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ACCEPTANCE

This dissertation, WHAT IS THE IMPACT OF SELF-MANAGEMENT ON DAILY NET CALORIES CONSUMED BY WOMEN WHO ARE OVERWEIGHT, by CHAD A. DOLLAR, was prepared under the direction of the candidate's Dissertation Advisory Committee. It is accepted by the committee members in partial fulfillment of the requirements for the degree Doctor of Philosophy in the College of Education, Georgia State University.

The Dissertation Advisory Committee and the student's Department Chair, as representatives of the faculty, certify that this dissertation has met all standards of excellence and scholarship as determined by the faculty. The Dean of the College of Education concurs.

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ABSTRACT

WHAT IS THE IMPACT OF SELF-MANAGEMENT ON DAILY NET CALORIES CONSUMED BY WOMEN WHO ARE OVERWEIGHT?

by

Chad A. Dollar

The purpose of this research was to examine the impact of self-management on daily net calories consumed by women who are overweight. Four white females between the ages of 35 and 41 with a self-reported BMI between 25 and 29.9 completed this study. A multiple baseline across participants design was used to demonstrate a functional relation between the independent variable (i.e., self-management) and the dependent variable (i.e., net calories consumed) for each participant. Three of the four participants decreased their daily net calories consumed after beginning the self-management intervention. This was the first single case research study to examine the effectiveness of self-management on daily net calories consumed (i.e., caloric intake minus caloric expenditure) and extended previous literature on white females who were overweight.

WHAT IS THE IMPACT OF SELF-MANAGEMENT ON DAILY NET CALORIES CONSUMED BY WOMEN WHO ARE OVERWEIGHT?

by
Chad A. Dollar

A Dissertation

Presented in Partial Fulfillment of Requirements for the
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Doctor of Philosophy
in
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in
the Department of Educational Psychology and Special Education
in
the College of Education
Georgia State University

Atlanta, GA
2012

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CHAPTER 1
SELF-MANAGEMENT

Introduction

Self-management is a skill individuals can learn and apply to many behaviors, thereby promoting self-reliance and responsibility for behavior change. However, some people live their entire lives believing they were born without self-control (Skinner, 1948). Consider individuals who choose to have poor diets and eventually come in contact with health problems, students who choose to party rather than study and then struggle to graduate, or business managers who opt for a quick and unethical sale and find themselves losing customers. Through the use of self-management strategies, individuals in these circumstances can learn what influences their actions and how these influences can be altered to bring about a desirable behavior change (Thoresen & Mahoney, 1974). In contrast, consider an individual who recently has been diagnosed with diabetes and for whom sugar-laden desserts are highly desirable and rewarding. While this person may have been able to eat these foods at any time prior to having diabetes, through the use of self-management strategies this person can now learn how to forego the immediate pleasure of eating sugar-laden foods for the possible long-term pleasure of reducing the risk of his or her medical condition.

For people to reach their potential and provide greater contributions to society, they should have control over their behaviors and achieve their self-selected goals without the constraints of an outside intervention (Kazdin, 2001). Individuals should learn to think for themselves, have confidence in their ability to solve their problems, and not blame other people or uncontrollable forces for their problems (Epstein, 1997). People have been shown to search for particular ways to modify, control, and maintain

behaviors and the application of self-management has provided solutions (Burke, Wang, & Sevick, 2011; Epstein, 1997; Jones & Riazi, 2011; Ozkan & Sonmez, 2011). Self-management has provided self-changing strategies that have allowed individuals to manage their own behavior through the manipulation and deliberate alteration of variables that serve the function of the behavior. "Self-management theory holds that by arranging environmental contingencies, establishing specific goals, and producing consequences for their actions, people can be taught to exercise more control over their lives" (Godat & Brigham, 1999, p. 67). Self-management has provided a means to increase and decrease behaviors and to promote independence among individuals.

The application of self-management has promoted effective and efficient living by helping people accomplish difficult tasks (Gerhardt, 2007; Mendelson, McCullough, & Chan, 2011), achieve personal goals (Becker, McMahan, Allen, & Nelson, 2004; Hall, 1972; Pattni, Soutar, & Klobas, 2007), replace undesirable habits with desirable ones (Newman & Bloom, 1981; Watson, Tharp, & Krisberg, 1972), improve performance (Gaetani, Johnson, & Austin, 1983; Lamal & Benfield, 1978), and enhance life (Christian & Poling, 1997; Fremouw, Callahan, Zitter, & Katell, 1981). Epstein (1997) encouraged a lifestyle of self-managing because self-managers are likely to contribute more to society, fulfill their potential, and behave in ways that pass up immediate reinforcement for delayed outcomes (e.g., recycling and public transportation).

Further, self-management techniques have been essential to human civilization, because without them constant monitoring by others would be needed (Epstein, 1997). Unfortunately, some people are not using self-management techniques, and as Epstein (1997) described "are blowing aimlessly in the wind" (p. 563). Not because they are

unable, but most likely because they have not been taught adequately. People of varying ages and intellectual abilities have learned and used self-management to self-direct their behavior (e.g., Brigham, Hopper, Hill, De Armas, & Newsom, 1985; Christian & Poling, 1997; Hartig & Kanfer, 1973; Lamal & Benfield, 1978). Once self-management is learned, people may apply these skills to a wide variety of everyday behaviors.

For example, Skinner (1948) described a scenario in a Utopian community where children were taught self-management through a simple lesson involving a lollipop. Children were given a lollipop covered in powdered sugar and told it could only be enjoyed if at the end of the day no powdered sugar had been licked. One strategic approach in this situation is to remove the lollipop from sight to self-manage the licking behavior. Self-management strategies can be taught.

Self-management has guided the path for individuals to set performance standards, evaluate the performance, and reinforce the reaching of standards (Becker et al., 2004). An attempt at self-management occurs when a person decides to apply control over certain behaviors and structures the environment in such a way as to attain these performance standards (Frayne & Geringer, 2000). People become self-managers as they learn to regulate their behaviors through a set of learned skills such as "arranging environmental contingencies, establishing specific goals, and producing consequences for their actions" (Frayne & Latham, 1987, p. 387).

Learning to self-manage increases one's ability to control behaviors in circumstances not conducive to external agents for intervention. For example, through the application of self-management, eating and exercising, not available for constant monitoring by an outside source, are readily available for monitoring by the individual in

the absence of others. Self-management increases self-reliance and responsibility (Christian & Poling, 1997; Fremouw et al., 1981; Godat & Brigham, 1999). Even a small repertoire of self-management strategies has helped control a variety of behaviors (Burke et al., 2011; Ozkan & Sonmez, 2011). This ability to change behavior without dependence on another individual decreases the probability of the behavior occurring without reinforcement. For example, adults with intellectual disabilities learned to apply self-instructions while ironing clothes at home and received reinforcement from the completion of each step in the behavior chain (Faloon & Rehfeldt, 2008). This increased the likelihood of every occurrence of the desired behavior to be reinforced. The "self" component of self-management is always present with the individual and may transfer from an environment with external reinforcement to an environment with no external reinforcement. Finally, individuals can find pleasure in exerting control over important areas in their lives.

Throughout the history of self-management research, a variety of components have been tested and reviewed. Some researchers have examined the use of combining several of these components to produce packaged interventions because there is no "one size fits all" for using self-management to change behavior (Hickman & Geller, 2005; Ozkan & Sonmez, 2011; Pattni et al., 2007). Self-management provides a systematic approach for students to accomplish social and academic goals (Cancio, West, & Young, 2004). When students are taught self-management strategies they can increase academic productivity and achievement (Dean, Malott, & Fulton, 1983). Additionally, self-management has been shown to be a reasonable system to change and improve work-related problems found in the business environment (Godat & Brigham, 1999). Self-

management has improved the quality of life, health status, and physical functioning of individuals and reduced social isolation and risk factors (e.g., Faloon & Rehfeldt, 2008).

History of Terminology

The literature and terminology for self-managing behaviors has evolved over decades. The terms self-control (Skinner, 1953), self-management (Skinner, 1974), self-regulation (Bandura, 1991), and self-modification (Watson & Tharp, 2007) have been used over the last several decades to refer to the strategies used by people to change their own behaviors. While these terms have been used interchangeably within the extant literature, the definitions and uses of these terms are typically defined by the context in which they are found. For example, Pattni et al. (2007) used self-management, self-control, and self-regulation in the following sentence: "Through active engagement with the use of self-management, people participate in self-regulatory behaviors that foster responsibility and self-control, which encourages a commitment to change" (p. 160). This sentence appears to describe self-control as a consequence from using self-regulatory behaviors as a part of a self-management intervention. Researchers have continued to use both terms (i.e., self-control and self-management) in their research to describe interventions that involve individuals managing their own behavior.

Self-control typically refers to the behaviors deliberately carried out by a person to achieve self-selected goals (Kazdin, 2001). Skinner first discussed self-control as a conflict people endure when making decisions in life (e.g., arriving at a "fork in the road") and offered nine techniques individuals could learn and implement to change their own behavior (Skinner, 1953). He provided these techniques for self-control and later in his book *About Behaviorism* introduced the term self-management as a replacement for

the term self-control (Skinner, 1974). Epstein (1997) later clarified the definition of self-management as "the practice of self-control" that "encompasses a set of powerful skills and procedures that produce substantive change" (p. 560). The term self-regulation became popular in the literature in the 1990's and emphasized the role of cognition (Cameron & Leventhal, 2003; de Ridder & de Wit, 2006).

Skinner's minimal writing and lack of research conducted on self-management has allowed researchers to diverge from his original writings (Epstein, 1997) and create their own concepts of managing behavior (e.g., Watson & Tharp, 2007). Researchers have used the terms interchangeably because there appears to be a lack of consensus on which term should be used. Despite this evolution, the commonality of "behavior changes behavior" (Epstein, 1997) has remained constant and began with the term Skinner introduced as self-control. Regardless of the term used, most of the research has involved a person who has learned to use one behavior to change another behavior. This process begins with a behavioral approach to direct self-change based upon operant theory, and self-management is the term chosen for this paper to describe the strategies used by a person to self-direct change in his or her own behavior. Some researchers have included an outcome measure of self-efficacy that reflects Bandura's (1991) social cognitive theory approach. However, from a radical behaviorist perspective, feelings exist and are acknowledged although they play no causal role in behavior. This review of the self-management literature is based upon a radical behaviorism theoretical framework and discussed from an operant theory perspective.

Self-Managing Behavior

Self-Control

Most of the time, behavior change involves a decision between two opposing consequences--one being immediate and pleasurable and the other delayed and maybe not pleasurable (Skinner, 1953). For example, before someone smokes a cigarette, a decision is made between the immediate (and most likely certain) pleasure (e.g., relaxation, nicotine "fix," etc.) he or she may receive and the future possible (and uncertain) long-term health complications (e.g., emphysema, reduced quality of life, etc.). How can this person pass on the immediate, certain, and pleasurable consequences of smoking for the possible, long-term, and pleasurable consequences? Skinner suggested using self-control techniques (Skinner, 1953).

Skinner (1953) discussed two different types of responses involved with self-control: the controlling response and the controlled response. He described the controlling response as a behavior used to impact the probability of another behavior, the controlled response. In other words, the first behavior occurs in order to affect the second. For example, an individual who counts out the appropriate number of potato chips in a serving (i.e., controlling response) in order to increase the likelihood of eating less (i.e., controlled response) has successfully practiced an incidence of self-control.

Self-control involves choosing between opposing immediate and delayed consequences. The immediate consequence may be pleasurable (e.g., those from eating candy, using drugs, and engaging in unprotected sex) or not so pleasurable (e.g., those from going to dental appointments, getting flu shots, and taking medicine). Likewise, a delayed consequence also may be pleasurable (e.g., avoiding root canals and illness and

getting well) or not so pleasurable (e.g., diabetes, job loss, and sexually transmitted diseases). Behaviors with an immediate, pleasurable consequence and delayed punishment have been called temptations (Epstein, 1997). The immediate short-term positive effects mask the long-term negative effects of specific behaviors.

Skinner's techniques for self-control. Skinner (1953) introduced nine self-control techniques individuals could learn and implement to change their own behavior. His self-control techniques were provided in the context of a controlling response (i.e., manipulating variables) to change a controlled response (i.e., probability of future behaviors). The controlling response occurred in order to affect the controlled response (Skinner, 1953). He provided these nine techniques to be used as controlling responses (i.e., self-control): (1) physical restraint and physical aid, (2) changing the stimulus, (3) depriving and satiating, (4) manipulating emotional conditions, (5) using aversive stimulation, (6) drugs, (7) operant conditioning, (8) punishment, and (9) "doing something else."

Physical restraint involves the use of bodily action to avoid or manage the occurrence of a behavior. For example, people who use their hands to cover their eyes to avoid seeing scary things when walking through a haunted house or cover their ears to avoid hearing loud or aversive sounds. This technique also may include removing one's self from an environment in which the undesired behavior may occur. For example, when an employee decides to turn around and leave the room to avoid getting angry and using profane language after hearing several coworkers attack her work ethic.

In behavioral terms, a discriminative stimulus sets the stage for a behavior by signaling reinforcement is available. It is possible to insert and remove these signals in

our daily lives when needed. For example, when a person is trying to stop buying cigarettes and typically purchases cigarettes while paying for gas inside the service station, he or she could refrain from entering the gas station and instead pay at the pump. This removes the stimulus (i.e., cigarettes behind the counter) that prompts the unwanted response (i.e., purchasing cigarettes to smoke). Hall (1972) demonstrated the success of weight loss for 10 women by changing the stimulus of food presentation. The women were allowed to store and consume food only in the kitchen of their home and were to refrain from engaging in any other activities while eating. In addition, to maintain a limited amount of food, the women could only prepare one portion of food at a time and were given smaller containers (e.g., bowls, plates, and cups) to hold the food to be consumed. In a similar study, Fremouw et al. (1981) taught 4 obese women to designate one location to eat meals and snacks, purchase only nonfattening foods, store food in opaque containers, and buy and prepare low calorie snacks. These techniques helped the women lose weight, reduce the number of snacks consumed, reduce the number of locations in which they ate meals, and increase the purchasing of nonfattening foods.

For some people, it is easy to recognize when too much (i.e., satiation) or too little (i.e., deprivation) of something has been experienced in life. Satiation refers to the loss of effectiveness of a reinforcer because of overconsumption, while deprivation refers to the increase in effectiveness because of its prior unavailability (Daniels & Daniels, 2006). For example, after eating Thanksgiving dinner, a person who feels uncomfortably full has most likely been satiated on food. This means the chance of eating more food when the plate of food is passed again is minimized because the food is no longer reinforcing (i.e., the person's stomach had enough food).

Individuals with a short fuse and little tolerance for irritating and alarming situations could learn to reduce the intensity of reactions by learning to manipulate their emotional condition. For example, a person who takes time to count to ten and gather thoughts may produce a more appropriate response to a high-stressed situation rather than lashing out and possibly regretting his or her reactions (i.e., the delay in responding may decrease the intensity of an emotional response). When actors or actresses are required to film a scene in which a particular emotion is needed, they may think about a past experience or event to manipulate an emotional response. Tharp, Watson, and Kaya (1974) taught a woman how to reduce her thoughts of depression that followed uncomfortable moments. The woman took time to focus on a fantasy dream before responding to situations that typically resulted in depressed thoughts. In a similar study, 10 obese women changed their emotional condition to help lose weight. When the women experienced the urge to consume food, they verbalized statements (overtly when alone and covertly with others) that produced positive affect about weight reduction (Hall, 1972).

Typically, the desired responses to an aversive situation are escape and avoidance. For example, after a person has entered the shower and realized the water is not yet warm he exits the shower immediately to escape any further contact with cold water. To avoid this from happening in the future, the person could reach a hand under the water and test the temperature before entering the shower. Hartig and Kanfer (1973) instructed one group of children not to look at the toys on the table behind them after the adult left the room. The children were told that looking at the toys when the adult left the room made them bad children. Most of the children considered the consequence aversive and used

self-instructions to avoid looking at the toys and to escape the aversive label of a bad child. Another way people have used aversive stimulation to control behavior is by making proclamations before peers. People have participated in specific behaviors in order to achieve their proclaimed goals and avoid the appearance of failure.

Various stimulants and depressants have been used in society to "simulate the effect of other variables in self-control" and to alter the rates of behaviors (Skinner, 1953, p. 237). For example, many Americans have had a cup of caffeinated coffee in the morning to assist in waking up or to stay awake (alert) during a meeting or morning commute. Anesthesia has been used to reduce the pain for people in medical settings who endured operations, discomfort, or severe injuries. Some people drink alcohol or smoke cigarettes to help relax after a stressful day, during a social event in hopes of "taking the edge off," and possibly to avoid feelings of guilt. These are alternatives people have used to create a sense of control.

Self-reinforcement (operant conditioning) has created some debate within the realm of self-management. From an operant theory perspective, reinforcement is provided within the environment and not by the individual directly. Skinner (1953) emphasized the importance of a person delivering reinforcement only after a particular response has occurred. Unfortunately, because the person controls the reinforcer, he or she may choose to obtain reinforcement without engaging in the necessary behavior. This ability to bypass the behavior and still access the reinforcement has led to the debate on self-determination and determinism.

Self-punishment is also debated. Similar to self-reinforcement, it is important that self-punishment only be delivered after a specific response has occurred and that it is

delivered each time the behavior occurs. For example, an individual who wants to stop biting his or her nails may deliver a punisher (e.g., snapping a rubber band on his or her wrist) after every occurrence of nail biting. Because the person controls the punisher during self-punishment, it is possible the individual may bite his or her nails and not snap the rubber band on his or her wrist. The question of whether a person can truly deliver self-reinforcement or self-punishment has been left for debate. Unfortunately, Skinner never provided a definitive answer within his writings or at any time during his career (Epstein, 1997).

The concept of incompatible behaviors relies on the inability of two behaviors to occur at the same time (Skinner, 1953). This means a desired behavior replaces an undesired behavior and is incompatible with the undesired behavior. For example, if a person wanted to increase the amount of time spent studying rather than watching television, he or she could spend additional time in the library (where there are no televisions) rather than in the dorm room (where there is a television). Hall (1972) taught obese women to engage in a reinforcing and desired behavior or activity that was incompatible with eating to help them lose weight. For example, the women chewed gum during the approximate time the desire to eat occurred. Both of these are examples of what Skinner (1953) called "just doing something else" (p. 239).

Skinner wrote very little in regards to self-control. In fact, he wrote his nine techniques for self-control in *Science and Human Behavior* in 1953 and wrote nothing more on self-control until 1974 when he wrote *About Behaviorism*--only this time he used different terms. In his later writings Skinner spent more time writing about his own

self-management practices and provided advice on how to become a better self-manager (Epstein, 1997).

Self-Management

For reasons unknown, Skinner replaced the term self-control with self-management and discussed the *managing self* and *managed self* rather than the previously used controlling response and controlled response (Skinner, 1974). Typically, it is the context and usage of the term that provide meaning. For example, Kazdin (2001) described self-control and self-management both as techniques used to alter one's own behavior. His description provides no distinction between these two terms; rather, it appears the two terms share the same meaning. Even though several reasons have been provided in the literature for the possible use of one term rather than another (e.g., Cooper, Heron, & Heward, 2007), researchers have continued to use the terms interchangeably within the research. Reserving the term self-management for a repertoire of responses and self-control as a term to identify specific response contingencies may help to determine which term appears more appropriate for a given situation. In other words, self-management (controlling response) is a means to achieve self-control (controlled response).

When a person has controlled any aspect of a plan that has resulted in a change of behavior, some degree of self-management has been performed (Cooper et al., 2007). For example, if John, a graduate student wanted to increase his writing behavior (controlled response), he could send a daily email of what he had written for his comprehensive exams to a friend (controlling response). In doing so, he might increase his writing behavior through the application of self-management. Likewise, if the desired change did

not occur, self-management did not occur (this refers to self-management as a functionally-defined term). In other words, if it does not function to change the behavior it is not self-management (Cooper et al., 2007).

Self-Regulation

Bandura's (1991) social cognitive theory of self-regulation added the self-efficacy mechanism to self-management. Bandura (1991) described self-efficacy as "people's beliefs about their capabilities to exercise control over their own level of functioning and over events that affect their lives" (p. 257). Social cognitive theory builds upon Skinner's work on self-management by integrating environmental events with thoughts, beliefs, and perceptions (cognitive processes). Around 1990, experts in the field of social cognitive theory began to focus on the term self-regulation (Forgas, Baumeister, & Tice, 2009). Two-thirds of more than 2,700 publications (i.e., chapters, dissertations, and journal articles) containing the word "self-regulation" have been published since that time (Cameron & Levental, 2003; de Ridder & de Wit, 2006). Although the term self-regulation has been used to describe a process of changing behavior, it should not be confused or misunderstood as an operant theory term when self-efficacy is included. In other words, self-regulation moves from a principle within operant theory to one within social cognitive theory when self-efficacy is included. Radical behaviorists have recognized the existence of feelings and argued feelings are not essential for the analysis of behavior. Inner conditions (or feelings) are "at best 'collateral products' of environmental events" (Epstein, 1997, p. 560) and can be used for predicting behavior. Therefore, from a radical behaviorist standpoint, self-efficacy has not been considered a necessity in the formula for managing behaviors. Similar to self-control, people have

learned to self-regulate behaviors through self-management. As Gerhardt (2007) discussed, people who have learned and mastered self-management techniques have included self-regulation as one of the skills. Although self-regulation has typically been associated with social cognitive theory (Bandura, 1991), the term is rooted in operant theory and has been used without the self-efficacy measure.

Components of Self-Management

Self-management from operant theory based on Skinner's radical behaviorism involves behavior management that is analogous to the way a thermostat operates to heat and cool a home (Watson & Tharp, 2007). First, the thermostat in the home is set to a specific and desired temperature. Next, the system has a sensor to monitor the current temperature within the home and communicate this information back to the thermostat. Then, a process takes place in which the current temperature is compared to the desired temperature and a decision is made for action. Finally, if the temperature is too high, the system behaves in a manner to lower the temperature and if it is too low it behaves in a manner to raise the temperature. This cycle continues in order to maintain the specific and desired temperature of the house. According to operant theory, a person can behave similarly to achieve and maintain a desired outcome.

"When researchers and practitioners describe self-management tactics, they should provide a detailed statement of the exact procedures used" (Cooper et al., 2007, p. 578). That is, self-management has been defined by the component(s) used for managing the behavior and has included the term self to place emphasis on the individual. Snyder, Manz, and Laforge (1983) suggested the components used for self-managing behaviors be defined according to whether they are used as antecedents (e.g., goal-setting),

consequences (e.g., self-reinforcement) or on a continuous basis (e.g., self-observation). These components are necessary for behavior change. According to Watson and Tharp (2007)

> no change would be expected when standards are lacking, when we do not notice our own behavior, when we do not compare it to our standards, or when actions are not available to us that would bring behavior into line with our standards. (p. 111)

The process of self-managing behavior includes a systematic approach to changing behaviors. In order to understand what behavior needs to be changed an individual must be aware of the present state of behaving. This process of identifying behaviors for self-management is known as self-assessment (Barry & Messer, 2003; Frayne & Geringer, 2000; Frayne & Latham, 1987; Gerhardt, 2007) or self-observation (Pattni et al., 2007; Rosenbaum & Drabman, 1979; Snyder et al., 1983; Watson et al., 1972). It is common for individuals to create self-established goals (Snyder et al., 1983) or to participate in goal setting (Briesch & Chafouleas, 2009; Frayne & Geringer, 2000; Frayne & Latham, 1987; Gerhardt, 2007) to identify the desired end result. During the self-management process individuals observe and record their own behavior by self-monitoring (Becker et al., 2004; Briesch & Chafouleas, 2009; Christian & Poling, 1997; Frayne & Latham, 1987) or self-recording (Barry & Messer, 2003; Korotitsch & Nelson-Gray, 1999; Rosenbaum & Drabman, 1979). The present behavior is matched against the goals through self-evaluation (Briesch & Chafouleas, 2009; Frayne & Geringer, 2000; King-Sears, 2008; Mooney, Ryan, Uhing, Reid, & Epstein, 2005) and the individual provides self-applied consequences (Snyder et al., 1983), typically in the form of self-

reinforcement (Barry & Messer, 2003; Briesch & Chafouleas, 2009; Frayne & Latham 1987) or self-reward (Christian & Poling, 1997). In addition, self-instructions (Christian & Poling, 1997; Faloon & Rehfeldt, 2008; Mooney et al., 2005) may be integrated into a packaged intervention or used in isolation to assist in directing behavior. Any of these components may be used individually (Lamal & Benfield, 1978) or in various combinations to form a packaged intervention (Briesch & Chafouleas, 2009).

Self-assessment/self-observation. The current performance of the behavior needs to be known in order to have an idea of where to begin with self-management. This self-awareness occurs through the process of self-assessment or self-observation. The terms refer to the process that provides the foundation for self-management by identifying the "when" and "why" surrounding the behavior (Snyder et al., 1983). This systematic approach of collecting data has helped to identify problems and promote self-awareness (Pattni et al., 2007), identify antecedents and consequences associated with the behavior (Frayne & Latham 1987; Hickman & Geller, 2005), and identify problems that may impede a person from reaching his or her goals (Gerhardt, 2007). The process of self-observation alone may have an impact on the behavior before any intervention begins (Rosenbaum & Drabman, 1979). After the present performance of behavior has been observed and assessed an individual may set goals for future behaviors.

Goal setting. It is common for individuals to create self-established goals or to use goal setting to pinpoint and capture the desired results of self-management. These short-term and/or long-term (Frayne & Geringer, 2000; Frayne & Latham, 1987) goals are self-selected behavioral targets (Mooney et al., 2005) that define what behaviors are needed in order to receive reinforcement (Briesch & Chafouleas, 2009; Gerhardt, 2007)

at either an individual or group level (Olympia, Sheridan, Jenson, & Andrews, 1994). Goals should be specific, challenging, and achievable. For example, unionized state government employees improved their attendance on the job site after setting both distal and proximal goals (Frayne & Latham, 1987). Participants achieved their set distal goals (i.e., improvement in attendance within a specified time period) by setting proximal goals to reach along the way. In a similar way, students increased the amount of homework completion and accuracy by setting individual and group goals (Olympia et al., 1994). If goals are too vague, the individual may struggle to establish a direction. Goals too difficult may punish the individual and do more harm than good (Snyder et al., 1983). Prompts can be placed strategically to remind participants of their goal and to help maintain direction. King-Sears (2008) had students write the desired amount of time on-task on their self-monitoring form as a reminder of their behavior goals.

Self-monitoring/self-recording. During the self-management process, a person should have a procedure to identify and record the occurrence or nonoccurrence of the behavior. Self-monitoring or self-recording is a two-part component process of observing and recording one's own behavior (Briesch & Chafouleas, 2009; Gerhardt, 2007; Mooney et al., 2005). This identifying and recording of the behavior helps to provide continuous feedback regarding the treatment effect (Korotitsch & Nelson-Gray, 1999) and allows for the counting of the behavior to determine what consequence to deliver (Clayton, 2006). In addition, it helps to identify what is or is not working in the intervention (Pattni et al., 2007). Self-monitoring has been used independently of other self-management components because of its possible reactive effects (Korotitsch & Neslon-Gray, 1999; Lamal & Benfield, 1978). Similar to self-observation, behavior has

increased and decreased just from the feedback provided from recording the occurrence or nonoccurrence of the behavior.

The process of self-monitoring has looked different depending on the environment, type of behavior, or person self-monitoring. People have used diaries and charts (Frayne & Latham, 1987; Fremouw et al., 1981), placed check marks in boxes for items they participated in throughout the day (Becker et al., 2004; King-Sears, 2008), and written on a piece of paper when and/or how long the behavior occurred (Briesch & Chafouleas, 2009; Christian & Poling, 1997; Gaetani et al., 1983; Mooney et al., 2005; Olson & Austin, 2001; Olympia et al., 1994; Rodriguez et al., 2006). Self-monitoring has provided systematically collected data to individuals about their behavior and has become the basis for evaluating the effects of an intervention (Rosenbaum & Drabman, 1979).

Self-evaluation. Self-evaluation is the component that involves the comparison of the present performance to the standard or goal. For example, student teams used a team manager to self-evaluate and determine whether completion and accuracy goals were achieved in a classroom setting (Olympia et al., 1994). Individuals have evaluated the success of their interventions and refined their strategies if necessary. For example, students used a self-evaluation component as a part of their self-management intervention to increase healthy living (Becker et al., 2004). The students charted their food selection and physical activity and compared this to the goals they had previously set to evaluate their performance. The self-evaluation of a behavior typically has been followed by a consequence based on a specific criterion. Self-evaluation has helped individuals examine how well they performed and what consequence to deliver (i.e., reinforcement or punishment).

Self-applied consequences. Typically in the form of self-reinforcement or self-reward, self-applied consequences are delivered after the goal for the desired behavior is obtained. The reinforcement should be powerful, easily administered, and delivered as close to the behavior as possible (Frayne & Latham, 1987). It is important to remember "self-reinforcement of operant behavior presupposes that the individual has it in his power to obtain reinforcement but does not do so until a particular response has been emitted" (Skinner, 1953, p. 237-238). In other words, self-reinforcement must be readily available and passed upon until the desired behavior occurs. For example, self-reinforcement may include people delivering physical reinforcers (e.g., dinner, glass of wine, sleeping late) or self-thought reinforcers (e.g., "I did a great job selling the house"), and having a visual reminder of the reinforcement may help. For example, students listed the reinforcement they would earn after their goal had been reached in the classroom and increased on-task behavior (King-Sears, 2008).

Self-instructions. In addition to these components, self-instructions are an approach to managing behaviors by making overt and covert self-statements. Instructions spoken aloud, which can be observed and measured by another person refer to overt self-instructions. Alternatively, covert self-instructions refer to those verbalizations not spoken aloud, which cannot be observed or measured by another person. For example, adults learned to iron clothes using self-instructions as a self-management intervention. The steps for ironing clothes were stated overtly as they were performed, and as the adults became more and more fluent with the behaviors, the steps were stated covertly (Faloon & Rehfeldt, 2008).

Importance of packaging components. Although the above-mentioned components can be used in isolation to achieve self-management, typically they have been grouped together in a packaged intervention (Briesch & Chafouleas, 2009). Compared to using only one component in isolation, packaging components and using them in combination with one another has produced more resilient behavior change and helped to facilitate robust interventions (Barry & Messer, 2003). Coordinating components and using a more integrated approach has built a stronger system of strategy to examine, monitor, and reinforce desired behaviors. Epstein (1997) simplified this to "modify your environment, monitor your behavior, and make commitments" and more simply stated "behavior changes behavior" (p. 563).

Applications of Self-Management

The application of self-management strategies has allowed individuals to control their behaviors in a desirable way. Self-management promotes self-confidence, competency, and possibly an increase in motivational factors within a range of environments for individuals (Kahn, 1976). Self-management interventions have been implemented successfully across a variety of applied settings including education (Briesch & Chafouleas, 2009; King-Sears, 2008; Ozkan & Sonmez, 2011), business (Frayne & Geringer, 2000; Pattni et al., 2007; Rodriguez et al., 2006), and health/self-help (Faloon & Rehfeldt, 2008; Fremouw et al., 1981; Mendelson et al., 2011). In addition, self management has been used by individuals of a variety of ages (Becker et al., 2004; Gerhardt, 2007; Hartig & Kanfer, 1973), skill levels (Brigham et al., 1985; Frayne & Latham, 1987; Olympia et al., 1994), and cognitive abilities (Faloon & Rehfeldt, 2008; King-Sears, 2008).

Education. Difficulties in student learning and academic achievement are often caused by an inability to self-manage and control certain behaviors. Self-management has been used to reduce disruptive behaviors (Barry & Messer, 2003) and increase on-task behaviors (Amato-Zech, Hoff, & Doepke, 2006; Barry & Messer, 2003; Levendoski & Cartledge, 2000; Moore, Prebble, Robertson, Waetford, & Anderson, 2001; Smith & Sugai, 2000; Stahr, Cushing, Lane, & Fox, 2006; Wolfe, Heron, Goddard, 2000; Wood, Murdock, & Cronin, 2002). Self-management also helped students improve work completion (Brooks, Todd, Tofflemoyer, & Horner, 2003; Harris, Friedlander, Saddler, Frizzelle, & Graham, 2005; Levendoski & Cartledge, 2000; Wolfe et al., 2000) and accuracy (Gureasko-Moore, DuPaul, & White, 2007; Holifield, Goodman, Hazelcorn, & Heflin, 2010).

For example, following the instruction of the general education classroom teacher, students self-monitored their behaviors using a checklist to record the occurrence or nonoccurrence of steps in the task analysis. Six students appeared to participate more in class and completed their work more consistently after self-monitoring was introduced (Agran et al., 2005). Students also have increased their amount of time on task by recording their on-task behavior (i.e., paying attention or not paying attention) after being prompted by an electronic vibration (Amato-Zech et al., 2006). A similar study provided students with a self-monitoring form that used pictures as examples of on-task behaviors. When prompted, the students circled whether they were on task or not (i.e., circled yes or no) to self-monitor (Holifield et al., 2010). Self-monitoring cards were used to assist students with increasing time on task and the number of problems completed during math (Levendoski & Cartledge, 2000). When prompted, students marked on their forms

whether or not they were doing their work at that moment (Levendoski & Cartledge, 2000). All students increased the amount of time on task and the amount of independent work (i.e., not yet mastered) completed (Levendoski & Cartledge, 2000). Middle school students used self-management to increase their amount of time on task and reduce the number of talking-out behaviors (Smith & Sugai, 2000). Similarly, self-management was used to help students decrease disruptive behavior and increase on-task behavior and academic performance (Barry & Messer, 2003).

After implementing self-management strategies, students increased their academic skills in spelling (Harris et al., 2005), written language (Wolfe et al., 2000), math (Holifield et al., 2010; Levendoski & Cartledge, 2000), and reading (Joseph & Eveleigh, 2011). Students improved their academic performance, attention to tasks, and levels of accuracy for performance in mathematics and language arts immediately after self-management strategies were introduced to each new setting (Wood et al., 2002). Students were taught to self-monitor their on-task behaviors and practice their spelling (Harris et al., 2005) by recording either their attention or performance. They increased their spelling practice to a higher level when recording their attention rather than their performance (Harris et al., 2005) and increased the amount of time on task to similar levels regardless of which behavior they recorded. Reading comprehension increased after students used a self-management procedure in their Science and Social Studies classrooms (Rogevich & Perin, 2008). Students increased their written expression after they were prompted with a tone to record their on-task behavior (Wolfe et al., 2000). Over time, these students implemented a public posting of performance and reached their

goals of being on task during writing. These students reported the desire to continue using self-monitoring and written expression in their classrooms (Wolfe et al., 2000).

Students improved classroom behaviors of preparation skills (Gureasko-Moore et al., 2007), social skills (Peterson, Young, Salzberg, West, & Hill, 2006), and following directions (Agran et al., 2005). Students used a behavior checklist to monitor the behaviors necessary for classroom preparation and homework completion. In addition, students were taught to self-evaluate their self-monitoring behavior to identify possible behaviors that aided in accomplishing or compromising their goals. The students reported the self-management intervention was helpful in enhancing their organizational skills (Gureasko-Moore et al., 2007). Academic-work engagement and assignment completion increased for students over time and across settings after self-management techniques were introduced (Brooks et al., 2003). The implementation of self-management helped students in the general education classroom to increase on-task behavior, follow instructions, accept "No" for an answer, accept teacher feedback, and obtain teacher attention while decreasing the amount of time off task (Peterson et al., 2006).

Self-management has been used across a range of populations including students who were at-risk (Peterson et al., 2006; Wood et al., 2002), students who were typically developing (Moore et al., 2001), and students with emotional and behavior disorders (Amato-Zech et al., 2006; Levendoski & Cartledge, 2000; Smith & Sugai, 2000), autism (Holifield et al., 2010), mild to severe intellectual disabilities (Agran et al., 2005; Brooks et al., 2003), learning disabilities (Amato-Zech et al., 2006; Wolfe et al., 2000), attention deficit hyperactive disorder (Barry & Messer, 2003; Gureasko-Moore et al., 2007; Harris

et al., 2005; Stahr et al., 2006), and speech and language impairments (Amato-Zech et al., 2006; Stahr et al., 2006).

These populations of students have improved classroom performance within general education classrooms (Agran et al., 2005; Barry & Messer, 2003; Brooks et al., 2003; Gureasko-Moore et al., 2007; Harris et al., 2005; Moore et al., 2001; Peterson et al., 2006; Wood et al., 2002), resource rooms (Brooks et al., 2003; Wolfe et al., 2000), and self-contained special education classrooms (Amato-Zech et al., 2006; Holifield et al., 2010; Levendoski & Cartledge, 2000; Smith & Sugai, 2000; Stahr et al., 2006). These classrooms have included a variety of student ages and included elementary (Amato-Zech et al., 2006; Barry & Messer, 2003; Brooks et al., 2003; Harris et al., 2005; Holifield et al., 2010; Levendoski & Cartledge, 2000; Moore et al., 2001; Stahr et al., 2006; Wolfe et al., 2000), middle school (Agran et al., 2005; Gureasko-Moore et al., 2007; Peterson et al., 2006; Smith & Sugai, 2000; Wood et al., 2002), and high school students.

Students who successfully implemented self-management strategies in the academic setting maintained these skills past intervention (Agran et al., 2005; Gureasko-Moore et al., 2007). According to social validity surveys, self-management interventions have been ranked highly by both students and teachers for ease of implementation and rates of success (Agran et al., 2005; Amato-Zech et al., 2006; Gureasko-Moore et al., 2007; Harris et al., 2005; Holifield et al., 2010; Levendoski & Cartledge, 2000; Peterson et al., 2006; Wolfe et al., 2000). The amount of time needed from the teacher for self-management interventions is low and may therefore increase treatment acceptability and

follow through. Teachers had more time for instruction because they spent less time prompting students to maintain engagement (Amato-Zech et al., 2006).

Business. Self-management is beneficial to business organizations for several reasons. Implementing self-management in the work place helps employees to influence their own behavior rather than depend on external control mechanisms (Frayne & Geringer, 2000). Additionaly, self-management has been associated with gaining a competitive advantage for companies when compared to more control-oriented approaches to management (Uhl-Bien & Graen, 1998). Finally, reductions in managers, supervisors, and costs have occurred because employees have learned to influence their own behavior and have shown higher levels of commitment (Pattni et al., 2007). More specifically, acting somewhat as their own boss, employees have learned and developed self-management skills to solve problems independently (Uhl-Bien & Graen, 1998). Saks and Ashforth (1996) emphasized the impact of self-management to enable individuals to structure their own work behavior to achieve goals and better manage obstacles.

After self-management training and implementation, businesses have decreased tardiness (Gaetani et al., 1983; Lamal & Benfield, 1978), increased attendance (Frayne & Latham, 1987; Godat & Brigham, 1999), and improved work performance (Becker et al., 2004; Christian & Poling, 1997; Frayne & Geringer, 2000; Godat & Brigham, 1999; Hickman & Gellar, 2005; Lamal & Benfield, 1978; Olson & Austin, 2001; Pattni et al., 2007; Rodriguez et al., 2006). In addition, a lack of self-management from employees beginning a new job has been associated with general anxiety and stress of employees

(Saks & Ashforth, 1996). Training in self-management may increase socialization behaviors (e.g., coping with stress, acquiring new skills) and lead to better performance.

Health and self-help. Self-management has been used with individuals for a variety of behaviors within the health and self-help literature (Fremouw et al., 1981; Hall, 1972; Mendelson et al., 2011; Tharp et al., 1974; Watson et al., 1972). Programs using self-management assist in bringing awareness and skills to individuals to prevent negative outcomes, increase health care effectiveness, and possibly reduce the cost of medical care (Rae-Grant et al., 2011). Self-management techniques have been used to modify living and work environments (Faloon & Rehfeldt, 2008; Marks, Allegrante, & Lorig, 2005), and to increase relaxation (Sherman & Plummer, 1973), self-control (Hartig & Kanfer, 1973), and athletic skills (Wolko, Hrycaiko, & Martin, 1993). In addition, self-management techniques have been used to reduce scratching (Watson et al., 1972), pain (Marks et al., 2005), smoking (Newman & Bloom, 1981), anxiety (Marks et al., 2005), fear (Marks et al., 2005) and depressed thoughts (Marks et al., 2005; Tharp et al., 1974).

Self-management has given individuals living with chronic illnesses the ability to manage these illnesses (Rae-Grant et al., 2011). That is, rather than just providing information about a specific disease, self-management provides strategies individuals can use to manage the disease (Lyons, 2003). Participants have used self-management strategies with arthritis, diabetes, stroke, spinal cord injury, Parkinson's disease (PD), multiple sclerosis (MS), traumatic brain injury (TBI), migraines and other headaches, and heart disease (Rae-Grant et al., 2011). For example, individuals who used a self-management program for arthritis showed improvements in their quality of life and

overall health status by increasing exercise time and use of community education and support groups (Mendelson et al., 2011).

Researchers have examined the potential for healthy living through self-management of diet (Burke et al., 2011; Fremouw et al., 1981; Marks et al., 2005), exercise (Burke et al., 2011; Kau & Fischer, 1974; Saelens et al., 2000), and weight loss (Burke et al., 2011; Fremouw et al., 1981; Hall, 1972). The majority of the weight management literature is focused on reducing the number of calories consumed (Burke et al., 2005) and increasing the number of calories burned through physical activity and exercise (VanWormer, 2004). Although weight loss has been researched and measured, the behaviors associated with weight management (i.e., calories consumed and calories burned) have been the focus for behavior change (Burke et al., 2011). In more recent research, the frequency of self weigh-ins was studied to examine the impact on weight loss (Gokee-LaRose, Gorin, & Wing, 2009). The most common self-management components used for behavioral treatments to decrease caloric intake and increase caloric expenditure were goal setting (Pearson, 2012) and self-monitoring (Burke et al., 2011).

Self-monitoring has been identified and often described as the cornerstone to weight loss (Burke et al., 2011). The ability for an individual to self-manage his or her own weight-loss behaviors has demonstrated advantages. For example, self-monitoring reduced the number of face-to-face visits to a weight loss program (Chambliss et al., 2011), increased awareness of eating behaviors and foods consumed (Burke et al., 2005), and allowed individuals to alter their food intake or exercise to remain within set goals (Burke et al., 2005).

The format of self-monitoring has evolved from paper and pencil to handheld electronic diaries (e.g., Personal Digital Assistant [PDA]) to record calories consumed, calories burned, and weight. Studies have shown the advantages and disadvantages of both approaches (Burke et al., 2011). Paper diaries require minimal training, are simple to use, available in a variety of formats and typically inexpensive. Unfortunately, paper diaries require the participant to be literate (i.e., looking up and reading nutritional information) and to manually calculate the number of calories consumed and burned. In addition, the handwriting may be difficult to read, and no automatic time stamp of the calorie or exercise entry is recorded. On the contrary, electronic diaries are able to record the time of caloric entries, remove the difficulty of reading handwriting, summarize and analyze the data, provide nutritional content of foods, increase social acceptance, and calculate the number of calories consumed and burned. Some disadvantages of electronic diaries include a requirement for the participant to be literate, additional training and practice, and the consistent charging and concern of the battery. According to Shay, Seibert, Watts, Sbrocco, and Pagliara (2009), the decision to use paper or electronic diaries as a means to self-monitor is best left to the participant because preference impacted adherence to self-monitoring.

In addition to self-monitoring, researchers have examined goal setting as a strategy to increase healthy living for overweight and obese adults (Pearson, 2012). Goal setting has helped individuals focus on behaviors relevant to the desired outcome, improve performance, increase persistence, and find new strategies and knowledge (Locke & Latham, 2006). Goal setting has assisted in the identification of specific behaviors and led to measurable achievements (Pearson, 2012). While healthy living

may be a difficult achievement for some individuals, the use of goal setting has allowed individuals to deconstruct these achievements into subgoals for incremental celebrations of reinforcement and an increase in desired behaviors (Pearson, 2012). Although goal setting has been successful to increase healthy living behaviors, research has suggested goal setting be used in combination with other components (e.g., self-monitoring) to achieve optimal results.

Additional research is needed to further examine the impact of using self-management to increase the behaviors associated with healthy living. Weight loss has been associated with goal setting (i.e., short and long term goals) and the self-monitoring of calories (i.e., consumed and burned). Goal setting assists in keeping participants on track (Pearson, 2012) and self-monitoring helps bring awareness to behaviors. The appropriate type of goal to use with weight management has not been decided. In addition, how frequently and accurately food, exercise, and weight should be recorded is still debated (Burke et al., 2011; Pearson, 2012). The burden of self-monitoring should be reduced to help increase adherence for self-monitoring of healthy behaviors. In other words, the easier and simpler the self-monitoring becomes, the more likely individuals will adhere to recording behaviors. Research has shown the more participants adhere to the self-monitoring the greater the weight loss (Burke et al., 2011). The correct dose of self-management for healthy living still remains to be determined. In addition, implementing self-management as prevention of potential weight problems should be examined as an alternative to self-management as an intervention.

Conclusion

Individuals have the ability to learn self-management skills and design their own environments for success. The implementation of self-management provides individuals with the information needed to understand what influences their behaviors and to manipulate these influences to achieve desired outcomes. Self-management allows individuals to be independent and manage their own behaviors. The application of self-management is diverse and can be applied to a variety of behaviors, settings, and individuals to enhance life (e.g., living an effective and efficient life, accomplishing difficult tasks, achieving personal goals, etc.). Fortunately, the ability to use behavior to change behavior is a skill people can learn.

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CHAPTER 2

WHAT IS THE IMPACT OF SELF-MANAGEMENT ON DAILY NET CALORIES CONSUMED BY WOMEN WHO ARE OVERWEIGHT?

The United States ranks among the list of countries highest for obesity in the world (Caballero, 2007). The obesity epidemic in the United States suggests an increase in daily caloric intake (Caballero, 2007) which also increases the risk of high blood pressure, high blood cholesterol, type 2 diabetes, sleep apnea, and stroke for individuals who are overweight (National Institutes of Health [NIH], 2011). Since a weight loss of 5 - 10% of an individual's body weight can improve health risks (Centers for Disease Control and Prevention [CDC], n.d.), and 70% of adults have reported an attempt to manage their weight (Annesi, 2012), it is important for researchers to find a means of achieving this feat. Although the weight of an individual is the result of many factors (e.g., height, genes, metabolism, behavior, and environment), the NIH (2011) recommends a balance of energy to maintain a healthy weight.

According to the CDC (n.d.), "when it comes to maintaining a healthy weight for a lifetime, the bottom line is--calories count" (*The Caloric Balance Equation* under Balancing Calories). The ability to manage weight resides in learning to balance the number of calories an individual consumes (i.e., caloric intake) with the number of calories an individual uses or burns (i.e., caloric expenditure) (CDC, n.d.). An individual is considered to be "in balance" when the number of calories consumed equals the number of calories burned. When a person is not "in balance" there is either an excess or deficit of calories. More specifically, creating an excess of calories will most likely lead to weight gain, whereas creating a deficit of calories will most likely lead to weight loss.

An individual must reduce his or her net calories by approximately 3,500 to burn one pound of body fat (NIH, 2005).

The obesity epidemic in the United States can be addressed nationally/regionally, within the community/locality, at work/school/home, and through individual efforts (Kumanyika et al., 2008). Unfortunately, addressing the obesity epidemic at any level other than the individual level requires the cooperation or working together of more than one person to achieve success. Fortunately, addressing the obesity epidemic at an individual level allows individuals to self-manage their own behaviors and may assist in the prevention of obesity one individual at a time.

Self-management is a learned skill that allows people to exercise more control over their lives through arranging environmental contingencies, establishing specific goals, and producing consequences for their actions (Godat & Brigham, 1999). The majority of the weight-management literature has focused on using self-management to reduce the number of calories consumed (Burke et al., 2005) and to increase the number of calories burned through physical activity and exercise (VanWormer, 2004). The behaviors associated with weight management (i.e., calories consumed and calories burned) are typically the focus for behavior change (Burke, Wang, & Sevick, 2011), although the dependent variable researched and measured has been the amount of weight lost or gained by participants over time. The two most common self-management components used in behavioral treatments to decrease caloric intake and increase caloric expenditure are self-monitoring (Burke et al., 2011) and goal setting (Pearson, 2012).

Self-monitoring often has been described as the cornerstone to weight loss (Burke et al., 2011) and has reduced the number of face-to-face visits to a weight-loss program

(Chambliss et al., 2011), increased awareness of eating behaviors and foods consumed (Burke et al., 2005), and allowed individuals to alter their food intake or exercise to remain within set goals (Burke et al., 2005). The format for self-monitoring has evolved from using paper diaries to handheld electronic diaries (e.g., Personal Digital Assistant [PDA]) for recording calories consumed, calories burned, and weight. Researchers have demonstrated the advantages and disadvantages of using paper and electronic diaries (Burke et al., 2011). For example, paper diaries are simple to use, require minimal training, and are typically inexpensive and available in a variety of formats. Unfortunately, there are also several disadvantages to using paper diaries. They require the participant to be literate (i.e., looking up and reading nutritional information) and to manually calculate the number of calories consumed and burned. In addition, the individual's handwriting may be difficult to read and no automatic time stamp for the entry of calories consumed or expended is recorded. Electronic diaries are able to calculate the number of calories consumed and burned, record the time of caloric entries, and remove the possible difficulty of reading handwriting. In addition, electronic diaries can summarize and analyze the data, provide nutritional content of foods, and are more socially acceptable. Disadvantages of electronic diaries include the requirement of the participant to be literate, time for training and to practice using the device, and concern of draining the battery (i.e., consistent charging). According to Shay, Seibert, Watts, Sbrocco, and Pagliara (2009), the decision to use paper or electronic diaries as a means to self-monitor is best left to the participant because preference impacts adherence to self-monitoring. Although, Burke et al., (2011) suggested electronic diaries lessen the burden of self-monitoring and may increase adherence.

In addition to self-monitoring, researchers have examined goal setting as a strategy to increase healthy living and weight management for overweight adults (Pearson, 2012). Goal setting helps individuals create self-established goals to pinpoint and capture the desired results of self-management and to help determine the behaviors needed to achieve these results (Briesch & Chafouleas, 2009; Gerhardt, 2007). Goal setting has helped individuals focus on behaviors relevant to the desired outcome, improve performance, and increase persistence (Locke & Latham, 2002). Goal setting has assisted in the identification of specific behaviors and led to measurable achievements. While healthy living (e.g., weight management) may be difficult to achieve for some individuals, goal setting has allowed individuals to create subgoals for incremental celebrations of reinforcement to increase desired behaviors (Pearson, 2012). Although goal setting has been successful to increase healthy living behaviors, researchers suggest goal setting be used in combination with other components (e.g., self-monitoring) to reach optimal results (Pearson, 2012).

Weight management has been associated with self-monitoring of calories (i.e., consumed and burned), setting goals (i.e., short and long term), and self-monitoring of weight (Burke et al., 2011; Pearson, 2012). However, this research is limited. In previous studies, only group designs were used to examine the effect of self-management on weight management (Burke et al., 2005; Burke et al., 2011; Chambliss et al., 2011; Pearson, 2012), the majority of participants were white females who were overweight or obese, and they used personal digital assistants (PDAs) for their electronic diaries (Burke et al., 2011). From previous research, it is not yet clear which components of self-management are necessary to support weight management for healthy living; although,

researchers have suggested that a combination of components be used to achieve the highest level of success (Burke et al., 2011; Chambliss et al., 2011; Pearson, 2012;). Further, researchers studying the effect of self-management on weight management have used body weight as the primary dependent variable (Burke et al., 2005; Burke et al., 2011; Chambliss et al., 2011; Pearson, 2012). However, weight loss or gain is not a behavior but rather the result of behaviors performed by an individual, and these behaviors have not been the dependent variable in studies of self-management and its impact on weight management. Finally, it is not clear how frequently a person should weigh him or herself to have an impact on weight management; however, researchers have suggested that self-weighing one time per week appeared beneficial for most adults (VanWormer, French, Pereira, & Welsh, 2008). Although, women's weight as measured by a scale will fluctuate regardless of net calories.

The purpose of this research was to examine the impact of self-management (i.e., goal setting, self-monitoring, self-assessment, and behavioral feedback) on daily net calories consumed by women who are overweight. This study sought to extend and replicate previous research through its methodology, participants, and intervention. This was the first study to use a single-case methodology to examine the impact of self-management on daily net calories. Because most prior research was conducted with white women who were overweight or obese, this first single-case study was conducted with white women who were overweight. Rather than using PDAs, as have been used in the past, participants used their personal smartphones for their electronic diary to increase participant adherence, reduce the burden of self-monitoring, and examine the accuracy and frequency of recording. This study replicated earlier studies by including self-

monitoring and goal setting and extended earlier research by including self-assessment and behavioral feedback.

Method

Participants

Five women between the ages of 35 and 41 years confirmed they met the inclusion criteria and volunteered to participate by responding to a mass email describing the purpose of this self-management study (i.e., examining the impact of self-management on daily net calories consumed by women who are overweight) sent out by the researcher. Unfortunately, one participant withdrew during baseline and only the four remaining women completed this study.

Criteria for inclusion in this study included: (a) access to an internet-connected computer and email, (b) not currently participating, or in the last three months participated, in any self-directed or commercial nutrition/weight-loss program, (c) possession of a smartphone compatible with the Livestrong application (e.g., iPhone, Blackberry, etc.), (d) access to a bathroom scale, (e) body mass index (BMI) ranging from 25 – 29.9 (overweight status), and (f) identifying as a white woman between the ages 30 and 50. In addition, exclusion criteria included: (a) persons with a history of pregnancy within the last six months or intentions of becoming pregnant during the next six months, and (b) the presence of a significant health problem (e.g., any metabolic or cardiovascular disorder, heart disease, diabetes, etc.).

Settings and Materials

Each participant provided her own smartphone, Livestrong application on the smartphone, computer, and scale to self-manage behaviors. The smartphone was the

hand held device with the Livestrong application (i.e., an abbreviated version of the Livestrong website) used to manage daily net calories (i.e., self-monitor caloric intake and exercise) and record weight. Participants provided their own computer with internet access to use the Livestrong website to set up their account, create personal goals, manage daily net calories (i.e., self-monitoring caloric intake and exercise), record weight, send and receive emails (e.g., questions and concerns, self-monitoring during baseline, etc.), and observe graphic data for self-assessment and behavioral feedback. Participants used their own scale for weekly weigh-ins and the same scale throughout this study.

Instructional sessions for the use of the Livestrong application on the smartphone and Livestrong website on the computer occurred in the home of each participant. The self-monitoring of caloric intake and expenditure occurred in the participants' natural (typical) daily environments and varied according to each participant. Self weigh-ins occurred weekly in the home of the participant at the same time and day each week.

Experimental Design

A multiple baseline across participants design was used to demonstrate if a functional relation existed between the independent variable (i.e., self-management) and the dependent variable (i.e., net calories) for each participant (Alberto & Troutman, 2013; Kazdin, 2011). The independent variable was a self-management intervention and included the following components: (a) goal setting, (b) self-monitoring, (c) self-assessment, and (d) behavioral feedback. The dependent variable was net calories consumed per day and defined as the total number of calories consumed minus the number of calories burned (caloric expenditure). In addition, participants recorded their

weight after each weekly weigh-in. Weight was defined as the number displayed in pounds on the scale during weigh-ins.

All participants began with a baseline phase at the same time and remained in baseline a minimum of five days. The first participant moved into the intervention phase when her data were stable (i.e., no more than a 50% variance around the mean) during baseline, while the remaining participants continued in baseline. After intervention data for the first participant were stable (i.e., did not exceed 15% above the participant's net calorie goal for three consecutive days), the second and third participants moved from baseline to intervention at the same time while the remaining participants continued in baseline. This pattern was to continue until all participants moved from baseline into intervention. However, by the time intervention data were stable for participants two and three, participant five had withdrawn from the study leaving only participant four to move into intervention. The researcher provided instructional training for the use of the electronic diary (i.e., the Livestrong smartphone application and website) on the last day of baseline and before beginning the self-management intervention. These instructional sessions were scheduled as soon as possible and caused no delay of time between the two phases.

Procedures

Each participant received approximately 2-3 hours of instructional time for using the Livestrong application on the smartphone and the Livestrong website on the computer. This instruction was given by the researcher and occurred in the home of each participant using a one-on-one format. Prior to instructional sessions, only one of the participants had experience with using the Livestrong application or Livestrong website.

Participants were encouraged to contact the researcher via email or phone for any assistance needed to address any questions or concerns throughout the study. The researcher was available and assisted the participants with any problems or concerns during this study. For example, one of the participants had trouble entering her updated weight in the Livestrong application after her weekly weigh-in and the researcher provided a solution to her problem.

Livestrong application instruction. Participants received instruction on how to use the Livestrong application located on their smartphone for managing net calories (i.e., self-monitoring caloric intake and expenditure) and to record their weight. Participants were taught using step-by-step instructions and were given multiple opportunities to practice with the application (and ask questions) before starting the intervention. Participants were reminded and encouraged to update the Livestrong application when prompted by the smartphone to help ensure use of the application's latest version. In addition, participants were taught how to sync the data on their smartphone with the Livestrong website.

Livestrong website instruction. Participants received instruction for navigating the Livestrong website for managing net calories (i.e., self-monitoring caloric intake and expenditure) and recording weight. Participants were taught step-by-step instructions how to access the website, create and login to their profile with a unique username and password, self-monitor (i.e., record caloric intake, caloric expenditure, and weight), view graphic data for self-assessment, and look for helpful hints and other information using the Livestrong website. In addition, participants were shown ways to reduce the amount of time required to self-monitor their daily net calories. For example, the women were

shown how to create a complete meal using the foods they frequently ate. This allowed the participants to record one entry, rather than record an entry for each food included in the meal. In other words, a participant could record her meal named "cereal and coffee" as a single entry instead of recording four entries (i.e., ½ cup of cereal, 4 ounces of milk, 8 ounces of coffee, and 2 tablespoons of creamer) each time for breakfast. During instructional sessions, participants were given multiple opportunities to practice using the website (and to ask questions) before starting the intervention. Participants also received a paper copy of a task analysis for future reference when using the Livestrong website.

Baseline

Baseline sessions occurred daily and were conducted a minimum of five days to assess the number of net calories consumed each day for each participant. During baseline, participants recorded the food eaten each day using the format of their choice (e.g., writing on paper, smartphone, etc.). Participants were instructed to record only the food they ate (e.g., peanuts, banana, and roast pork) and approximately how much of the food they ate (e.g., handful of peanuts, one medium banana, 6 ounces of roast pork). Participants did not record any nutritional content during baseline. Participants emailed the list of food each day to the researcher to be recorded as daily caloric intake. In addition, participants were instructed to email any exercise beyond their typical physical activity each day (e.g., 30 minute brisk walk, 20 minute bike ride, etc.) to be recorded as daily caloric expenditure. Participants were encouraged to eat and exercise as they would during a typical day. The women were also asked to weigh themselves on the first day of baseline and include their weight in the first email.

Self-Management

Goal setting. The first step of the self-management intervention was goal setting. Participants met with the researcher individually and discussed distal goals for healthy living and weight management. After distal goals were discussed and confirmed, proximal goals were created to determine the necessary behaviors to achieve these results (i.e., number of net calories consumed per day). The Livestrong website assisted in creating realistic and healthy daily net calorie goals for each participant based on the participant's current height, weight, age, and goal for weight management.

Self-monitoring. The focus of self-monitoring caloric intake, exercise, and weight revolved around the frequency, completeness, and quality of the recordings. Participants were instructed to record their food immediately after every meal or snack, and encouraged to minimize the latency between eating and recording. In addition, participants were discouraged from recording daily caloric intake and exercise at one time at the end of the day or on following days (i.e., all at once). Participants were shown how the immediacy of self-monitoring after every meal would allow them to receive an immediate and up-to-date number of net calories (i.e., calories consumed and remaining) as the day progressed. Self-monitoring was completed using the Livestrong application on the smartphone or the Livestrong website. Participants also weighed themselves on a scale and recorded their weight in pounds using Livestrong at the same time and on the same day each week.

Self-assessment. The caloric intake and expenditure recorded by the participants was immediately provided in graphic feedback from the Livestrong application and website. At any given moment, the participants were able to access a visual

representation of the number of net calories consumed thus far and how many net calories remained for the day using the application and/or website. This graphic feedback allowed the participants to make adjustments throughout the day to increase or decrease caloric intake and exercise to assist in reaching their daily net calorie goal.

Behavioral feedback. The Livestrong application sent the participants an electronic reminder (i.e., a visible and audible notification to their smartphone) to self-monitor their caloric intake and exercise if they had not done so by a specified time each day. In addition, participants received behavioral feedback in the form of visual displays (e.g., charts and graphs) on both the Livestrong application and website that provided up to date feedback on the number of calories consumed, burned, and remaining for each day. The Livestrong website provided the participants with congratulatory messages in response to behaviors such as tracking foods, tracking exercise, and logging in to their account.

Procedural Fidelity

Using a behavioral checklist, the researcher collected procedural fidelity of the self-management intervention (i.e., independent variable) across approximately 20% of the intervention sessions. To measure procedural fidelity, participants were responsible for emailing pictures of all food consumed during this 20% of intervention sessions. The self-monitoring data synced with the Livestrong website and was accessible to the researcher at any given time during the study. The researcher compared the participants' pictures of the foods to the foods they recorded on the website to verify that the participants had recorded the foods correctly (see Appendix A). To calculate procedural fidelity, the researcher divided the smaller number of foods by the larger number of foods

and multiplied by 100. Intervention sessions were implemented with an overall mean of 90% (range 71-100%) fidelity by Corine, 64% (range 22-100%) fidelity by Anisa, 82% (range 75-92%) fidelity by Cathy, and 75% (range 56-88%) fidelity by Jasmine. It should be noted that the majority of sessions with less than 100% procedural fidelity occurred because participants recorded more foods in Livestrong than were included in the pictures they emailed to the researcher.

Interobserver Agreement

Interobserver agreement (IOA) was collected for at least 20% of sessions equally distributed across baseline and intervention. To calculate IOA, the researcher used the emails sent from the participants during baseline and the self-monitoring data they recorded on the Livestrong application or website during intervention. Two researchers independently recorded the occurrence or nonoccurrence of self-monitoring for caloric intake (i.e., breakfast, lunch, dinner, and snacks) and expenditure (i.e., exercise) for each of the IOA sessions (see Appendix B). IOA was calculated using point-by-point agreement between the two researchers by dividing the number of agreements by the total number of agreements plus disagreements and multiplying by 100. The percentage of agreement during baseline and intervention sessions was 100% for Corine and Anisa, 97% (range 80-100%) for Cathy, and 97% (range 80-100%) for Jasmine.

Social Validity

Each participant was provided a social validity survey to fill out after the study was completed (see Appendix C). The survey was constructed to provide feedback to the researcher about the participants' experience with this study. Multiple questions were asked to examine (a) what components of the self-management package were most

helpful, (b) what parts of the intervention were easy or difficult to complete, hard to understand, or caused problems, (c) what variables were not accounted for that may have had an impact, (d) whether or not the participant found the intervention beneficial, and (e) if the participant would be interested in participating again or would recommend the self-management of daily net calories to others. Participants rated all items on the survey as either agree or strongly agree with the exception of one participant who rated Number 7 (I was satisfied with this study) as neutral. Despite this one neutral rating, all participants reported they would participate in this study again if given the opportunity and plan to continue self-managing their daily net calories. In addition, participants found both the application on the smartphone and the website easy to use with a preference for the Livestrong application on the smartphone over the Livestrong website.

The women listed several things that may have caused problems and impacted their success during this study. First, entering the complex ingredients for meals that were only eaten one time was found difficult and time consuming. Second, a lack of exercising due to a busy lifestyle interrupted a desired increase for caloric expenditure. Third, technical difficulties with the Livestrong application syncing with the website created moments of frustration. Finally, one participant mentioned vacationing with friends and her menstrual cycle as two key factors that impacted her success during this study. Conversely, participants attributed will power, self-control, and self-awareness as contributors to their success in this study.

Results

Visual analysis was used to assess the effects of the self-management intervention on daily net calories. Within- and between-phase data patterns were examined and the following criteria were used to determine if there was a functional relation between the independent and dependent variables: (a) level--mean score for the data within each phase, (b) immediacy of effect--the change in level during the time of onset or termination of a phase, (c) overlap--the number of data points from one phase that overlaps with data from the previous phase, and (d) consistency of data patterns across similar phases--how similar the data are across the same conditions (Alberto & Troutman, 2013; Kazdin, 2011).

The data in Figure 1 display the number of net calories consumed per day and weight in pounds during baseline and intervention phases for Corine, Anisa, Cathy, Jasmine, and Gabrielle. During baseline, Corine averaged 2,020 daily net calories (range 1,485 – 2,575) across 5 sessions. With the start of the self-management intervention Corine reduced her daily net calories below her 1,451 daily net calorie goal and maintained an average of 1,380 (range 1,035 – 1,618) net calories across 30 sessions with 94% of nonoverlapping data. Corine remained below her net calorie goal across 90% of sessions during intervention. During the remaining sessions, she never exceeded her daily net calorie goal by more than 12% (range 2-12%). Corine weighed 147 pounds on the first day of baseline and after 30 sessions of self-managing her daily net calories, she lost 7 pounds and weighed 140 pounds.

Anisa averaged 1,619 daily net calories (range 1,218 – 1,979) across 8 sessions during baseline. By the second session in the self-management intervention, Anisa

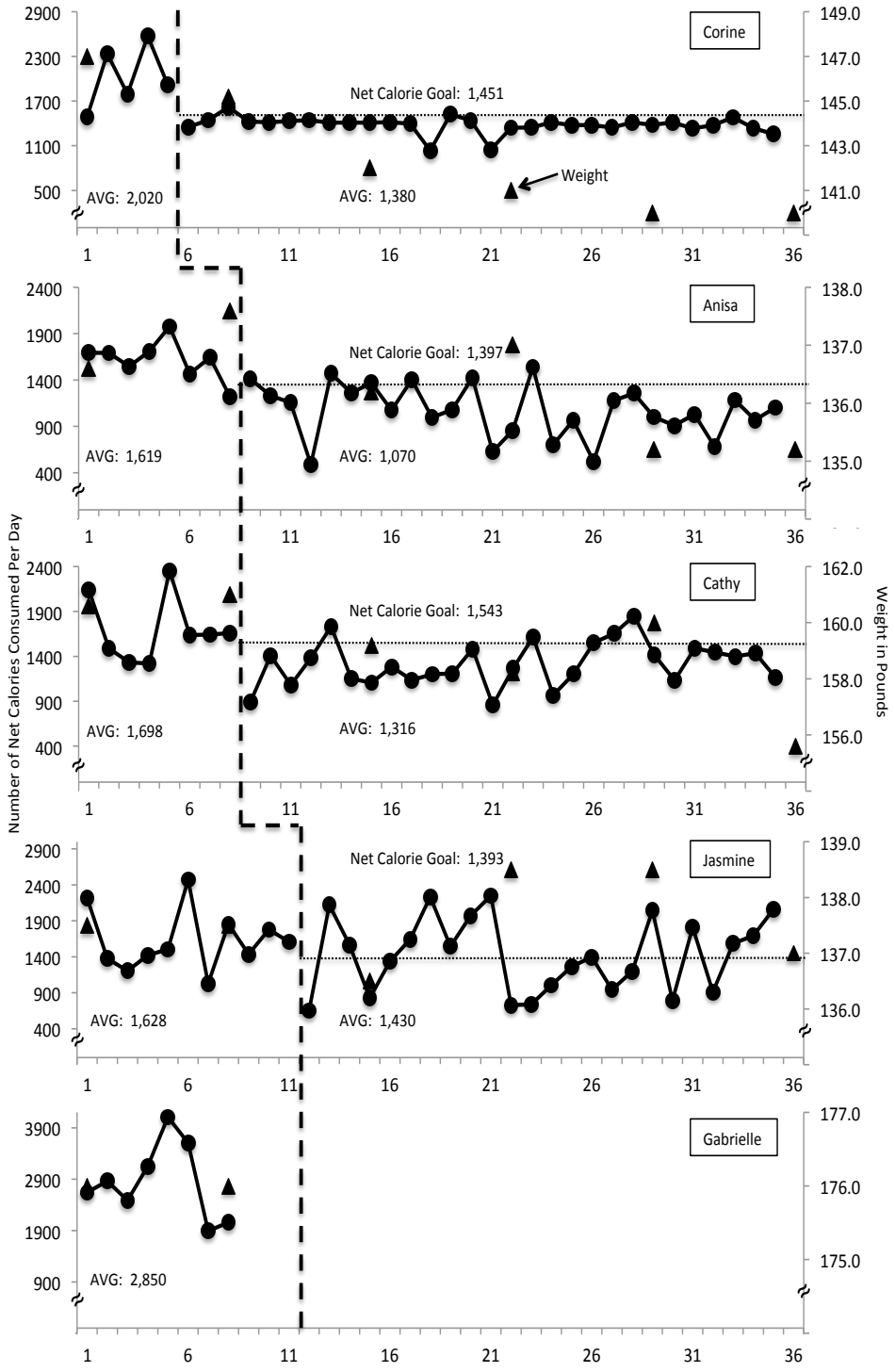

Figure 1. Number of daily net calories consumed and weight in pounds during baseline and self-management.

reduced her daily net calories below her 1,397 daily net calorie goal and maintained an average of 1,070 (range 490 – 1,540) across 27 sessions with 67% of nonoverlapping data. Anisa remained below her net calorie goal across 81% of sessions during intervention. During the remaining sessions, she never exceeded her daily net calorie goal by more than 10% (range 1-10%). Anisa weighed 136.6 pounds at the beginning of this study, and after 27 sessions of self-managing her daily net calories, she lost 1.4 pounds and weighed 135.2 pounds.

During baseline, Cathy averaged 1,698 daily net calories (range 1,320 – 2,354) across 8 sessions. With the start of the self-management intervention, Cathy reduced her daily net calories below her 1,543 daily net calorie goal and maintained an average of 1,316 (range 858 – 1,850) across 27 sessions with 52% of nonoverlapping data. Cathy remained below her net calorie goal across 81% of sessions during intervention. For the remaining sessions, she never exceeded her daily net calorie goal by more than 20% (range 1-20%). Cathy weighed 160.6 pounds at the beginning of this study and after 27 sessions of self-managing her daily net calories, she lost 5 pounds and weighed 155.6 pounds.

Jasmine averaged 1,628 daily net calories (range 1,028 – 2,473) across 11 sessions during baseline. With the start of the self-management intervention, Jasmine reduced her daily net calories below her 1,393 daily net calorie goal and maintained an average of 1,430 (range 652 – 2,249) across 24 sessions with 33% of nonoverlapping data. Jasmine remained below her net calorie goal across 54% of sessions during intervention. During the remaining sessions, she never exceeded her daily net calorie goal by more than 61% (12-61%). Jasmine weighed 137.5 pounds at the beginning of

this study and after 24 sessions of self-managing her daily net calories, she lost 0.5 pounds and weighed 137 pounds.

Gabrielle weighed 176 pounds at the beginning of this study and averaged 2,850 daily net calories (range 1,890-4,109) across 8 sessions during baseline. When Gabrielle withdrew from the study after 8 sessions of baseline, she had lost 0 pounds and weighed 176 pounds.

Discussion

The purpose of this research was to examine the impact of self-management on daily net calories consumed by women who are overweight. The independent variable (i.e., self-management) was implemented at three different points of time. The dependent variable (i.e., daily net calories) changed with the introduction of the independent variable during two of those times for three participants providing one demonstration and one replication of the impact of the independent variable. With the third implementation of the independent variable there was no change in the dependent variable. Specifically, the data for Corine, Anisa, and Cathy reveal an effect, but because Anisa and Cathy entered intervention together, the data for these two women are considered one replication. The data for Jasmine are too variable to show an effect of the independent variable. Because the dependent variable did not change with *each* implementation of the independent variable a functional relation cannot be confirmed (Alberto & Troutman, 2013). Even though a functional relation cannot be confirmed, it is important to mention the effects of the self-management intervention on daily net calories for all the participants who completed the study.

The average reported daily net calories decreased from baseline to intervention for all participants. Corine averaged 2,020 daily net calories during baseline and reduced this amount 32% to 1,380 during the self-management intervention. Anisa reduced her average daily net calories 34% from 1,619 daily net calories during baseline to 1,070 during intervention. Cathy averaged 1,698 daily net calories during baseline and reduced this average 22% to 1,316 during intervention. Although Jasmine's data are variable, she reduced her 1,628 average daily net calories during baseline by 12% to 1,430 during the intervention. Additionally, although the amount of weight loss varied across participants, they all experienced a loss in weight (0.5 to 7 pounds) and only after implementing the self-management intervention. Finally, after the study ended, all the women reported that participating in this study was beneficial and they each plan to continue self-managing their daily net calories.

Although this study focused on the effectiveness of self-managing daily net calories, it is also important to examine the effectiveness on weekly net calories. According to the NIH (2005), individuals must reduce net calories by roughly 3,500 to burn one pound of body fat. The weight loss goal for all participants in this study was to lose 1 pound per week. This reduction of 3,500 calories per week was equally distributed across seven days (i.e., 500 calories per day) to calculate the daily net calorie goal for each participant. Although participants exceeded their daily net calories during some of the intervention sessions, there were also sessions when participants consumed fewer than their daily net calorie goal. An examination of weekly net calories reveals a reduction of 3,500 net calories across all participants during intervention with the exception of Jasmine's first week. Therefore, future research should examine the use of

weekly net calorie goals rather than just daily net calorie goals for individuals who prefer to distribute calories differently across a week to allow for more calories on some days than others.

This study extends and supports the self-management literature. It extends previous research that reported the use of self-management to reduce the number of net calories for individuals who were overweight (Burke et al., 2005; VanWormer, 2004). More specifically, this was the first single case research study to examine the effectiveness of self-management on daily net calories for women who were overweight. Previous research attributed success to the amount of weight lost or gained by the participants (Burke et al., 2011), rather than to the change in behaviors associated with weight management. This study measured a dependent variable (i.e., daily net calories) within the control of the participants, in addition to measuring the amount of weight lost or gained.

Self-monitoring has been identified as the cornerstone of behavioral weight loss intervention programs (Burke et al., 2011). It helps bring awareness to specific behaviors and the environment around those behaviors. Previous studies have examined the self-monitoring of caloric intake using paper and electronic diaries (Burke et al., 2011). This study extends the literature on using electronic diaries to self-manage net calories by using the Livestrong application on a smartphone and the Livestrong website.

Several advantages were found using an electronic diary to self-manage daily net calories. The electronic diary provided a running total of daily net calories (i.e., caloric intake and expenditure) to the participants. This allowed the participants to make adjustments throughout the day in order to meet their daily net calorie goal. That is, if a

participant knew she was going to a party one evening and planned to consume a high number of calories, she was able to choose to consume fewer calories earlier in the day or choose to exercise and burn extra calories to remain at or below her daily net calorie goal. The ease of self-monitoring using the smartphone may have facilitated adherence to the self-management intervention. In addition, the smartphone was socially acceptable and included databases of foods and nutrition facts that allowed for quick and easy self-monitoring. This study extends and supports previous literature that reported higher adherence to the intervention when participants used electronic diaries to self-monitor (Burke et al., 2011).

Pearson (2012) suggested goals be specific, include both short and long terms, and be collaboratively set. During this study, participants made both short-and long-term goals to assist in achieving incremental celebrations and to make their environment more rewarding. Writing specific short-term goals helped to keep the participants on track to achieve their long-term goals.

Recently, researchers have started to discuss the impact of self-monitoring one's weight on weight management (Gokee-LaRose et al., 2009). The behavior of standing on a scale and weighing oneself should increase the participant's awareness of how his or her weight is directly related to managing net calories through caloric intake and expenditure (Burke et al., 2011). Although weight loss it not a behavior, and not within the sole control of an individual, participants only recorded their weight once a week as an additional measure to track if weight loss had occurred. Future research should continue to examine the impact of self-weighing at different intervals (e.g., daily, weekly, biweekly, monthly, etc.) on achieving intended weight loss goals.

Although the results from this study support the impact of self-management on daily net calories, there were several limitations. The accuracy and frequency of self-monitoring required to reduce caloric intake and increase exercise is unknown. It appears participants in this study recorded every occurrence of caloric intake and expenditure for net calories during the intervention; however, procedural fidelity suggests that participants sometimes recorded more foods than they included in the pictures they sent to the researcher. Future researchers should examine how accurately and how frequently individuals need to self-monitor to accomplish set goals.

This study included goal setting, self-monitoring, self-assessment, and behavioral feedback in the self-management intervention; however it is unknown which of these components had the most or least effect on behavior, or if all components, or some combination of components are required for success. According to the social validity survey, participants agreed or strongly agreed that all of the components in the self-management intervention were helpful. The women rated behavioral feedback the most helpful, self-assessment the least helpful, and goal setting and self-monitoring in between these two. Future researchers may conduct a component analysis, that is, slowly integrate and/or remove specific components to identify those most important for success in the reduction of net calories.

Participants used the Livestrong application and Livestrong website as the vehicles for self-managing their daily net calories. Although Livestrong assists individuals with setting and achieving goals for healthier living, it should be noted that other programs are available that provide similar services. Future research should

examine other software and applications available for self-managing caloric intake and expenditure (e.g., Lose It!, Calorie Counter, and My Fitness Pal).

Previous research examining the effectiveness of self-management on weight loss has been conducted primarily with white females who were overweight or obese (Burke et al., 2011). This study supports previous literature by only including overweight white females between the ages of 30 and 50. Using such a homogenous group of participants limits the generalization of this intervention to individuals who are not overweight white females. Future research should include a variety of participants to expand the generalization of using self-management for daily net calories beyond white females who are overweight.

Finally, this study was conducted over five weeks and no maintenance data were collected. Future research should follow up with the participants after intervention to determine if self-management continued and if the behaviors were successful in achieving participants' distal goals. Previous research has only reported the amount of weight gain or loss of the participants as the measure for maintenance. As mentioned earlier, weight loss or weight gain is not a behavior and should not be used as the only dependent measure for success. Therefore, future research should examine if the participants continue to self-manage their daily net calories and whether the goal for daily, or weekly, net calories is maintained over time.

Researchers should continue to focus more on preventive approaches towards obesity, in addition to treatment-based approaches (Kumanyika et al., 2008). The purpose of this research was to examine the impact of self-management on daily net calories consumed by women who were overweight. Participants were offered a

behavioral approach at the individual level to help manage their daily net calories. Self-management provided a means for individuals to take responsibility for the behaviors associated with weight management and to move toward a healthier lifestyle. Although weight loss is not a behavior, the behaviors associated with weight management (i.e., caloric intake and exercise) can be self-managed and may help individuals achieve desired results through goal setting, self-monitoring, self-assessment, and behavioral feedback.

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APPENDIXES

APPENDIX A

Procedural Fidelity

Pictures	Livestrong
1. Pictures of foods eaten for breakfast.	1. Participant recorded foods eaten for breakfast.
2. Pictures of foods eaten for lunch.	2. Participant recorded foods eaten for lunch.
3. Pictures of foods eaten for dinner.	3. Participant recorded foods eaten for dinner.
4. Pictures of foods eaten for snacks.	4. Participant recorded foods eaten for snacks.
Total number of foods in pictures.	Total number of foods recorded on Livestrong.

APPENDIX B

Interobserver Agreement (IOA)

Directions: Circle "+" for the occurrence OR "-" for the nonoccurrence of self-monitoring for breakfast, lunch, dinner, snacks, and exercise.

Participant _____ Session # _____

	Circle + or -
Breakfast	+ -
Lunch	+ -
Dinner	+ -
Snacks	+ -
Exercise	+ -

Participant _____ Session # _____

	Circle + or -
Breakfast	+ -
Lunch	+ -
Dinner	+ -
Snacks	+ -
Exercise	+ -

APPENDIX C

Social Validity Survey

Please read the statements below and rate them according to whether you: ***Strongly disagree (SD), Disagree (D), are Neutral (N), Agree (A), or Strongly agree (SA).***

1. Self-managing net calories fits well with my lifestyle.

SD D N A SA

2. Self-managing net calories is beneficial to me.

SD D N A SA

3. Self-managing the number of daily net calories is important to me.

SD D N A SA

4. I will recommend using self-management for/of daily net calories to others.

SD D N A SA

5. Participating in this study had a positive impact on my life.

SD D N A SA

6. I achieved my net calorie goals using self-management.

SD D N A SA

7. I was satisfied with this study.

SD D N A SA

8. The following components were helpful in this self-management intervention:

(a) Goal Setting

SD D N A SA

(b) Self-monitoring

SD D N A SA

(c) Self-assessment

SD D N A SA

(d) Behavioral feedback

SD D N A SA

9. I would participate in this study again if given the opportunity.

SD D N A SA

10. I plan to continue using self-management for my daily net calories.

SD D N A SA

11. I am interested in learning how to apply self-management to other areas of my life.

SD D N A SA

12. What part(s) of the intervention were easy for you?

13. What part(s) of the intervention were difficult or hard for you to understand?

14. What part(s) of the intervention caused you problems?

15. In addition to the intervention, what else do you feel had an impact on your success (or lack of success)?