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EXPLORING THE RELATIONSHIP BETWEEN EMOTIONAL BRAIN TRAINING, STRESS, DEPRESSION, FOOD ADDICTION, AND WEIGHT

Bailey Regina Adams
University of Kentucky, baileyregina.adams@gmail.com

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Bailey Regina Adams, Student

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Dr. Kelly Webber, Director of Graduate Studies

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THESIS

A thesis submitted in partial fulfillment of the
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Bailey Regina Adams

Lexington, Kentucky

Director: Dr. Kelly Webber, MPH, MS, RD, LD, Assistant Professor of Dietetics and Human Nutrition

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ABSTRACT OF THESIS

EXPLORING THE RELATIONSHIP BETWEEN EMOTIONAL BRAIN TRAINING, STRESS, DEPRESSION, FOOD ADDICTION, AND WEIGHT

Obesity is a complex issue; stress, depression, and food addiction, are several psychological conditions that can accompany an obesity diagnosis. Emotional Brain Training (EBT) was evaluated as a new approach to these conditions. Stress, depression, food addiction, and weight were assessed at baseline, after a seven week active intervention, and after a seven week no contact period. The final sample consisted of 26 obese adults. At seven week assessments, EBT participants experienced significant weight loss (p-value = 0.05) and decreased perceived stress (p-value = 0.035). Food addiction also decreased from 50% to 8.3% (or one participant). At fourteen week assessments, EBT participants maintained significant weight loss (p-value = 0.05) and increased perceived stress from the seven week evaluation (p-value = 0.012). The percentage classified as food addicted remained constant at fourteen weeks. This study suggests EBT is an appropriate intervention for weight loss and weight maintenance. In addition, EBT targets a variety of the complex issues surrounding obesity.

KEYWORDS: Emotional Brain Training, Adult Obesity, Psychological Effects, Food Addiction, Weight Maintenance

Bailey Regina Adams

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By

Bailey Regina Adams

Dr. Kelly Webber, MPH, MS, RD, LD

Director of Thesis

Dr. Kelly Webber, MPH, MS, RD, LD

Director of Graduate Studies

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Chapter One

Introduction

Approximately 35.7% of adult Americans are now classified as obese and 69% are classified as overweight or obese (CDC, 2013). The weight loss and diet industry has capitalized on this epidemic. Each day new diet solutions emerge, promising quick and lasting weight loss results. However, many popular weight loss solutions fail to recognize the complexity surrounding obesity. Stress, food addiction, and depression are some of these issues.

Emotional Brain Training (EBT), a mindfulness, stress management-based therapy, specifically targets the unique components that often plague those suffering from obesity. In contrast to many traditional weight loss treatments, EBT does not focus on caloric intake and physical activity. Rather, EBT provides the necessary tools and knowledge required to manage stress and emotions. First developed in 1979 by Laurel Mellin, EBT is based upon four general concepts. These concepts include: "it's not us; it's our wiring," "wiring triggers brain states," "brain states become persistent," "we can change our wiring (Mitrovic et al., 2011)."

The first concept, "it's not us, it's our wiring," evolves out of the early life stress model (Mitrovic et al., 2011). This model illustrates that the tendency or vulnerability to develop emotional and behavioral disorders is impacted by a variety of factors early on in life. Genes, environment, and the caregiving response throughout infancy and early childhood determine the validity of one's needs and wants, therefore, establishing either secure or detached brain connections (Loman et al., 2010), with secure attachment leading to better stress coping skills. Concept two is, "wiring triggers brain states."

Based on this concept, five brain states have been elucidated that correspond to specific areas of the brain (Mitrovic et al., 2011). An individual's specific wiring, developed throughout early infancy to childhood, determines the brain's reaction to perceived stress and threats. The third concept, "brain states become persistent," refers to the body's often static response to stress (Mitrovic et al., 2011). If an individual constantly perceives stressful stimuli very harshly, the brain will remain in that particular state. The reverse is also true; remaining in a positive brain state for long periods of time will also result in a more consistent state of joy and the ability to manage stress appropriately. The final concept of EBT is "we can change our wiring" (Mitrovic et al., 2011). Neuroplasticity is the concept that new neural connections in the brain can be formed and old connections can be broken, throughout the life span. In short, change to the physical brain structure is possible with dedicated EBT practice.

Problem

According to the World Health Organization, the prevalence of obesity has doubled since 1980 (CDC, 2013). Chronic weight related diseases such as cardiovascular disease, diabetes, and cancers have consequently impacted the lives of many Americans. Despite modern advances in medicine, obesity and other chronic weight related diseases continue to produce medical costs of more than $147 billion per year (CDC, 2013). Without identifying a solution to the weight problem facing millions, these numbers will continue to expand exponentially.

The solution to the obesity epidemic may appear simple on the surface. Decreasing calories and increasing physical activity should result in a shift in energy balance, equating to weight loss for an individual. However, approximately 82.2% of

overweight and obese individuals report increasing physical activity and 78.2% report decreasing caloric intake (French, Jeffery, & Murray, 1999). In short, diets and physical activity are not the only factors that contribute to weight loss.

Purpose

The purpose of this study was to evaluate the effectiveness of an EBT intervention for food addiction, stress, depression, and weight loss. The EBT intervention was also compared to a mindfulness/intuitive eating based intervention to determine which was better at affecting change in food addiction, stress, depression, and weight.

Research Objectives

EBT, a new approach to weight loss, was evaluated for producing changes in food addiction, stress, depression, and weight loss. The objectives of this study include:

1. Determine if an EBT intervention can produce changes in food addiction, stress, depression, and weight during a seven-week active intervention and seven-week follow-up period.
2. Evaluate the effectiveness of an EBT intervention compared to an intuitive eating-based intervention over a seven-week active intervention and seven-week follow-up period on changes in food addiction, stress, depression, and weight.

Research Questions

1. Can a seven-week active intervention and a seven-week follow-up period in EBT produce significant changes in food addiction, stress, depression, and weight?

2. Is EBT more effective than an intuitive eating based intervention in producing changes in food addiction, stress, depression, and weight?

Justification

Approximately one-third of the adult population of the United States is now classified as obese (CDC, 2013). If the obesity trend continues, by 2030 approximately 51% of adults will be classified as obese. Additionally, by 2048 all American adults would be classified as overweight or obese. This rise in obesity is correlated with a rise in health care costs. Upon reaching 2030, total health care costs related to excess weight would double every decade. This would equate to approximately $860-956 billion in total (Wang et al., 2008).

Historically, caloric intake and physical activity were identified as the primary factors in weight loss. Although diet and physical are important components of a healthy lifestyle, there are many contributing factors in obtaining and maintaining a healthy weight. EBT offers a new, innovative approach to the treatment of obesity. Stress management remains the key focus of EBT. Participants are given tools and strategies to tackle stressful situations and encounters. At this time, limited research is available on this topic. Therefore, it is critical to begin evaluating the effectiveness of EBT and its impact on stress, food addiction, depression, and weight loss.

Chapter Two

Review of Related Literature

The purpose of this study was to evaluate the effectiveness of EBT as an innovative approach to weight loss and explore the relationship between food addiction, stress, depression, and weight loss. This review of the related literature provides information on the following key topics: (1) Obesity and associated weight related psychological conditions, (2) Weight loss and weight maintenance strategies, and (3) EBT.

Obesity

Today, two-thirds of the adult population in the United States are classified as obese or overweight (CDC, 2013). Current theories attribute the obesity epidemic to an imbalance of energy, environmental influences, genetics, and many other factors (Frood, Johnston, Matteson, & Finegood, 2013). Despite varying theories, researchers agree; obesity is a very complex issue.

Obesity and overweight status is determined based upon an individual's body mass index. The table below illustrates the classifications of BMI and weight status.

Table 1. Body Mass Index and Weight Status.

BMI	Weight Status
Below 18.5 kg/m^2	Underweight
18.5-24.9 kg/m^2	Normal
25-29.9 kg/m^2	Overweight
30.0 kg/m^2 and above	Obese

Associated Weight-Related Conditions. There are a variety of physical conditions that accompany obesity. These include: type 2 diabetes mellitus; hypertension; dyslipidemia; coronary heart disease; stroke; osteoarthritis; liver/gallbladder disease; sleep apnea; and gynecological problems (CDC, 2013). This review will focus on the psychological aspects of obesity, such as depression, stress, and food addiction.

Psychological Effects. Psychological disorders encompass a variety of conditions. Several of these conditions can result in a decreased quality of life (Saarni et al., 2007). The Diagnostic and Statistical Manual of Mental Disorders V identifies and defines standardized diagnostic criteria for all psychological disorders. Some examples of these psychological disorders include: binge eating disorder, bipolar and manic depressive disorder, and generalized anxiety disorders. An increased risk of developing major depression, bipolar disorder, and panic disorder has been recently associated with obesity (Simon et al., 2006). Studies have also established an association between obesity and binge eating disorder (Zawaan, 2001).

Depression. Varying types of depressive disorder exist. These include: major depression, persistent depressive disorder, bipolar disorder, psychotic depression, postpartum depression, and seasonal affective disorder (NIMH, 2014). Of particular interest in this review are major depression, persistent depressive disorder, and seasonal affective disorder. The National Institute of Mental Health defines major depression as, "severe symptoms that interfere with your ability to work, sleep, study, eat, and enjoy life. An episode can occur only once in a person's lifetime, but more often, a person has several episodes;" persistent depressive disorder as, "depressed mood that lasts for at

least two years. A person diagnosed with persistent depressive disorder may have episodes of major depression along with periods of less severe symptoms, but symptoms must last for two years;" and seasonal affective disorder, "which is characterized by the onset of depression during the winter months, when there is less natural sunlight. The depression generally lifts during spring and summer" (NIMH, 2014).

The relationship between obesity and major depression has been evaluated throughout countless studies. Roberts et al. (2002) utilized community-based study information to explore the hypothesized relationship. The 2,298 participants included in this analysis ranged in age from 50-95 years. Results revealed participants categorized as obese were significantly more likely to be depressed than underweight or normal weight participants. Major depression was found in 15.5% of obese (compared to 8.8% in underweight and 7.4% in normal weight) participants (Roberts et al., 2002).

Utilizing the National Health and Nutrition Examination Survey, researchers also determined depression occurred more frequently in obese individuals than in normal weight individuals (Onyike et al., 2003). Females experienced greater rates of depression, aligning with existing literature regarding rates of depression in women (Kessler, 2003). In addition, rates of depression in women increased as the rate of obesity increased. In males the results were not as consistent. There was not a linear relationship found between weight and depression (Onyike et al., 2003).

Researchers have also begun to evaluate the effect of weight loss, in overweight and obese individuals and rates of depression. Data gathered from gastric-restrictive weight-loss surgery patients was utilized. Participants were evaluated through a depression inventory pre and post operation. Results revealed severely obese women had

significantly higher depression rates than men. One-year post operation, a significant decrease in depression and weight was observed. Subsequent year follow-ups did not reveal a significant change in depression; weight remained relatively stable (Dixon, Dixon, & O'Brien, 2003).

The cause of the association between depression and obesity has not yet been determined. One theory hypothesized, relates inflammation present in obesity and depression. Depression, like obesity, produces elevated inflammatory markers and inflammatory co-morbidities (Patel, 2013).

Stress. Stress is defined as "the generalized, non-specific response of the body to any factor that overwhelms, or threatens to overwhelm, the body's compensatory abilities to maintain homeostasis" (Sherwood, 2001). Researchers have only now begun to evaluate the relationship between stress and obesity. In a community sample of African Americans, researchers evaluated perceived stress and consumption of high fat foods to determine if a stronger relationship existed for overweight and obese participants. Results concluded that perceived stress significantly predicted responses for emotional eating and poor meal planning, for the entire sample (p-value, <0.01) (Sims et al., 2008). Perceived stress accounted for 8% of the variance in emotional eating for the entire sample, while 11% of the variance for overweight or obese participants. In this overweight or obese subset, perceived stress levels also predicted snacking on sweets (p-value, <0.05) (Sims et al., 2008).

An additional study focused on evaluating the effectiveness of an 8-week stress management intervention to enhance a weight loss program. Participants were recruited through an outpatient obesity clinic. A relatively small sample of 34 women was

included, with an average BMI of 38.17kg/m^2. Participants were approximately 47.35 years old + 11.64 years (Christaki et al., 2013). Study participants were randomly assigned into the treatment (stress management) or control group. Anthropometric measurements, Dutch Eating Questionnaire (DEBQ), Eating Attitudes Test (Eat-26), Health Locus of Control (HLC), and Perceived Stress Scale (PSS) were evaluated prior to and at the conclusion of the intervention. The results of this study concluded significant increased weight loss in the stress management group (4.44kg compared to 1.38kg, p-value, 0.012). Surprisingly, there was no statistical difference in the perceived stress levels in the intervention and control group (Christaki et al., 2013).

Food Addiction. Food addiction is a controversial topic argued by many researchers and professionals. Research in rodents has revealed food addiction exists (Avena, 2010). Following this discovery, the Yale Food Addiction Scale (YFAS) was developed by researchers to evaluate food addiction in humans. The YFAS evaluation tool was created through the modification of criterion utilized in the American Psychiatric Association, Diagnostic Statistical Manual – IV to diagnosis behavior addictions and substance dependence (Gearhardt et al., 2009). The following table illustrates the seven basic substance dependence criteria established by the DSM-IV and utilized to create the YFAS.

Table 2. DSM-IV Substance Dependence Criteria.

1.	Substance taken in larger amount and for longer period than intended
2.	Persistent desire or repeated unsuccessful attempt to quit
3.	Much activity/time to obtain, use, recover
4.	Important social, occupational, or recreational activities given up or reduced
5.	Use continues, despite lack of knowledge of adverse consequences
6.	Tolerance (marked increase in amount, marked decrease in effect)
7.	Characteristic withdrawal symptoms; substance taken to relieve withdrawal

The YFAS assesses participants by posing two to four statements regarding each of the seven substance dependence criteria listed above. Participants then evaluate the statement based upon a Likert-scale of frequency. Examples of these statements include: "I find that when I start eating certain foods, I end up eating much more than I had planned," and "I spend a lot of time feeling sluggish or lethargic from overeating." If a participant meets one of the seven substance dependence criteria, they are then classified as suffering from a food addiction (Gearhardt et al., 2009).

Researchers have utilized the YFAS tool to assess food addiction in a variety of populations. One study evaluated food addiction in male and female weight loss seeking patients (Eichen et al., 2013). Prior to the initiation of a weight loss intervention, 178 (74.7% female) participants were evaluated utilizing the YFAS. Participants also completed the Beck depression inventory scale to assess depression. At baseline, mean BMI for participants was approximately 36 – categorizing the majority of participants in the obese range. Results revealed 15.2% of participants were categorized as "food addicts" based upon the YFAS criteria. These participants also scored significantly

higher in the depression inventory assessment than participants not categorized as food addicts (Eichen et al., 2013).

Researchers have also evaluated 57 overweight and obese adults; approximately 68% of participants were female with a mean BMI of 38.2 (Burmeister et al., 2013). Participants completed the Yale Food Addiction Scale at the beginning and conclusion of the intervention. Other questionnaires were also completed: Binge eating scale (BES), Dutch Eating Behavior Questionnaire (DEBQ), Eating Self-Efficacy Scale (ESES), Anti-Fat Attitudes Questionnaire (AFA), Weight Bias Internalization Scale (WBIS), Objectified Body Consciousness Scale-Body Shame (OBCS-Shame), and Multidimensional Body Self-Relations Questionnaire (MBSRQ). Results revealed participants' with increased levels of food addiction were more likely to have more psychosocial distress. Higher levels of food addiction were also associated with increased depression (Burmeister et al., 2013). A greater number of food addiction symptoms was related to increased binge eating behaviors, emotional eating, and difficulty in controlling one's eating. Results also showed higher YFAS scores were associated with poorer short-term weight loss (Burmeister et al., 2013).

Weight Loss

Chronic weight related conditions are significantly improved with a 5-10% decrease in weight (Freedman, King, & Kennedy, 2001). The National Heart Lung and Blood Institute (NHLBI) researchers have extensively evaluated various studies to publish the Clinical Guidelines on the Identification, Evaluation, and Treatment of Overweight and Obesity in Adults. Published in 1998, researchers identified six key factors that facilitate weight loss. These factors include: dietary therapy; physical

activity; behavior therapy; combined therapy; pharmacotherapy; and weight loss surgery (NHLBI, 1998).

The first factor the NHLBI has identified, as a key component in weight loss, is dietary therapy. An appropriate dietary therapy for an individual seeking weight loss is a reduction in calories of 500 to 1,000 kcal/day. A reduction of calories of this magnitude will likely equate to an approximate 1-2 pound weight loss/week. The NHLBI also advises the reduction of calories to focus on reducing the caloric intake of dietary fat and carbohydrates. The second factor identified is physical activity. Physical activity, according to NHLBI researchers, is an integral part of a comprehensive weight loss plan for four specific reasons. These include: "modestly contributes to weight loss in overweight and obese adults, may decrease abdominal fat, increases cardiorespiratory fitness, and may help with maintenance of weight loss" (NHLBI, 1998). Weight loss seeking individuals are advised to participate in 30-45 minutes of physical activity, 3-5 days per week.

The third factor identified by the NHLBI is the utilization of behavior therapy. Behavior therapy is a unique counseling approach that allows healthcare professionals to appropriately understand the patient's motivation, change readiness, and a variety of other variables. Physicians, registered dietitians, and the weight loss team are encouraged to utilize behavior therapy to promote optimum success for weight loss seeking patients. The fourth factor identified by the NHLBI is the combination therapy approach. Weight loss, as previously discussed, is a multiple faceted issue. Incorporating dietary and behavior therapy and physical activity are key components to success. The NHLBI also identifies appropriate and approved medications may be

consumed under a physicians order and supervision, if the drug proves beneficial for a patient's weight loss and overall health. Lastly, weight loss surgery is discussed by the NHLBI researchers as an appropriate option for "clinically severe" obese patients – given conventional methods of weight loss prove unsuccessful. In order to be considered for weight loss surgery, patients should be "at high risk for obesity-associated morbidity or mortality" (NHLBI, 1998).

Maintaining Weight Loss. Maintaining weight loss is difficult. There are many compounding factors that influence an individual success. These factors include: weight loss goals, weight loss patterns, physical activity, dietary intake, eating patterns, binge eating, self-monitoring, life-events and social support, stress and coping, attitudes, motivation, locus of control, self-efficacy, personality, depression/mood and psychiatric diagnosis, and weight cycling (Elfhag & Rössner, 2005). Researchers have found that a common characteristic among individuals who regained weight was poor coping skills. Very often individuals with poor coping skills eat in response to stressful situations and utilize food as a mood regulator. Following weight loss, increased reported depressive symptoms has predicted poor weight loss maintenance (Elfhag & Rössner, 2005).

Also published in the Clinical Guidelines on the Identification, Evaluation, and Treatment of Overweight and Obesity in Adults by the NHLBI are identified goals and appropriate strategies for weight loss maintenance. The NHLBI encourages the continuation of a combination therapy approach (despite reaching the desired weight), consisting of dietary and behavior therapies and physical activity. Therefore, the key to maintaining the weight loss is to continue the lifestyle changes that were necessary to achieve the weight loss success.

The National Weight Control Registry (NWCR) is the largest evaluation of successful long-term weight loss maintenance (Klem et al., 1997). Approximately 800 individuals participate. All have lost an average of 30kg and maintained a minimum weight loss of 13.6kg for 5 years. Participants utilized diet and exercise to lose weight. During the maintenance phase of weight management, participants also report increased physical active. Small frequent meals and weekly weigh-ins were additional commonalities of participants. Outcomes of weight loss maintenance for participants included: increased energy, physical mobility, general mood, self-confidence, and physical health (Klem et al., 1997).

The Look AHEAD study is an additional long-term weight loss maintenance evaluation. All participants were overweight or obese with a type 2 diabetes diagnoses. Participants were randomly assigned to the intensive lifestyle intervention (ILI) or diabetes support and education (DSE) (Wadden et al., 2011). The ILI was an intensive treatment, adapted from the Diabetes Prevention Program. During years 2-4 of the study (maintenance phase of weight loss), ILI participants were evaluated and given calorie ranges, dependent on gender, body weight, and desire to lose weight. In addition, participants were also encouraged to achieve $\geq$ 175 minutes/week of physical activity. Monthly visits with an interventionist to establish individualized goals were held. Monthly goal sheets detailed daily calorie and activity goals, food journal information, weigh-ins, and desired weight change/maintenance. Monthly group sessions were also held for participants to weigh-in, discuss food and activity journals, and presentation of new relevant topic. Results of the year-4 analysis concluded: ILI participants lost a mean $4.7 \pm 0.2\%$ of initial weight, compared to a mean loss $1.1 \pm 0.2\%$ of initial weight in DSE

participants. In addition, 35% of ILI and 18% of DSE participants achieved the overall study goal of losing ≥7% of initial weight (Wadden et al., 2011).

Mindfulness

Mindfulness-based eating was originally developed for the treatment of binge eating disorder. Binge eating disorder is the utilization of food in response to emotions (Kristeller & Wolever, 2011). Mindfulness-based eating awareness training (MB-EAT) incorporates meditation, mindful eating, and self-awareness or self-acceptance to tackle disorder-eating behaviors. The goal of MB-EAT is to normalize eating behaviors and habits (Kristeller et al., 2011).

MB-EAT as an Approach to Weight Loss. Due to the increase in binge eating disorder tendencies in the overweight and obese population, mindfulness-based therapies have now been applied to tackle the weight epidemic. A recent study published in *Appetite,* evaluated the effectiveness of MB-EAT in weight loss. Approximately 60 women participated in the study; half received MB-EAT in the form of four workshops, while the others did not. Data were collected at baseline, four, and six months (BMI, physical activity, and mental health). At the six-month assessment, women that received MB-EAT instruction reported participating in significantly more physical activity and greater reductions in BMI compared to the control group (Tapper et al., 2009). Researchers concluded from this study that MB-EAT is transferable to the overweight and obese population and can produce significant weight loss.

Emotional Brain Training

SHAPEDOWN Program. EBT was first adapted and developed into a weight management program for adolescents. The program, entitled SHAPEDOWN, utilized

cognitive, behavioral, and affective tools to aid in the adaptation of behaviors that contributed to the adolescence's excess weight. Published in the *Journal of American Dietetic Association,* "Adolescent obesity intervention: validation of the SHAPEDOWN program," evaluated the effectiveness of the new weight management program (Mellin, Slinkard, & Irwin, 1987). Results of this study concluded that participation in the SHAPEDOWN program was associated with significant change in weight, weight-related behaviors (i.e. binge eating, food addiction, etc.), depression, and knowledge of weight-management following the intervention and at 1-year follow-up for adolescents receiving the SHAPEDOWN instruction (Mellin et al., 1987).

Due to the successes evident in the SHAPEDOWN program for adolescents, an additional program for adults emerged. The adult program (at the time of development, entitled Cognitive – Emotive Training) was evaluated in a controlled setting. Twenty-nine adults participated and received the adapted SHAPEDOWN program. Participants met once per week. Researchers discovered participants at 12, 26, and 52 weeks lost an average 9.6lbs, 13.3lbs, and 13.5lbs respectively (Mellin, 1996). Participants also reported increased physical activity. Most notably, at the conclusion of year-1 of the study, improvement in functioning was reported by 90% of participants for health, 33% for medications, 19% for substance use, 42% for financial management, 90% for work effectiveness, 81% for relationship satisfaction, and 90% psychological functioning (Mellin, 1996).

Summary

Obesity is a multi-faceted issue. Current theories have identified a variety of factors that have contributed to the current obesity epidemic. Current research presented

has linked increased weight with stress and inflammation, increased depression, and food addiction. Achieving and maintaining weight loss presents an additional challenge. As discussed in the previous literature, weight loss maintenance is a journey that continues indefinitely.

Mindfulness and MB-EAT, originally developed to assist in binge eating disorder recovery, has begun to be utilized in counseling obese and overweight individuals. The mindfulness approach tackles many of the issues that surround obesity. MB-EAT focuses on reducing binge eating disorder tendencies. Despite these new methods, the obesity epidemic continues to expand.

EBT was formatted into a program for adolescents entitled SHAPEDOWN. The SHAPEDOWN program was evaluated and produced successful weight loss results. After the evaluation of the SHAPEDOWN program, the program was adapted and initiated in an adult population. Success was also evident in the program amongst the adult population. Although the program produced successful weight loss and health results, limited additional research has been completed to assess EBT as an effective tool in managing weight, stress, food addiction, and depression.

Chapter Three

Methodology

Research Design

A two group randomized experimental design was utilized. Both quantitative and qualitative data were collected and evaluated for this study. Participants received a comparative weight loss program (MB-EAT) or stress management based intervention (EBT) upon randomization. The two groups actively met face-to-face for the first seven weeks (twice per week for 75 minute sessions) and a follow-up period without face-to-face interaction (emails only) was conducted for an additional seven weeks. Data were collected at baseline, seven, and fourteen weeks utilizing anthropometrics measurements of height, weight, blood pressure, and waist circumference. In addition, all participants completed the Perceived Stress Scale (PSS), Center for Epidemiological Studies Depression Scale (CES-D), and the Yale Food Addiction Scale (YFAS) at baseline, seven, and fourteen.

Sample

The population of interest in this study was the adult population, classified as obese. Male and females were recruited to participate by flyer and Internet advertisements. Therefore, the sample collected for this study was convenience sample, first come; first serve.

All interested individuals were initially screened in order to assure the inclusion criteria were satisfied. These included, participants must (1) be 25-65 years of age and (2) Have a BMI $\geq$ 30 and $\leq$ 40. In addition, individuals were screened on the following exclusion criteria; participants must not (1) have a medical diagnosis of orthopedic or

join problems; (2) Endorse any of the first three items on the Physical Activity Readiness Questionnaire: heart problems, chest pain, faintness or dizzy spells; (3) Endorse any of the other items on the Par-Q without a physician's consent; (4) have had a hospitalization for a psychiatric disorder within the last year; (5) have a history of anorexia or bulimia nervosa; (6) have a medical diagnosis or cancer or HIV; (7) have a diagnosis of a major psychiatric disorder; (8) be pregnant, nursing, or plan on becoming pregnant (within the time frame of this study); (9) be less than nine months post-partum; (10) have a weight loss $\geq$ 10 pounds in the last six months. A total of 33 participants met the above criteria and initially began the study. At the final evaluation session, 26 individuals completed the study.

Procedures

The sample in this study was randomly assigned to either the EBT (EBT) or mindfulness based eating awareness training (MB-EAT) intervention. Participants were then subdivided into smaller groups of 6-8 individuals. A core component of EBT is the small group environment. Subdividing the two intervention arms into groups of 6-8 participants allowed participants to form connections and associations within their unique subgroups.

For the first seven weeks, both groups met twice per week for one hour and 15 minutes. The location of meetings depended upon the intervention group assigned. EBT participants met off campus at the facility of the EBT certified provider. MB-EAT alternatively met on campus with instructors (the study PI and graduate assistants) that provided the MB-EAT for comparison. Attendance was recorded throughout the intervention.

Participants also received monetary incentives for completion of the evaluations at seven and fourteen weeks. The monetary incentives for participants included $30 for 7-weeks and $40 for 14-weeks. In total, participants that completed all evaluations received $70. An additional session was held for interested participants at the conclusion of the study to regroup, connect, and reflect. At the conclusion of this session, a free book was also given to all participants. Individuals received a book depicting the intervention the opposing group received (i.e. MB-EAT individuals received an informational EBT book).

Measurement Instruments

Data used in this study for analysis were collected through a variety of instruments. Anthropometric measurements were obtained at baseline, 7-weeks, and 14-weeks prior to discussions. At baseline participants were evaluated utilizing an electronic body weight scale, blood pressure cuff, portable stadiometer, and tape measure to evaluate waist circumference. At 7-weeks and 14-weeks, the same anthropometric measurements were collected utilizing consistent equipment.

Center for Epidemiological Studies Depression Scale (CES-D)

All participants at baseline, 7-weeks, and 14-weeks completed the CES-D scale to assess depressive symptoms. The CES-D scale is uniquely designed for use by the general population and is a self-reported questionnaire. The questionnaire focuses on specific depression symptoms and characteristics. These characteristics include: depressed mood, feelings of guilt and worthlessness, feelings of helplessness and hopelessness, psychomotor retardation, loss of appetite, and sleep disturbance (Radloff, 1977). Scoring the CES-D scale will reflect the degree of depressive symptoms present

for the completer (i.e. the higher the score, the more depressive symptoms evident). An arbitrary cut-off number of 16 is utilized in previous studies as the maximum presence of symptoms in a non-depressed individual (Radloff, 1977). It is important to note, the CES-D scale is not utilized to diagnose depression.

Perceived Stress Scale (PSS)

The Perceived Stress Scale was utilized to assess the perception of stress in an individual's daily life. The scale was designed to determine how unpredictable, uncontrollable, and overloaded completers find their lives (Cohen et. al, 1983). The scale was designed for individuals of at least a junior high school education. Previous studies indicate an average perceived stress score of 12-14 for the US adult population (Cohen and Janacki-Deverts, 2012).

Yale Food Addiction Scale (YFAS)

The Yale Food Addiction Scale is a relatively new scale that was developed based on the theory of food addiction. The Diagnostic and Statistical Manual of Mental Disorders (DSM-IV), published by the American Psychiatric Association, "as the standard classification of mental disorders used by mental health professionals in the United States" (APA, 2013). Specifically included in the manual, diagnostic criteria for each mental health disorder. The diagnostic criteria include symptoms and other characteristics seen in a particular mental health disorder. The YFAS utilizes the diagnostic criterion for substance addiction to classify the presence of a food addiction (Gearhardt et al., 2009). The survey highlights high sugar and high fat foods. This approach was developed based on previous clinical studies that evaluated the composition of foods and the presence of an addiction.

Emotional Brain Training

The workbook, *Wired for Freedom*, by Laurel Mellin, PhD, was utilized to provide participants training in EBT. This text provides detailed information regarding the varying states of the brain and the skills necessary to manage stress in each state. The skills are designed to aid an individual in reaching a more relaxed brain state. The chart below briefly illustrates the skills.

Table 3. EBT brain states, description, and skills.

Brain State	**Description**	**Skill**
1	Feeling great	Feel compassion for self and others.
2	Feeling good	"How do I feel?" and "What do I need?"
3	A little stressed	Emotional housecleaning
4	Stressed	Cycle of thoughts
5	Stressed out	Damage control

EBT participants were provided a copy of the *Wired for Freedom* text to utilize as a reference throughout the study.

Data Analysis

The analysis presented here is for completers only as this was a pilot study with a small sample size and limited power. All analyses were performed using Windows version 20.0 of the Statistical Package for the Social Sciences (SPSS, Chicago, IL). Descriptive statistics were used to characterize both study groups at baseline. Continuous variables were compared between groups using two-sample t-tests if the normality assumption held or Wilcoxon rank-sum test otherwise. The normality of the variables was checked using Kolmogorov-Smirnov. Other categorical variables were compared using Chi-square tests. Univariate analysis of variance with a 0.05 significance level was used to assess differences between groups. Within-group changes in outcome variables

over time were examined using paired t-tests. The correlation between process variables (group attendance) and weight loss was examined using the Pearson R coefficient.

Chapter Four

Results

Description of Participants

Initial participants. A total of 33 participants initially participated, 30.3% (n = 10) male, and 69.7% (n = 23) female. The majority, 93.9% (n = 31) of participants were white and 6.1% (n = 2) black. The average age of participants was 52.6 ± 10.5 years. Participants reported varying levels of education, 30.3% (n = 10) high school, 30.3% (n = 10) undergraduate, and 39.4% (n = 13) graduate/professional. The average baseline blood pressure for participants was 138.8/87.6± 16.3/9.1 mmHg. Based on the actual height and weight collected, the average BMI was 36.3 ± 3.9kg/m^2. Participants scored a 9.4 ± 8.4 for CES-D and 16.4 ± 6.4 for PSS.

Completed participants. A total of 26 participants completed the entire study, 78.8% retention, 30.8% (n = 8) male, and 69.2% (n = 18) female. The majority, 92.3% (n = 24) of participants were white and 7.7% (n = 2) were black. The average age of participants was 53.8 ± 9.8 years. Participants reported varying levels of education, 26.9% (n = 7) high school, 30.8% (n = 8) undergraduate, and 42.3% (n = 11) graduate/professional. The average blood pressure for completed participants was 141.4/87.6± 17.1/9.5 mmHg. Based on the actual height and weight collected, the average BMI of participants 35.8 ± 4.1kg/m^2. Participants scored a 10.0 ± 8.9 for CES-D and 16.8 ± 6.9 for PSS. In addition, completed participants were 38.5% clinically significant on the YFAS.

Completed participants were comprised of a larger percentage of graduate/professionally educated. However, overall initial and completed participants

demographically remained consistent. Table 4 below provides a visual representation of initial and completed participants.

Table 4. Baseline characteristics of initial and completed participants compared.

	Initial participants N = 33	**Completed participants N = 26**
Gender (% female)	69.7%	69.2%
Average age (years)	52.6 ± 10.5 years	53.8 ± 9.8 years
Race	93.9%	92.3%
Education		
High-school	30.3%	26.9%
Undergraduate	30.3%	30.8%
Professional/graduate	39.4%	42.3%
BMI (kg/m^2)	36.9 ± 3.9	35.8 ± 4.1
Blood pressure (mmHg)	87.6/138.8 ± 9.1/16.3	87.6/141.4 ± 9.5/17.1
CES-D	9.4 ± 8.4	10.0 ± 8.9
PSS	16.4 ± 6.4	16.8 ± 6.7
YFAS - % Clinically Significant	33.3%	38.5%

Baseline Characteristics for Treatment Groups

Experimental (EBT). A total of 12 participants completed the experimental treatment group. At baseline, these participants scored 8.33 ± 7.88 on CES-D and 16.25 ± 6.69 for PSS. At baseline evaluation, 6 (50%) of experimental group participants were classified as clinically significant via the YFAS.

Comparative (MB-EAT). A total of 14 participants completed the comparative treatment group. At baseline, these participants scored 11.62 ± 10.17 on the CES-D and 17.46 ± 7.46 on the PSS. At baseline evaluation, 4 (28.6%) of the comparative treatment group participants classified as clinically significant via the YFAS. At baseline the EBT group was statistically significantly older and had higher systolic blood pressure than the MB-EAT group.

Table 5, below, illustrates the baseline characteristics for the two groups.

Table 5. Comparative baseline characteristics for EBT vs. MB-EAT (N = 26)

	EBT N = 12	**MB-EAT N = 14**
Gender (% female)	58.3%	78.6%
Average age (years)	58.3 ± 7.1	49.9 ± 10.4
Race (% white)	100%	85.7%
Education		
High-school	33.3%	21.4%
Undergraduate	16.7%	42.9%
Professional/graduate	50.0%	35.7%
BMI (kg/m^2)	37.1 ± 4.3	34.7 ± 3.7
Blood pressure (mmHg)	149.7/90.8± 16.5/9.9	134.4/85.0± 14.7/8.7
CES-D	8.33 ± 7.878	11.62 ± 10.17
PSS	16.25 ± 6.69	17.46 ± 7.457
YFAS - % Clinically Significant	50%	28.6%

Midpoint (7-Week) Evaluation of Treatment Groups

Experimental (EBT). At the 7-week evaluation, weight change equated to 3.3 ± 7.3 lbs for males and 2.5 ± 1.4 lbs for females. Participants evaluated depressive symptoms via CES-D reporting an average score of 8.9 ± 8.2. Perceived stress was recorded at 10.1 ± 5.8. Clinical significance of food addiction utilizing the YFAS was present in one (8.3%) participant. Table 6, below, illustrates the changes observed and recorded from baseline to mid-point evaluations for the EBT group.

Table 6. Comparing baseline vs. midpoint in experimental (EBT) group

	Baseline	**Midpoint**	**% Change**
Weight Change (lbs)			
Males		3.3 ± 7.3	
Females		2.5 ± 1.4	
CES-D	8.3 ± 7.9	8.9 ± 8.2	-7.1%
PSS	16.2 ± 7.0	10.1 ± 5.8	38.0%
YFAS - % Clinically Significant	50%	8.3%	83.4%

The overall weight change was significant (p-value = 0.05). Perceived stress also resulted in a significant decrease (p-value = 0.035). The CES-D was not significant (p-value = 0.832).

Comparative (MB-EAT). Weight change for MB-EAT participants equated to 0.8 ± 0.9 lbs for males and 1.7 ± 3.7 lbs for females. Participants evaluated depressive symptoms utilizing the CES-D scale resulting in an average score of 10.1 ± 9.9. Perceived stress resulted in an average score of 15.8 ± 7.7. Clinical significance of food addiction utilizing the YFAS was present in four (28.6%) participants.

Table 7. Comparing baseline vs. midpoint in comparative (MB-EAT) group

	Baseline	Midpoint	% Change
Weight Change **Males** **Females**		 .8 ± .92lbs 1.74 ± 3.7lbs	
CES-D	11.6 ± 10.2	10.1 ± 9.9	13.2%
PSS	17.5 ± 7.5	15.8 ± 7.7	9.7%
YFAS - % Clinically Significant	28.6%	28.6%	0%

Overall, weight change (p-value, = 0.12), CES-D (p-value = 0.332), and PSS (p-value = 0.223) were not significant.

Table 8, below, displays a side-by-side comparison of the treatment groups and outcomes at mid-point evaluation.

Table 8. Comparing change at mid-point evaluation (EBT vs. MB-EAT)

	EBT	MB-EAT	P-Value for difference
Weight Change (lbs)	2.9 ± 4.6	1.5 ± 3.3	0.41
CES-D	8.8 ± 2.5	5.5 ± 1.5	0.47
PSS	8.9 ± 2.6	4.8 ± 1.3	0.13

Final (14-Week) Evaluation of Treatment Groups

Experimental (EBT). At the 14-week evaluation, weight change from midpoint to final evaluation equated to -2.8 ± 4.0 lbs for males and -0.6 ± 2.2 lbs for females. Participants evaluated depressive symptoms via CES-D reporting an average score of 12.2 ± 11.3. Perceived stress was recorded at 15.0 ± 5.8. Clinical significance of food addiction utilizing the YFAS was present again in one (8.3%) participant. Table 9, below, illustrates the changes observed and recorded from baseline to mid-point evaluations.

Table 9. Comparing midpoint vs. final evaluation in experimental (EBT) group

	Midpoint	**Final**
Weight Change (lbs)		
Males	3.3 ± 7.3	2.8 ± 4.0
Females	2.5 ± 1.4	.6 ± 2.2
CES-D	8.9 ± 8.2	12.2 ± 11.3
PSS	10.1 ± 5.8	15.0 ± 5.8
YFAS - % Clinically Significant	8.3%	8.3%

The overall weight change was significant (p-value,). CES-D scores did not significantly increase (p-value = 0.108). In addition, perceived stress scores translated to a significant increase (p-value = 0.012). Only one participant remained classified as clinically significant for the prevalence of food addiction.

Comparative (MB-EAT). Weight change from midpoint to final evaluation for the comparative participants equated to -2.1 ± 3.6 lbs for males and 0.4 ± 3.5 lbs for females. Participants evaluated depressive symptoms utilizing the CES-D scale resulting in an average score of 10.1 ± 7.0. Perceived stress resulted in an average score of 14.8 ±

7.4. Clinical significance of food addiction utilizing the YFAS was present again in four (28.6%) participants.

Table 10. Comparing midpoint vs. final in comparative (MB-EAT) group

	Midpoint	Final
Weight Change (lbs)		
Males	.8 ± .92	-2.1 ± 3.6
Females	1.7 ± 3.7	.4 ± 3.5
CES-D	10.1 ± 9.9	10.1 ± 7.0
PSS	15.8 ± 7.7	14.8 ± 7.4
YFAS - % Clinically Significant	28.6%	28.6%

The above table, Table 4.7, displays the changes observed and recorded at midpoint and final evaluations. Overall, changes in weight, CES-D, and PSS were not significant.

Table 11, below, displays a side-by-side comparison of change in the treatment groups and outcomes at between midpoint and final evaluations.

Table 11. Comparing change at final point evaluation (EBT vs. MB-EAT)

	EBT	MB-EAT	P-Value for difference
Weight Change (lbs)	1.5 ± 3.1	.2 ± 3.5	.21
CES-D	-3.2 ± 6.4	-.1 ± 8.8	.32
PSS	-4.9 ± 5.6	.9 ± 7.3	.04

Chapter Five

Discussion

Key Findings

The intent of this study was to evaluate the effectiveness of an EBT intervention on food addiction, stress, depression, and weight loss. EBT was compared to a mindfulness/intuitive eating based intervention to determine which is better at effecting change in food addiction, stress, depression, and weight. Results indicated EBT was more effective at producing change in the variables measured.

The first objective of this study was to determine if an EBT intervention could produce changes in food addiction, stress, depression, and weight during a seven-week active intervention and seven-week follow-up period. At baseline 6 EBT participants identified themselves as "food addicts" according to the Yale Food Addiction Scale (YFAS). At midpoint, an 83.4% change was observed – only one participant identified as a "food addict." YFAS scores remained unchanged at the end of the follow-up period. EBT participants displayed a 38% change (from baseline to midpoint) in Perceived Stress Scale (PSS) scores. A slight increase in PSS scores was reported between midpoint and final evaluation. An increase was also observed in Center for Epidemiological Studies Depression Scale (CES-D) scores from baseline to midpoint and from midpoint to final evaluation. EBT participants lost a mean 2.9 $\pm$ 4.6 lbs throughout the initial seven-week intervention. Weight loss continued throughout the seven-week follow-up session (1.5 $\pm$ 3.1 lbs). To conclude, results from this study demonstrate changes in food addiction, stress, and weight. A change in depression was not observed.

The second objective of this study was to evaluate the effectiveness of an EBT intervention compared to an intuitive eating-based intervention over a seven-week active intervention and seven-week follow-up period. Due to the small sample size, a lack of statistical difference was observed between intervention groups at midpoint. The percentage of change between groups was evaluated for each variable. As mentioned above, an 83.4% change was observed in the classification of food addiction in the EBT intervention group. No change was observed in the mindfulness/intuitive-eating group throughout the intervention. EBT participants revealed a 38% change (from baseline to midpoint) in Perceived Stress Scale (PSS) scores, compared to a 9.7% change observed in the mindfulness/intuitive-eating participants. At midpoint EBT participants lost a mean 2.9 $\pm$ 4.6 lbs, compared to 1.5 $\pm$ 3.3 lbs observed in MB-EAT participants.

Results collected at the end of the seven-week follow-up period, revealed a notable statistical significance between intervention groups in PSS scores. EBT participants reported experiencing less perceived stress. YFAS scores remained consistent, at one participant, in the final evaluation of the EBT intervention group. Again, no change was observed in the YFAS scores in the mindfulness/intuitive-eating group. EBT participants also continued to lose more weight (1.5 $\pm$ 3.1lbs), compared to the comparative group (.2 $\pm$ 3.5lbs).

Implications

This study demonstrated EBT has the ability to influence food addiction, stress, and weight. Depression measures were unaffected in both interventions. Findings of this study add, support, and oppose current research, as described below.

Despite initial higher YFAS scores, EBT participants lost more weight throughout the course of the intervention and follow-up period. Burmeister and colleagues found higher YFAS scores were associated with poorer short-term weight loss in a traditional weight loss intervention (Burmeister et al., 2013). Based on this current study's results, EBT may provide clinically diagnosed "food addicts" a more appropriate weight loss method.

Stress, as indicated in previous research findings, is closely related to food choices, weight, and weight loss success (Christaki et al., 2013; Sims et al., 2008). EBT participants experienced a 38% decrease in perceived stress from baseline to midpoint; versus, a 9.7% decrease observed in the MB-EAT group. However, at the conclusion of the study EBT participants experienced a significant increase in perceived stress (p-value, 0.04). This significant increase in perceived stress could have been due to several factors: (1) participants felt abandoned following the conclusion of the 7-week active intervention period which included twice weekly group meetings, as reported verbally by at least one participant, (2) participants could have experienced more natural stress during the second seven weeks, or (3) participants may have been stressed because they did not feel prepared to use the skills from EBT on their own, that they were still learning. It is also important to note, this study took place from the end of August through the end of November 2013.

Weight loss and weight loss maintenance requires a variety of key components to produce optimum results. Increased physical activity, daily calorie goal, weekly weigh-ins, and food journals are several of these components (Klem et al., 1997; Wadden et al., 2011). This study focused strictly on EBT as an approach to weight loss in the adult,

obese population. Moderate weight loss and weight loss maintenance were observed. Future studies may incorporate the key components documented in the National Weight Control Registry and Look AHEAD study to facilitate more significant weight loss.

Additional findings from this study are not consistent with prior observations regarding depression and obesity (Roberts et al., 2002). In this study, depression, as measured with the CES-D scale, did not on average exceed 16 points, the level for elevated depression symptoms. It is possible that the small sample size was not large enough to detect higher depression rates.

Strengths, Limitations, and Assumptions

Strengths. A strength of this study was the collaboration of an experienced and certified EBT provider. She provided the EBT intervention to participants, utilizing the standardized EBT system – to facilitate consistency between groups. EBT was provided to participants in a small group setting that allowed appropriate individual attention and the opportunity to establish relationship and connectedness with other participants. An additional strength of the study was the use of valid and reliable scales to assess food addiction, stress, and depression. The Perceived Stress Scale (PSS), Yale Food Addiction Scale (YFAS), and CES-D well established in the literature and provide a useful point of comparison to other studies. A final strength of this study is the evaluation of participants seven weeks after the conclusion of the seven-week, active intervention. Evaluating participants at the fourteen-week mark allowed for the determination of adherence and comprehension of the randomly assigned intervention.

Assumptions. The participants in this study were selected to represent the obese adult population of the United States. Prior to the initiation of this study, it was assumed

that all participants provided accurate demographic information. It is also believed that participants completed the Perceived Stress Scale, Yale Food Addiction Scale, and CES-D accurately and appropriately. We assume the answers provided truthfully reflected their current experiences and beliefs.

Limitations. The limitations for this study include the small sample size of participants. A larger sample size would have provided a more adequate representation of the population. In addition, participants were not selected randomly. Participants were recruited through online advertising methods and fliers posted throughout Lexington, KY. An additional limitation of the study was time. A longer time frame may have aided in the participants understanding of EBT. Participants also met twice a week for an hour and 15 minutes. Participants may have experienced difficulty remaining "present" throughout the entire sessions. A shorter meeting time may have been more conducive for the learning styles and attention span of participants. Lastly, despite utilizing a consistent measuring device, the data collected from waist circumference measurements were unreliable and inaccurate so that was not utilized in determining success or results.

Future Research

Future research is needed to further validate findings discovered in this study due to the lack of EBT research. Researchers may utilize a larger sample size and increase the duration of the intervention, in hopes to produce greater statistically significant results. Additional research is also needed to explore the weight loss findings of this study. This study demonstrated continued weight loss throughout the non-active

intervention period for EBT participants. Future findings may add to the growing body of evidence suggesting EBT as a means of weight loss.

References

Avena, N. M. (2010). The Study Of Food Addiction Using Animal Models Of Binge Eating. *Appetite*, 55(3), 734-737.

Burmeister, Jacob M., Nova Hinman, Afton Koball, Debra A. Hoffmann, and Robert A. Carels. "Food addiction in adults seeking weight loss treatment; implications for psychosocial health and weight loss." *Appetite.* 60 (2013): 103-110.

Causes and Consequences. (2012, April 27). *Centers for Disease Control and Prevention*. Retrieved October 6, 2014, from http://www.cdc.gov/obesity/adult/causes/ind

Christaki E., Kokkinos A., Costarelli V., Alexopoulos E.C., Chrousos G.P. & Darviri C. (2013) Stress management can facilitate weight loss in Greek overweight and obese women: a pilot study. *Journal of Human Nutrition and Diet*. 26 (1), 132–139.

Dansinger, M. L. (2005). Comparison Of The Atkins, Ornish, Weight Watchers, And Zone Diets For Weight Loss And Heart Disease Risk Reduction: A Randomized Trial. *JAMA: The Journal of the American Medical Association*, *293*(1), 43-53.

Depression. (n.d.). *NIMH RSS*. Retrieved October 20, 2014, from http://www.nimh.nih.gov/health/topics/depression

Dixon, J. B., Dixon, M. E., & O'Brien, P. (2003). Depression In Association With Severe Obesity: Changes With Weight Loss. *Archives of Internal Medicine*, 163(17), 2058-2065.

Eichen, D. M., Lent, M. R., Goldbacher, E., & Foster, G. D. (2013). Exploration of "Food Addiction" in overweight and obese treatment-seeking adults. *Appetite*, 67, 22-24.

Elfhag, K. K., & Rössner, S. S. (2005). Who succeeds in maintaining weight loss? A conceptual review of factors associated with weight loss maintenance and weight regain. *Obesity Reviews*, 6(1), 67-85.

Freedman, M., King, J., & Kennedy, E. (2001). Popular Diets: A Scientific Review. *Obesity Research*, *9*(1), 1S-40S.

French SA, Jeffery RW, Murray D. Is dieting good for you? Prevalence, duration and associated weight and behavior changes for specific weight loss strategies over four years in US adults. *International Journal of Obesity Related Metabolic Disorders.* 1999;23: 320 –7.

Frood, S., Johnston, L., Matteson, C., & Finegood, D. (2013). Obesity, Complexity, and the Role of the Health System. Current Obesity Reports, 30(2), 320-6.

Gearhardt, A. N., Corbin, W. R., & Brownell, K. D. (2009). Preliminary Validation Of The Yale Food Addiction Scale. *Appetite*, 52(2), 430-436.

Kessler, R. (2003). Epidemiology Of Women And Depression. *Journal of Affective Disorders*, 74(1), 5-13.

Klem, M., Wing, R., McGuire, M., Seagle, H., & Hill, J. (1997). A descriptive study of individuals successful at long-term maintenance of substantial weight loss. *American Journal of Clinical Nutrition*, 66(2), 239-46.

Kristeller, J., & Wolever, R. (2011). Mindfulness-based eating awareness training for treating binge eating disorder: The conceptual foundation. *Eating Disorders*, *19*, 49-61.

Loman, M. M., & Gunnar, M. R. (2010). Early Experience and the Development of Stress Reactivity and Regulation in Children. *Neuroscience and Biobehavioral Review*, 34(6), 867-876.

Luppino, F. S., de Wit, L. M., Bouvy, P. F., Stijnen, T., Cuijpers, P., Pennix, B. W., et al. (2010). Overweight, Obesity, and Depression. *General Psychiatry*, 67(3), 220-229.

Mellin, L. (1996). Cognitive-Emotive Training Developmental Testing Of The Shapedown Method For Adults. *Journal of the American Dietetic Association*, 96(9), A31.

Mellin, L., Croughan-Minihane, M., & Dickey, L. (1997). The Solution Method2-year Trends In Weight, Blood Pressure, Exercise, Depression, And Functioning Of Adults Trained In Development Skills. *Journal of the American Dietetic Association*, *97*(10), 1133-1138.

Mellin, L., Slinkard, L., & Irwin, C. J. (1987). Adolescent obesity intervention: validation of the SHAPEDOWN program. *Journal of American Dietetic Association*, *87*(3), 333-8.

Mitrovic, I., de Pena, L. F., Frassetto, L., & Mellin, L. (2011). Rewiring the stress response: A new paradigm for health care. *Hypothesis*, 9(1), 1-7.

National Heart, Lung, and Blood Institute (1998). Executive Summary Of The Clinical Guidelines On The Identification, Evaluation, And Treatment Of Overweight And Obesity In Adults. *Journal of the American Dietetic Association*, 98(10), 1178-1191.

Obesity and overweight. (n.d.). WHO. Retrieved November 14, 2013, from http://www.who.int/mediacentre/factsheets

Onyike, C. U., Crum, R. M., Lee, H. B., Lyketsos, C. G., & Eaton, W. W. (2003). Is Obesity Associated With Major Depression? Results From The Third National Health And Nutrition Examination Survey. *American Journal of Epidemiology*, 158(12), 1139-1147.

Overweight and obesity. *Centers for Disease Control and Prevention.* Retrieved November 14, 2013, from http://www.cdc.gov/obesity/data/index.htm

Patel, A. (2013). Review: the role of inflammation in depression. *Psychiatry*, 25(2), 216-223.

Roberts, R. E., Kaplan, G. A., Shema, S. J., & Strawbridge, W. J. (2000). Are the Obese at Greater Risk for Depression?. *American Journal of Epidemiology*, 152(2), 163-170.

Saarni, S. I., Suvisaari, J., Sintonen, H., Pirkola, S., Koskinen, S., Aromaa, A., et al. (2007). Impact of psychiatric disorders on health-related quality of life: general population survey. *The British Journal of Psychiatry*, 190(4), 326-332.

Sherwood, L. (2001). *Human physiology: from cells to systems* (4th ed.). Pacific Grove, Calif.: Brooks/Cole.

Simon GE, Von Korff M, Saunders K, et al. Association Between Obesity and Psychiatric Disorders in the US Adult Population. *Arch Gen Psychiatry*. 2006;63(7):824-830.

Sims, R., Gordon, S., Garcia, W., Clark, E., Monye, D., Callender, C., et al. (2008). Perceived stress and eating behaviors in a community-based sample of African Americans. *Eating Behaviors*, 9(2), 137-142.

Tapper, K., Shaw, C., Ilsley, J., Hill, A., Bond, F., & Moore, L. (2009). Exploratory randomized controlled trial of a mindfulness-based weight loss intervention for women. *Appetite, 52*, 396-404.

Wadden, T. A., Ryan, D. H., Otto, A., Krakoff, J., Hill, J. O., Delahanty, L. M., et al. (2011). Four-Year Weight Losses in the Look AHEAD Study: Factors Associated With Long-Term Success. *Obesity*, 19(10), 1987-1998.

Wang, Youfa, May A. Beydoun, Lan Liang, Benjamin Caballero, and Shiriki K. Kumanyika. "Will All Americans Become Overweight Or Obese? Estimating The Progression And Cost Of The US Obesity Epidemic." Obesity 16.10 (2008): 2323-2330. Print.

Zwaan, M. d. (2001). Binge Eating Disorder And Obesity. *International Journal of Obesity*, 25, S51-S55.

Bailey Regina Adams, RD

Education

- Expected: Masters of Science, Dietetics Administration. University of Kentucky, Lexington, KY. 2013-2014.
- Bachelors of Science, Dietetics, Coordinated Program option. University of Kentucky, Lexington, KY. 2009-2013.

Professional Positions

- Graduate Assistant. University of Kentucky, Lexington, KY. 2013-2014.
- Registered Dietitian. Kentucky Center for Eating and Weight Disorders, Lexington, KY. 2014.

Academic Achievements

- Undergraduate Dietetics Student of Excellence. University of Kentucky, Lexington, KY. 2013.