is key to maintaining healthy eating habits.

From R. & N. Kushner, D. Blatner

Food for Thought Week 4

April 2nd, 2010
by Caitlin

Planning for Better Health

As Julian mentioned to you it generally takes about three weeks for a new habit behavior to stick, but between three and four weeks can also be a time when people begin to lose motivation. That makes this a good time to share what has changed so far in your life. What new habits have you started to form (aside from waking up in the wee early morning hours to come to the gym to workout..)?

I am going to share some of my daily/weekly habits too because we can all learn tips and tricks from each other. I know how precious time is, and I know the easy temptation of just "picking something up" on the way home, but I also have been fortunate enough to experience how good it feels when

you are taking care of yourself. It's amazing how improved diet can dictate your energy level, clarity, and ability to maneuver through difficult situations.

1. Make Lists.

I am a list maker. It helps me fall asleep at night knowing that somewhere I have a pad of paper filled with my "to-do's", and I have a feeling I'm not alone in this. I incorporate this list making into my kitchen as well. Every weekend I plan the week's meals ahead. This of course is fun for me because I love to cook and I love to think about food and how good something will taste, but it also helps me to stay healthy for the next week when I'm feeling significantly less motivated. I know which days I will be home late, which nights I will be working at home with virtually no time to look away from my computer, and which days I will have a bit more time. This way, I can plan to cook on those less busy days, and perhaps make extra to have as leftovers on the days where I don't have a second to spare except to throw some food in the microwave. For example, you can cook a bunch of chicken breasts to reheat and serve over salad or pasta. A really easy, basic chicken recipe for those who don't often cook is to buy a low sodium/low fat balsamic dressing and pour it over your boneless, skinless breasts and then bake the chicken at 375 for 20-30 minutes (or until it isn't pink in the middle).

I also do this with exercise, writing it down holds me accountable and helps me plan when I have more time to do a long cardio workout versus when I need to be in and out in a half hour.

Making a list ahead of time is also good for saving money, because if you have everything planned out, you can buy only what you need from the grocery store. Once you have planned your meals for the week make a shopping list too, and divide it up into "Meat", "Dairy", "Fruits and Veggies", and "Other". If you stick to your list you will have less impulse buys and more healthy choices.

2. Prep Now. For the non-foodies out there, this doesn't sound like much fun, but it's worth it when you come home after a long day and everything is ready for you. If you bought veggies to use later in the week in salads or other dishes, cut them up now and store them in airtight containers in your fridge.

Now you have quick food ready for you whenever you need it. Think of how easy it would be to make a tostada salad when you already have everything cut up. All you need is to heat up some black beans and ground turkey, throw some salsa on the top and you have a quick, and much healthier Mexican meal than you would find at a restaurant, or Taco Bell.

A professor of mine mentioned that some people have said that the prep work that it takes to cut up or peel a piece of fruit often deters people from eating more of them. If you have a bowl of already prepped fruit salad in your fridge, it's easy to grab in the morning to throw in a bowl of yogurt, or over some oatmeal, or even into a smaller container to take with you to work or school where you can easily eat it.

3. Eat Breakfast (and other meals).

You've heard this time and time again, but it's been proven that eating breakfast will help you to start the day off right, keep you going for the rest of the day, and help you lose weight. Why? Because those who skip breakfast are more likely to be so hungry later on that they end up overeating to compensate for that feeling of hunger. I know that if I skip a meal and I'm really hungry, I often end up opting for less nutritious foods. It's as if the body overrides any original healthy thoughts and goes straight for a quick bloodsugar fix. I end up going straight for the sugary, simple carbs and end up crashing soon after. It may feel counterintuitive but not skipping meals and eating more often (almonds, yogurt, fruit etc) will actually help you to lose weight and feel better overall. Your blood sugar steadies out instead of peaking and falling at such extremes.

Eating regularly requires planning ahead too so include breakfast, lunch, and snacks on your weekly meal plan so that you have everything ready in

your kitchen to make or pack when you are in a hurry or lacking in motivation.

Remember that choosing to eat for your health and better quality of life is just like any other new endeavor, it's not always easy in the beginning and it can take practice, but once it's a lifelong habit it just comes naturally and you won't even have to think twice anymore.

What tricks or tools have helped you to make your behavior changes? What has been the most difficult to change?

Food For Thought Week 5

April 11th, 2010
by Caitlin

EAT WELL – MOVE WELL FOLLOW-UP

Rex and Molly Stevens' talk on Saturday provided you with all kinds of information to think about. Some of it may have been familiar, but a lot of it may have been brand new. It's easy to feel overwhelmed, or as someone said on Saturday "information overload" when a lot of new information is presented to us. Here are a few highlights and clarifications from the talk that you may find helpful:

1. Rex and Molly discussed including fresh, local, organic produce in your diet every day. Aside from the abundance of Farmer's Markets SLO county has to offer (<u>visit here for dates/time</u>), you can also subscribe to a CSA. As Molly mentioned, a CSA allows you to pay for a share of produce from a local farm. Some can be picked up straight from the farm, and some offer an option of delivering right to your door. SLOVEG is one that delivers to your door (I subscribe to this one), allows you pay as you go (instead of in one large lump sum for a certain number of weeks), and offers produce from multiple farms so you get quite a variety of items. Their website is here: <u>SLOVEG</u>

2. If you join a CSA, or pick up a new food from the Farmer's Market and have absolutely NO idea what to do with it, never fear. Check out the <u>Pacific Coast Farmer's Market website</u> where you can look up a new fruit or veggie and find all kinds of recipes for preparing it.

3. A question was asked about the differences between "organic" and "natural" food labels. If you look closely many different claims are made, such as "100% Organic" or "Made with Organic Ingredients". How do you tell them apart?

- **100% Organic: If you see this statement, it will be alongside the USDA seal for a "Certified Organic" product. This means that every single ingredient in this product has to be organic, all the sugar, all the additives, everything.**

- **Organic: This label will also have the USDA seal, and at least 95% of the ingredients are organic. In fact, any product that is made up of at least 95% organic ingredients can have this label voluntarily.**

- **Made with Organic Ingredients: While these products include at least 70% organic ingredients, they do not yet meet the 95% required by the USDA, so they will not have the Certified Organic seal. You have to be careful for this particular label to see if the cost of the product is raised because they make this claim.**

- **Any product with less than 70% organic ingredients cannot make these claims and therefore cannot use the word "organic" on their label.**
- **Natural: Means the food must be free of artificial colors, artificial sweeteners, and preservatives.**

Whether you make the choice to buy organic or non-organic food, it is important to be informed and educated about what you are buying so you can decide what is best for you. It is the job of food corporations to make the label enticing to you so you will think, "Wow,

this is made with organic ingredients and whole grains? This must be good for me" even when it is a bag of cookies or a sugary cereal. It is our job as consumers to stop letting them get away with this.

These are only a few of the items covered in the talk. There was a lot of talk about supplementation, vitamin D, sunshine, and much more. If you have any more questions, or need any further clarification about something they talked about, please feel free to post the questions here.

Food for Thought Week 6

April 18th, 2010
by Caitlin

You, the Transformation Challenge Ladies are obviously motivated. Out of all the people who were interested, who attended an interview, who asked questions, or even who filled out an application but didn't follow through, you are the few who actually made the decision to be a part of the Transformation Challenge this year. This puts you

ahead of the curve. You signed up, you threw on your tennis shoes, and you were prepared to make some major life changes.

But for almost all of us no matter how ready we are to make big changes, barriers to making that change pop up along the way trying to block that new path we are attempting to create for ourselves. Whether it's our family who was completely supportive before they knew how much time we would be spending away from home, or our co-workers who don't understand why we won't split multiple bottles of wine at happy hour any more, or even our own self doubt creeping in, telling us it isn't working, or it's too hard or we just can't do it. These barriers are completely normal, but what is important is knowing how to fight back against them.

While the Transformation Challenge can seem intense at times, stuffing you full of workouts, education, nutrition, homework the point of all of it is to give you as many tools as possible to fight back against those barriers so that after the ten week program is over you are armed and dangerous.   You will be filled with the knowledge, the ability, and most importantly the confidence to know you can succeed. Not only that, you will have made amazing friends, whether they are your trainers or your teammates who will be there to support you when things get tough. Because let's face it, they will. Like everything else in life, making significant

changes takes time and patience, and many ups and downs before new habits stick. But after being in the Transformation Challenge, you will be resilient against this normal ebb and flo, knowing that even if you have one bad day, or one bad week, all is not lost. Don't be afraid to talk about it, whether it's on this blog or with each other. Equilibrium is now your extended family.

So now it's all about getting in as much as you can. Midway through this process can be tough. The initial excitement has worn off, and the finish line still seems far. But on those tough days remember that you are motivated and that original drive that made you stand up and sign up for the TC is still inside you somewhere. You are in control because you made the decision to start in the first place. And all the hard work you are doing now is going to pay off down the road as the small changes you make begin to turn into everyday habits.

Food For Thought Week 7

April 25th, 2010
by Caitlin

Weighing in on Health Clubs

Earlier this year the Journal of Nutrition Education and Behavior published an article "Attitudes of Overweight and Normal Weight Adults Regarding Exercise at a Health Club (*Journal of Nutrition Education and Behavior*, 2009; DOI: 10.1016/j.jneb.2008.08.005). The authors of this study surveyed 1,552 anonymous participants of all different backgrounds,

genders, and body types and asked about opinions of exercise improving appearance and health, as well as what may cause feelings of intimidation as a possible barrier to joining a gym. Of the 1,552 surveyed, 989 self reported that they were overweight.

The results of the study found that those who were overweight believed exercise improved their appearance and self image more than those categorized as normal weight. Those who responded to the survey who were overweight also reported feeling more embarrassed and intimidated about exercising in general, but also specifically intimidated about exercising around young people, fit people, or around gym sales people.

A conclusion was then made from this study that even though a person may truly believe that exercising and joining a health club may be good for him/her, the strength of the negative emotions associated with exercising outweighed the importance of health. This idea is something that is so common: we know a behavior is good for us, but within the cost/benefit analysis we do in our heads somehow we decide that the barriers to actually following through on that behavior are too costly, and the difficulty is not worth the benefit.

To join TC you must have done your own cost/benefit analysis. What was it? Take yourself back to those initial days when you first decided to sign up for the TC, or when you decided that you were going to be a participant no matter what. Something in your own life tipped the scale so that any barriers that existed before felt smaller than the benefits you saw from becoming a part of the TC.

And how do you feel now?

Food For Thought Week 8

May 4th, 2010
by Caitlin

Emotional Eating

Emotional stress can affect us in so many ways. It can make us irritable. It can make us fatigued or keep us up all night long. It can make us emotional and edgy. And for many of us stress can make us eat. Eat when we aren't hungry and eat more of the things that we normally don't even eat.

Sound familiar?

Many of us who fall victim to emotional eating do so when we are feeling stressed about something. There are many reasons for this and it really depends on the individual and his/her trigger. Some studies have shown us that certain sweet foods actually stimulate the release of chemicals to make us feel better, and we have become subconsciously addicted to this release. Some of us grew up in a home where fatty, sweet foods were given out as a reward so it has been wired into our brains to think, "Well today was a bad day, so I DESERVE this brownie." Shouldn't it be the other way around though? Shouldn't we think, "It's been a hard day on me and I DESERVE to give my body some nourishment to make it feel better, perhaps some roasted vegetables?" Well sure, that would be nice if that happened but not exactly realistic is it.

So what can we do?

Sharing your own experiences with stress/emotional eating with other people the way you did with Liz's discussion last Saturday can not only help you become more cognizant of your own habits that you may not even be aware of, but also may help others develop mindfulness and strategies of their own. You may always think of another TC woman as someone who inspired you, but you are just as much an inspiration to someone else. Knowing your own triggers and coping mechanisms, or helping someone else realize hers is so important to combating emotional eating, and often talking this out with other people who can relate to you can open up a door you may not even be aware of.

So what should you do? Keep the conversation going, whether it is with other TC participants, your trainer, on this blog, or even with yourself in a journal. Stay present and stop moving through eating on autopilot.   The goal is to become aware: Am I really hungry or am I just bored/tired/stressed/sad? Creating a habit for yourself to be mindful is a key step to stopping emotional eating. And often, creating a new habit or norm is easier when you are going through it with others to support and talk it out with you.

Are you an emotional eater? What is a trigger for you?

Food for Thought Week 9

May 13th, 2010
by Caitlin

Model Behavior

This past week I gave a talk in Santa Barbara on health and wellness programs for children. One of the topic s covered at this forum was the idea that children are influenced by those around them. Their parents, their peers, their teachers all have the opportunity to act as models for healthy behavior.

Then I began thinking about how this doesn't really change, that we are still very much influenced by those we spend time with. If your husband/wife/partner/friends/coworkers are engaging in some sort of behavior, whether it is celebrating happy hour with pizza and beer, or biking to work every day, whether you realize it or not you are influenced by their actions.

Researcher and author Brian Wansink (his book, "Mindless Eating" is excellent and a very easy read) has looked into this idea, and has found that people who are eating at a family style dinner, with multiple people sharing a meal together, that the portions we serve ourselves are directly influenced by the person who is sitting next to us. In other words, if we are sitting together at a table, and I take half a loaf of garlic bread, a whopping serving of lasagna, and a little bit of salad, then you are more likely to mimic that behavior. Or, if I instead serve myself smaller portions of bread and lasagna, and hefty portions of salad, you again will

be more likely to mimic my behavior. These are natural, subconscious social norms that influence us.

Even further, researcher Nicholas Christakis has looked at our influence on each other for bigger concepts such as obesity and happiness. Just like the old game 6 degrees of separation, he and his research partner have discovered that the closer you are socially to someone who is obese, or happy, or sad, the more likely you are to be one of these things (check out more about this under "Videos and Media)

And you are not only influenced by those around you, but you are constantly influencing others. It is a reciprocal action.

Then I began to think about you, the Transformation Challenge women. It's getting close to the end of the challenge and you have grown and changed so much throughout these past ten weeks. When you first began the challenge, you were looking to others to model behaviors for you: your trainers, other people who were avid exercisers, nutrition experts etc. But now YOU have all the tools to influence others. Think about how you felt before the challenge.

Sometimes when we get to the end of a guided experience, such as the TC, we start to feel nervous that we aren't ready to do it all on our own. But you have learned so much. Take what you have learned and be that model to influence others.

There are many women out there who want to make the change, but feel like they don't know how. Now you can be that model. You may already be doing this without knowing it for people around you.

Food For Thought

May 20th, 2010
by Caitlin

Documenting Success

Congratulations! It is the end of the last week of workouts for the 2010 Transformation Challenge! While it is surely a time to celebrate, for many this can also be a scary time. It is a time where it is now your job to

motivate yourself to get to the gym early, to eat healthy, to make time for your health. But just because the TC is ending, does not mean you will not have the support of your TC friends and trainers. It's just time to believe that you now hold the tools to succeed.

If you need a little inspiration try visiting The National Weight Control Registry (http://www.nwcr.ws/), a research site that tracks the characteristics and habits of over 5000 successful individuals who have lost weight and kept it off.

According to the research findings located on the website:

- 80% of persons in the registry are women and 20% are men. (WHOO HOO!!)

- Registry members have lost an average of 66 lbs and kept it off for 5.5 years.

    -
        o Weight losses have ranged from 30 to 300 lbs.
        o Duration of successful weight loss has ranged from 1 year to 66 years!
        o Some have lost the weight rapidly, while others have lost weight very slowly–over as many as 14 years.

- 98% of Registry participants report that they modified their food intake in some way to lose weight.

- 94% increased their physical activity, with the most frequently reported form of activity being walking.

    -
        o 78% eat breakfast every day.
        o 75% weigh themselves at least once a week.
        o 62% watch less than 10 hours of TV per week.
        o 90% exercise, on average, about 1 hour per day.

You can also read personal success stories here: http://www.nwcr.ws/stories.htm if you need a little inspiration.