MOTIVATING HEALTHY DIET BEHAVIORS:

THE SELF-AS-DOER IDENTITY

by

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ABSTRACT

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Background: Self-identity predicts healthy eating behaviors and intentions above and beyond Theory of Planned Behavior components (TPB; i.e., attitudes, perceived behavioral control, and subjective norms), but interventions exploring the relationship between self-identity and motivation are limited. Self-as-doer identity may be an important point of intervention for healthy eating behaviors (Houser-Marko & Sheldon, 2006). Therefore, I investigated whether the experimental manipulation of a self-as-doer identity predicted improved healthy food consumption, intentions, and increased self-identity as a healthy eater compared to women who received nutritional education or no intervention directly following the intervention and one month post-intervention.

Method: Participants were 79 women ages 18-53 years old (M=22.92, SD=6.92) who were randomly assigned to one of three conditions (i.e., control, education only, or education and self-as-doer activity) and asked to record their diet for four days using a food diary and an online food frequency questionnaire. Intentions to eat a healthy diet, nutrition knowledge, identity as a healthy eater, and healthy eating behaviors were recorded over a six week period: before, after, and one month post-intervention. Repeated

measures ANOVAs and hierarchal linear regressions were performed to determine if the self-as-doer intervention created change and predicted increases in intentions, self-identity, and healthy food consumption.

Results: Healthy eater identity predicted intentions to eat a healthy diet and overall healthy eating behavior above and beyond TPB components, but did not predict specific food group eating behaviors. Self-as-doer participants strengthened self-identity and intentions over the course of the study, but no group differences were found. Self-as-doer participants increased overall healthy eating behaviors while education and control participants decreased overall healthy eating behaviors. Self-as-doer participants ate significantly more healthy foods at time three than did education and control participants.

Discussion: Findings support the role of self-identity in predicting intentions and overall healthy eating behaviors and demonstrate a causal relationship between self-as-doer identity and change in healthy eating identity, intentions, and some behaviors. The self-as-doer intervention may provide individuals with the unique motivational tools needed for diet change. Further research refining the self-as-doer intervention, targeting other health behaviors, and employing the intervention in a clinical population is needed.

To Scott, my family, and my mentors -

Thank you for helping me become the person I am today.

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Motivating Healthy Diet Behaviors: The Self-as-Doer Identity

Results from the National Health and Nutrition Examination Survey demonstrate that obesity is a significant and growing problem in the United States. More than 68% of American adults are overweight or obese with women being disproportionately overweight (National Center for Health Statistics, 2010; Flegal, Carroll, Ogden, & Curtin, 2010). Moreover, the percentage of obesity in adults has more than doubled since 1980 (National Center for Health Statistics, 2010; Ogden, Carroll, Curtin, Lamb, & Flegal, 2010; U.S. Department of Health and Human Services, 2010). Obesity puts individuals at an increased risk of hypertension, diabetes, cancer, and cardiovascular disease (Office of the Surgeon General, 2001; Zajacova, Dowd, & Burgard, 2011). Moreover, children and adults who are overweight or obese are also at risk of social discrimination and a reduced quality of life (Olshansky & Ludwig, 2005; Puhl, Heuer, & Brownell, 2010). The effects of weight discrimination and stigma may lead to depression, eating disorders, and even suicide (Libbey, Story, Neumark-Sztainer, & Boutelle, 2008; U.S. Surgeon General, 2001). Further still, the physical and mental effects of obesity are arguably the foremost sources of heath care expense and policy concern (Center for Disease Control [CDC], n.d.). In fact, the cost of chronic illnesses resulting from obesity (e.g., diabetes, coronary heart disease, hypertension, etc.) accounts for more than 70% of the $1 trillion spent on health care per year in the United States, making obesity a health issue not only of concern for individuals and families, but for the entire public (CDC, 2004).

Obesity is caused by a combination of environmental, genetic, and health behavior factors (U.S. Department of Health and Human Services, 2010; Office of the Surgeon General, 2001). Researchers have demonstrated that a lack of optimal nutrition;

that is, consuming too many high fat, starch, and calorie foods and too few fruits, vegetables, and whole grains, is a strong predictor of obesity (Arluk, Branch, Swain, & Dowling, 2003; Kimbro, Brooks-Gunn, & McLanhan, 2007). Obesity is caused by a lack of physical activity, unhealthy eating patterns, or a combination of the two (CDC, 2004; U.S. Department of Health and Human Services, 2010). Others have argued that the growing trend of those who are overweight is also a result of societal values, sedentary behaviors such as increases in fast-food consumption and screen time (i.e., time spent watching TV, using the computer, and playing video games), and decreased physical activity due to environmental limitations such as access to sidewalks or bike paths and the elimination of funding for physical education programming in schools (Anderson, Economos, & Must, 2008).

Although several factors contribute to the growing number of individuals who are overweight and obese, recommendations and proposals to address this health concern consistently suggest decreasing energy-dense, high calorie foods and drinks, and increasing consumption of fruits, vegetables, and whole grains (c.f., American Public Health Association 2007, U.S. Department of Health and Human Services, 2011; Institutes of Medicine, 2006). For example, the Surgeon General's call for a fit and healthy nation argues that high-calorie, energy dense diets are, in part, responsible for the increasing rates of obesity and that an effective way to reduce these climbing rates is to increase a healthy diet where calories are consumed from high-nutrient foods like fruits and vegetables (U.S. Department of Health and Human Services, 2010).

Americans' current dietary habits are, however, far from meeting the diet recommendations set forth by the aforementioned foundations and by the national dietary

guidelines proposed by the U.S. Department of Agriculture (USDA; USDA, 2010). Researchers have demonstrated that less than one in ten Americans consume the daily fruit and vegetable recommendations (Kimmons, Gillespie, Seymour, Serdula, & Blanck, 2009). The USDA also estimates that in the last 20 years, the average caloric consumption of Americans has increased by 300 calories per day (Putnam, Allshouse, & Kantor, 2002). American's tend to have diets where the majority of the daily calorie intake is from added sugars and refined grains (Wallinga, 2010). In fact, 246 calories per day are reported to come from corn sweeteners (i.e. high-fructose corn syrup); an increase of 359% from 1970 (Wallinga, 2010). Moreover, American diets are becoming larger in portion size and meals are eaten away from home with greater frequency (Gidding et al., 2009; Neilsen, Siega-Rizz, & Popkin, 2002; USDA, 2006). The increased trend of consuming meals away from home is important because away-from-home foods tend to be high in fat, starch, and sugar while fruits, vegetables, and whole grains are typically absent (Buzby, Wells, & Vocke, 2006; Wallinga, 2010). In a longitudinal study investigating fast food, a common source of away from home meals, Duffey and Popkin (2007) found that not only did young adults increase their consumption of fast food over a 10 year period, but that past fast food consumption was associated with significant increases in body mass index (BMI) three years later.

Obesity is a prevalent and significant health concern which can be, in part, reduced and controlled by greater healthy food intake (Allicock et al., 2010; Stark et al., 2011). Yet, research demonstrates that there are several barriers to eating healthy. In an evaluation of conversations of families in a primary care setting, Maher and colleagues (2010) identified barriers to healthy eating such as poor knowledge of healthy foods, poor

skills to prepare healthy foods, and cost. Others have identified community factors such as a lack of places which sell healthy foods or little availability of fruits and vegetables (Taylor, Poston, Walker, Lovell, & Kraft, 2006), no time to purchase and prepare healthy goods (Rolnick et al., 2009), and a lack of willpower, laziness and the convenience of unhealthy foods (Barroso, Peters, Johnson, Kelder, & Jefferson, 2010) as barriers that prevent persons from consuming healthy foods. Underlying many of these barriers may be the degree to which people feel motivated to change behavior and, for example, consequently learn how to prepare healthy goods or travel to places which provide greater varieties of healthy foods. Yet, research investigating motivation for healthy food consumption is underdeveloped.

Taste and preference for healthy foods have also been demonstrated to be an important predictor in whether or not persons will eat healthy foods (Deshpande, Basil, & Basil, 2009; Gough & Conner, 2006). Others have determined that preference is often developed at a young age (Gidding et al., 2009; Kemm, 1987) which subsequently influences food choices later in life (Northstone, Emmett, & The ALSPAC Study Team, 2005). However, children are often under the direct influence of their family's preference (Aldridge, Dovey, & Halford, 2009; Bourcier, Bowen, Meischke, & Moinpour, 2003) and may therefore be limited in developing their taste preferences until they have reached an age where they can make independent food choices. Therefore, an important population of interest in research exploring food choice and motivators promoting one's choice to eat healthy or unhealthy foods is young adults who are transitioning into adulthood. Arnett (2006) describes this period of time as emerging adulthood; an "age of identity explorations" (p.8) wherein the transition from adolescence to adulthood is extended.

This period of time in emerging adulthood allows young adults to explore the world around them, decipher their possibilities in life, and engage in a variety of activities in an effort to determine who they are (Arnett, 2000). In this paradigm of development, young adults are often given the opportunity to begin making decisions on their own and establishing habits related to money, entertainment, and food preferences.

Unfortunately the majority of young adults have been found to have poor eating habits. An investigation of food availability in college-student dormitory rooms demonstrated that the majority (70%) of food items were unhealthy (i.e., salty snacks, desserts or candy, and sweetened beverages; Nelson, & Story, 2009). Freedman (2010) found a significant reduction in fruit and vegetable consumption when moving from home to college. Furthermore, the percentage of young adults meeting the daily fruit and vegetable requirements dropped significantly from 71% to only 46% when young adults moved to college. Freeman also demonstrated that the changes in diet from home to college were not related to gender or ethnicity. Overall, young adults, particularly college students, tend to have diets that fall short of daily recommendations of 3-4 servings of fruits and 4-5 serving vegetables per day (Brunt, Rhee, & Zhong, 2008). Nelson and colleagues (2009) found that college-aged men and women were eating, on average, fewer than 2 servings of fruit and 2 servings of vegetables per day. Young adults also have inadequate intake of whole grains. Whereas the USDA's (2010) dietary guidelines for Americans recommend that 50% of total grain intake be from whole-grains, Rose and colleagues (2007) found that only 13% of grain intake for young adults came from whole grain. Despite the new opportunities for young adults to make their own food choices, they are not consuming the adequate amount of fruits, vegetables, and

whole grains. Therefore research is needed to determine the mechanisms by which young adults choose healthy diets.

Programs theoretically grounded in health behavioral models have been more successful in creating and sustaining behavior change than programs not grounded in health behavior change models (Fishbein, 2002; Near & Zimmerman, 2005). One of the most common health behavior theories used to investigate healthy eating behaviors and intentions is the Theory of Planned Behavior (TPB; Ajzen, 1985; Guillaumie, Godin, & Vezian-Im, 2010; Sparks & Guthrie, 1998). The TPB was developed from an earlier theory proposed by Ajzen and Fishbein (1980), the Theory of Reasoned Action (TRA). The TRA was developed with the idea that humans are rational beings who weigh the outcomes of their actions before they engage in them (i.e., "reasoned action", Ajzen & Fishbein, 1980). As a result, an underlying concept of the TRA is that behavior is determined by one's intentions to perform behavior. That is, the degree to which one is ready to behave or has determined a particular plan of action, predicts whether one will actually enact a behavior. The TRA has been used to identify factors which predict intentions (Ajzen & Fishbein, 1980). These factors are determined by beliefs about the consequences of behavior and beliefs concerning the opinions of others about the behavior. Beliefs about the consequences of behavior determine attitudes (i.e., favorable or unfavorable feelings) toward certain behaviors and normative beliefs determine subjective norms (i.e., beliefs about what others in an individual's social environment think about the behavior; Ajzen, 1985). Together, attitudes and subjective norms predict intention, which consequently predict behavior.

Although research using the framework of the TRA demonstrates some success in predicting behavioral intentions (Boyd & Wandersman, 1991; Poss, 2001), the predictive ability of the TRA is limited in that it does not consider the degree of control individuals have over their ability to perform behaviors (Ajzen & Madden, 1986; Astrom & Rise, 2001; Ragin, 2011). That is to say, behavioral intentions are only relevant when a person has both external (i.e., time, opportunity, etc.) and internal (i.e., knowledge, skills, abilities, etc.) control. To address this limitation, Ajzen and colleagues (Ajzen, 1991; Ajzen & Madden, 1986) proposed adding a measure of perceived behavioral control. Perceived behavioral control is defined as the degree to which individuals perceive internal and external mastery over behaviors, or more simply, whether a behavior is perceived as easy or difficult to perform (Ajzen & Madden, 1986). The revised model, which includes the perceived behavioral control construct, is known as the Theory of Planned Behavior. Researchers have demonstrated that the greater the perceived behavioral control, the more likely the behavior will be performed (c.f., Armitage & Conner, 2001a; Murnaghan et al., 2010; Rise, Sheeran, & Hukkleberg, 2010). In fact, many researchers have found that perceived behavioral control is often the strongest predictor of intentions and behaviors when using the TPB framework (Armitage & Conner, 2001a; Strating, Schuur, & Suurmeijer, 2006) and that it may serve to predict behavior directly. As stated by Ajzen, (n.d.) “to the extent that perceived behavioral control is veridical, it can sever as a proxy for actual control and contribute to the behavior in question” (pg. 1).

Research has confirmed the predictive ability of the TPB in varied areas of health behavior such as tobacco cessation (Murnaghan et al., 2010), condom use, (Muñoz-Silva,

Sánchez-García, Nunes, & Martins, 2007), household recycling, (Terry, Hogg, & White, 1999) and healthy diet behaviors including eating a low-fat diet (Sparks & Guthrie, 1998) and consuming organic vegetables (Sparks & Shepherd, 1992). Guillaumine and colleagues (2010) argue the TPB is a better behavior change theory in predicting healthy eating behaviors than the Social Cognitive Theory and the Health Belief Model, because the TPB specifically predicts intention which has been demonstrated to be a valuable cognition to explore in diet behavior change (c.f., Armitage & Conner, 2001a; Blanchard et al., 2009a; Rise et al., 2010). Research has consistently demonstrated that attitudes, perceived behavioral control, and subjective norms are significant predictors of intentions to eat healthy (Blanchard et al., 2009a; Povey, Conner, Sparks, James, & Shepherd, 2000; Sjoberg, Kim, & Reicks, 2004), which consequently predict behaviors to consume a more healthy diet (i.e., increases in fruits and vegetables, whole grain, and low-fat foods) both at the time of the assessment and longitudinally (Jemmott et al., 2011; Murnaghan et al., 2010). The predictive ability of positive attitudes toward healthy eating, an environment supportive of health eating behaviors, and the perceived ability to consume a healthy diet has been supported regardless of ethnicity and gender (Blanchard et al., 2009a; Blanchard et al., 2009b). Furthermore, intervention programs designed from TPB components have been found to create successful and sustainable behavior change for healthy eating behaviors such as fruit and vegetable intake (Gratton, Povey, & Clark-Carter, 2007; Jackson et al., 2005).

Although the TPB has consistently and successfully been used to predict intentions to eat healthy (Anderson, Winett, & Wojcik, 2007; Rise et al., 2010), some continue to question the degree to which the TPB is able to explain all “theoretical

determinants" of intention and behavior (Armitage & Conner, 1999; Rise et al., 2010, pg. 1086). In an effort to extend the TPB many researchers have begun exploring how group and self-identity contribute to the variance accounted for in the intention to perform health behaviors (Chatzisarantis, Hagger, Wang, & Thogersen-Ntoumani, 2009; Rise et al., 2010; Sparks & Guthrie, 1998). Researchers have argued that identity, particularly self-identity, may provide additional predictive ability in health behaviors such as healthy eating (Armitage & Conner, 1999; Conner & Armitage, 1998; Astrom & Rise, 2001). Self-identity can be defined as an enduring characterization of one's self-perception which subsequently affects behavior: "the salient part of the actor's self which relates to a particular behavior" (Armitage & Conner, 1999, pg. 73). According to identity theorists, the self is composed of multiple parts or identities, each relating to social roles defined from cues in the social environment (e.g. self as teacher; Burke, 1991; Stryker, 1987; Stryker & Burke, 2000). Meaning and purpose is developed as a result of these situational selves (e.g., "Teachers encourage scholarship") which then promote related behavior ("I will provide learning opportunities for my students"). According to identity theory, the more one identifies with a particular role, the more likely one is to behave in accordance with that role (Stryker & Bruke, 2000).

Researchers have argued that the weakest component in predicting intentions is subjective norms (Godin & Kok, 1996; Sheppard, Hartwick, & Warshaw, 1988) and that by reorganizing subjective norms into components which reflect social influence norms (i.e., descriptive and injunctive) and self-representational norms (i.e., self-identity and group identification; Abraham, Sheeran, & Johnston, 1998), the TPB may be able to account for more variance in behavior change. Investigators have differentiated self-

identity from subjective norms in that subjective norms represent motivation to behave as a result of others opinions and environmental expectations (e.g., recycling is the "thing to do" in our neighborhood). Self-identity, on the other hand, is defined as self-representations with constructed meaning from social roles that provide descriptions and categorizations of which to identify with (Astrom & Rise, 2001; Stryker, 1987; Stryker & Burke, 2000). To clarify the relationships among subjective norms, self-identity, and group identity, Astrom and Rise (2001) explored whether self-identity and group identity predict behavioral intention to eat healthy foods, beyond the TPB constructs. They found that self-identity predicted an additional 4% of the variance in behavioral intention above and beyond the components of the TPB, including subjective norms. Group norms and group identification, however, were not significant predictors of behavioral intentions to eat healthy. The researchers concluded that "one's self-perception as a healthy consumer impacts directly upon the formation of intentions to eat healthily" (Astrom & Rise, 2001, p. 233).

Others have argued that self-identity reflects certain behaviors which can be theoretically accounted for by the attitudes components of the TPB (Eagly & Chaiken, 1993). However, Rise and colleagues (2010) have demonstrated only a modest amount of shared variance between self-identity and attitudes (i.e., $R^2 = .14$). They also found that self-identity significantly predicted intention after attitudes were controlled for, thereby suggesting that self-identity uniquely contributes to behavioral intentions and is not theoretically accounted for by the attitudes component of the TPB. Overall, identity theorists (Biddle et al., 1985; Stryker & Burke, 2000) purport that self-identity is a socially constructed motivation wherein individuals behave in ways to confirm their

sense of self, thus supporting a different motivation to formulate intentions to perform behaviors than that of subjective norms and attitudes (Rise et al., 2010). Therefore, self-identity can be conceptualized a unique construct, different from attitudes and subjective norms, which provides explanatory power in intentions to perform behaviors and of which can be the focus of future interventions.

Numerous researchers have found that self-identity accounts for between 3% and 9% of the amount of variance in behavioral intentions above and beyond the TPB components for various behaviors such as donating blood (Armitage & Connor, 2001b), physical activity (Campbell & Sheeran, 2001; Thompson & Rise, 2002), donating to charity (Austin & Sheeran, 2001), and dieting behaviors (Armitage & Connor, 1999; Sparks & Guthrie, 1998). To provide further evidence of the role of self-identity in the TPB, Rise and colleagues (2010) conducted a meta-analysis wherein they quantified the effect of self-identity on behavioral intentions. In their analysis of the role of self-identity on behavioral intentions from 33 different studies, they found that self-identity was a significant predictor of intention and had one of the highest beta weights, second only to attitudes. The researchers determined that self-identity was able to account for an additional 6% of the variance in intention beyond that of attitudes, subjective norms, and perceived behavioral control factors and an additional 9% of the variance in behavioral intentions when controlling for past behavior. Furthermore, intention was a significant mediating variable between self-identity and behavior thereby supporting the model of the TPB wherein behavioral beliefs predict intentions to perform behavior and those intentions consequently predict enacted behavior (Ajzen, 1991). The authors also distinguished self-identity from past behaviors and group identity, thereby concluding

that self-identity has a medium effect on intentions and that self-identity is able to explain additional unique variance beyond that of attitudes, subjective norms, and perceived behavioral control in the TPB. Moreover, the authors concluded that the resulting effect of self-identity provides sufficient evidence for self-identity to be added as a variable to the TPB. Therefore, in the present study, self-identity will be conceptualized a unique construct core to the TPB, different from attitudes, subjective norms, and perceived behavior control and able to predict behavior via intentions (see Figure 1).

Although the field of health behavior change has begun to include self-identity, self-identity defined within this framework fails to fully consider motivation. Burg (2008) argues that motivation (i.e., goal-directed arousal wherein self-interest is accommodated, Rothschild, 1999) is a key component in predicting intentions and that identity is a core concept in determining motivation. Albeit limited, research has demonstrated motivation to be a predictive factor of healthy eating behaviors such as fruit and vegetable consumption (Fuemmeler et al., 2006; Richards, Kattelmann, & Cuirong, 2006; Trudeau, Kristal, Li, & Patterson, 1998). Furthermore, motivation may be an important factor of intervention in an effort to reduce some of the aforementioned barriers (i.e., learning to prepare healthy meals, traveling to places with healthy food options, etc.) to healthy eating behaviors (Barroso et al., 2010; Taylor et al., 2006). However, together motivation and identity have been understudied in healthy eating behaviors (Burg, 2008; Shaikh, Yaroch, Nebeling, Yeh, & Resnicow, 2008). A construct which may bridge the gap between identity and motivation is the self-as-doer (Houser-Marko & Sheldon, 2006). Rooted in identity theory, the self-as-doer theory posits a link between identity and behavior, suggesting that the more one identifies with a particular role, the more likely

one is motivated to participate in related behaviors. The self-as-doer advances the notion that one behaves in accordance with his or her identity by suggesting that an individual defines him or herself as a doer of the behavior based on goals. Identity congruence between behaviors and goals then motivates behavior. For example, a woman may have a goal of eating more healthy foods and may therefore be more inclined to see herself as a "healthy eater" (i.e., the *doer* of the behavior) and henceforth more likely to eat more healthy foods. The self-as-doer capitalizes not only on the identification of one's identity role, but the behavior based upon that role. I have already demonstrated that for persons with diabetes, seeing themselves as a doer of their self-care behaviors predicts increased healthy eating behaviors (Brouwer & Mosack, 2011) and suspect that women who are interested in dieting and who see themselves as "healthy eaters" may be more likely to eat healthy foods. However, the relationship between an identity as a health eater from the framework of goals and motivation and how development of this identity subsequently influences healthy eating behaviors and intentions has yet to be investigated.

Self-identity may be a factor of intervention for researchers and health professionals as they work to motivate individuals for behavioral change (O'Keefe, 2002). Conceptualizing the degree to which one's identifies with goals and behavior related to certain behavior change (e.g., more fruit consumption) and discussing the discrepancies between one's current identification (i.e., a poor fruit eater) and what it might take to define oneself to a stronger degree in relation to the behavior in question (e.g., purchase more fruits to become a better fruit eater), could bring about change in behavioral intention and behavior (O'Keefe, 2002). Although this mechanism is similar

to motivational interviewing (Miller & Rollnick, 2002), which has been demonstrated to create some behavioral change in diet behaviors (Richards et al., 2006), intervention research specifically focusing on developing self-identity as a result of behavioral goals is limited. The processes whereby individuals identify goals related to healthy eating and transform those goals into identity statements (i.e., the self-as-doer) has the potential to activate existing self-representations related to healthy eating. Furthermore, the cognitive process of conceptualizing what it means to be a "healthy eater" may bring about greater identification with different, more health consistent behaviors which may consequently promote behavior change. Therefore, developing goals related to healthy eating behaviors, transforming those goals into self-as-doer identity statements and reflecting on how doer identities do or do not describe one, is suggested to influence self-identity related to healthy eating behaviors. Therefore, the purpose of the present study will be to investigate the role of a doer identity on healthy eating behaviors among a sample of dieting undergraduate women using an experimental design to test the effect of a self-as-doer intervention on eating behaviors, intentions, and self-identity.

In sum, the obesity epidemic continues to grow at alarming rates (Kopelman, 2000; Taylor, 2009). Researchers have demonstrated that identity is a significant predictor of healthy eating behaviors above and beyond attitudes, subjective norms, and perceived behavioral control. Ineffective interventions may not be taking into account how identity and motivation work together to influence diet choices and few investigators have examined the relationship between identity developed from behavioral goals and health behavior. Further still, even fewer researchers employ experimental methods that would enable us to infer causality. In fact, in a review of the determinants of fruit and

vegetable intake, Guillamine and colleagues (2010) reported that most research concerning the predictors of healthy eating behaviors was cross-sectional and focused solely on behavioral intentions and not enacted behaviors. Therefore, whether the experimental manipulation of a "healthy eater" self-as-doer identity predicts improved healthy food consumption, intentions, and a healthy eater identity will be investigated. Previous research has also demonstrated that nutrition education increases healthy eating intentions, perceived behavioral control, and behaviors both at the time of the intervention and longitudinally (Carcaise-Edinboro, McClish, Kracen, Bowen, & Fries, 2008; Oenema, Burg, & Lechner, 2001). Therefore the effects of a self-as-doer identity intervention to standard nutrition education will be compared. Since a self-as-doer identity is conceptualized to be a cognitive representation developed and enacted in social roles which are consistently being attended to, the self-as-doer identity intervention is expected to affect healthy eating intentions and behaviors to a greater degree than that of nutritional education. I hypothesize the following:

1. There will be no differences related to age, relationship status, education, ethnicity, physical activity levels, body mass index (BMI), healthy food consumption, nutrition knowledge, restrictive eating behaviors, and self-identity between intervention groups (i.e., control [CONTROL], education only [EDUCATION], or education and self-as-doer activity [SELF-AS-DOER]) at the beginning of the study.
2. Those with more positive attitudes toward healthy eating, greater perceived behavioral control over eating a healthy diet, greater subjective norms and stronger healthy eater identity will have higher intentions to eat a healthy diet. Furthermore,

a healthy eater identity will predict intentions to eat a healthy diet above and beyond attitudes, perceived behavioral control, and subjective norms.

3. Dieting women with more positive attitudes toward healthy eating, greater perceived behavioral control over eating a healthy diet, greater subjective norms, stronger healthy eater identity and greater intentions to eat a healthy diet will be more likely to report a healthier diet. Furthermore, a healthy eater identity will predict healthy eating behaviors above and beyond attitudes, perceived behavioral control, subjective norms, and intentions to eat a healthy diet.
4. SELF-AS-DOER participants will demonstrate an increase in self-identity related to healthy eating following the intervention (time 2) and 5 weeks post-intervention (time 3) when compared to baseline measures (time 1). EDUCATION and CONTROL participants will have no change in their self-identity related to healthy eating over the course of the study.
5. EDUCATION and SELF-AS-DOER participants will demonstrate an increase in intentions to eat a healthy diet and nutrition knowledge over the course of the study. More specifically, when compared to baseline measures (time 1), nutrition knowledge with be significantly higher directly following the intervention (time 2) and intentions will be significantly higher directly following the intervention (time 2) and 5 weeks post-intervention (time 3). CONTROL participants will have no change in nutrition knowledge and intentions to eat a healthy over the course of the study.
6. EDUCATION and SELF-AS-DOER participants will demonstrate an increase in healthy food consumption such that when compared to baseline measures (time 1),

healthy food consumption will be higher directly following the intervention (time 2) and 5 weeks post-intervention (time 3). Likewise, there will be an increase in healthy food consumption between time 2 and time 3. CONTROL participants will demonstrate no change in healthy food consumption over the course of the study.

7. SELF-AS-DOER participants will have a higher self-identity as a health eater, intentions related to healthy eating, and intake of healthy foods compared to EDUCATION and CONTROL participants at time 2 and 3. EDUCATION participants will have significantly higher intentions related to healthy eating and intake of healthy foods compared to CONTROL participants at time 2 and 3. Finally, SELF-AS-DOER and EDUCATION participants will have higher levels of nutrition knowledge compared to CONTROL participants at time 2 and 3.
8. There will be a significant interaction between time and condition, such that increases in self-identity as a healthy eater and intentions to eat healthy will be greatest for SELF-AS-DOER participants and increases in nutrition knowledge will be greatest for EDUCATION and SELF-AS-DOER participants.
9. There will be a significant interaction between time and condition, such that increases in healthy food consumption over the course of the study will be greatest for SELF-AS-DOER participants.

Methods

Participants

Previous research has demonstrated dramatic differences in food choice and dieting behaviors between men and women (Wardle et al., 2004). Furthermore, persons who are dieting or who are thinking about changing their diets are likely to be more

engaged in the study and better motivated to generate goals related to diet behaviors. Therefore, to adequately control for food behavior differences between sexes and to recruit engaged and motivated participants, only women who were dieting or who had considered changing their diet were recruited and enrolled in the study. A power analysis was conducted to determine the minimum number of participants needed to detect a medium effect on the key outcome variables (healthy food consumption, intentions, and self-identity) between groups and across time points. Power analyses were calculated using the statistical programming package G-power (Erdfelder, Faul, & Buchner, 1996). With alpha at .05 ($\beta = .95$) and an expected correlation of .5 between repeated measures, a total sample size of at least 54 participants was needed to detect a medium effect size ($f = .25$; Cohen, 1988). Participants in the current study were 79 women ages 18-53 years old (M=22.92, SD=6.92). Most women reported being Caucasian (79.7%), 7.6% were African American, 5.1% Asian or Pacific Islander and 7.6% of women indicated other ethnicities, including biracial ethnicities (e.g., African American and Caucasian, Asian and Caucasian), and ethnicities such as Middle Eastern, Indian, South Asian. Participants' reported year in college was evenly spread with approximately a quarter of participants in the first, second, and third years of college. The remaining quarter included students in their fifth or sixth year of college. The majority of women reported being single or in a relationship. Approximately 11.4% reported being partnered or married and one participant responded that her current relationship status was "complicated." At baseline, 27.1% reported eating at a fast food or sit-down restaurants at least one time per tracking day. The majority of participants prepared 1-3 meals at home

per day of food tracking. Descriptive statistics, including descriptive statistics for participants in each group, can be found on Table 1.

Procedure

Potential participants were recruited via flyers distributed across a large urban Midwestern campus inviting women to participate in a "diet study" (see Appendix A). Requests for participation were also made in various psychology and health sciences courses. After solicitation, either via flyer or classroom requests, participants contacted the lab or were contacted by the researcher and screened for inclusion in the study. Inclusion criteria included being a woman over the age of 18 who has been thinking about changing her diet or who is currently dieting. Participants were excluded from the study if they are unable to participate for the entire 6 weeks the study took place, if they demonstrated patterns of disordered eating, or if they had high levels of healthy eating behaviors. Eighteen participants did not qualify for the study. Eligible participants were then randomly assigned to one of three conditions (i.e., control [CONTROL], education only [EDUCATION], or education and self-as-doer activity [SELF-AS-DOER]) and then invited to the research lab. Participant flow and reasons for participant withdrawal can be found in Figure 2. The study was approximately 50 days (or 6 weeks) in length (see logic model, Appendix B).

For this project, "Time #" refers to the discreet study period during which there were observations and/or intervention components. This study contained 3 discreet time periods over a 50 day project. On Day 1/Time 1, all participants came to the research lab where they consented to participate and baseline measures were collected. Participants were asked to complete a survey including demographic questions and questions about

participants' nutrition knowledge, intentions to eat healthy, perceived control over eating a healthy diet, attitudes and subjective norms about healthy eating and self-identity related to healthy eating (i.e., TPB components, see Appendix C). Researchers have demonstrated differences in one's eating habits based on whether one is a restrained or unrestrained eater and the degree of physical activity one engages in (e.g., Federov, Polivy, & Herman, 1997; 2003; Jansen & van den Hout, 1991; USDA, 2010). Therefore, to control for potential differences in dieting and physical activity habits between groups, participants also reported their level of physical activity and completed a restrictive eating habits measure. Participants' weight and height were then measured in order to compute BMI. After the participant's weight was measure, they were also asked to indicate their ideal weight.

Key indicators of a healthy diet are diets high in fruits, vegetables, whole grains, and low-fat dairy food groups as well diets with limited sugar-sweetened beverages (USDA, 2010). Therefore, for the purposes of the present study a healthy diet was defined according to the recommended food patterns for fruits, vegetables, grains, dairy, and sugar-sweetened beverages as defined by the USDA (2010; see Appendix D). More specifically, increased healthy diets were operationalized as increases in servings of fruits, vegetables, grains, and low-fat dairy and decreases in sugar-sweetened beverages from baseline measures. A sum score of total healthy eating behaviors was also calculated.

Food consumption is a complex behavior and difficult to measure accurately and reliability (Bingham & Nelson, 1991; Willett, 1998). As such, food consumption was measured using two food recall tools, a food diary and a food frequency questionnaire

(FFQ; Willett, 1998). FFQs are frequently used among researchers to measure diet behavior. However, in reviewing the reliability and validity of FFQs, even the best measures tend to have low reliability and validity (Bingham & Nelson, 1991; Willett, 1998). Therefore, to more accurately assess healthy food consumption, participants were asked to also complete a food diary. The food diary served as resource (and prime) for completing a FFQ more completely and accurately when compared to participants simply recalling past diet behavior over a specified period of time without any memory aids. Participants were asked to complete a FFQ each of the four days they completed their food diaries. FFQs were completed in addition to only completing the food diaries in order reduce potential inaccuracies of food diaries and to control for missing data as a result of incomplete or not completed food diaries. FFQs generally ask participants to recall dietary information over a specified period of time such as one week or month (Willett, 1998). However, to aid in memory recall and increase the reliability of the FFQ, the FFQ was modified for recall of food consumed in the last day. Although a potentially important modification to the Willett (1998) FFQ measure, recalling one day of food consumption rather than foods consumed over the course of a week presented an easier cognitive task for participants.

At Day1/Time 1, participants received instructions to complete a 4-day food diary. Previous research suggests that a 3-4 day record with at least one weekend day is sufficient to collect a representative sample of food consumption and that collecting more records (e.g., 7 days) does not change overall outcome measure averages (Bingham & Nelson, 1991; Willett, 1998). Therefore, participants were asked to identify one weekend day (i.e., Saturday or Sunday) and three weekdays (i.e., Monday – Friday) where they

would track and record all foods and beverages consumed in that day. Committed days were recorded and referenced throughout the study by the researcher. Participants then received a food diary which included instructions for completing a food diary, both an accurately and inaccurately completed food diary, and four blank food diaries with each committed day identified at the top of each blank food diary page. Serving size references were included in the instructions of the food diary (Betty Crocker, 2007; see Appendix E). Participants were asked to record the following items on the food diaries: 1) time and date of meal or snack, 2) location, 3) whether the food consumed was a meal or snack, 4) a detailed description of the meal or snack, and 5) the amount of food consumed. On Day1/Time 1 researchers reviewed food diary instructions with each participant (see Appendix F). Food diary instructions included a demonstration highlighting the differences in serving size variables (i.e., ½ cup vs. 1 cup; 12 ounces vs 16 ounces) and completing a practice food diary with the researcher. Participants were asked to complete their food dairies on the chosen days and, if possible, to record the food or beverage as soon as possible after eating each meal. At the end of each day, participants completed a food diary, they received an email from the researcher inviting them to complete a few questions about their diet via an online survey (i.e., the FFQ, see Appendix G). Online surveys were developed and administrated using the online survey program Qualtrics (Qualtrics Incorporated, n.d.). After the researcher sufficiently reviewed the food diaries with participants, participants scheduled two appointments to return to the lab in one week and in five weeks.

On Day 8/Time 2, individual participants returned to the lab. All participants received payment for their first week of participation and researchers inquired about

concerns relating to the food diaries and online reports. CONTROL participants were then asked to complete an online questionnaire including items about nutrition knowledge, physical activity levels, healthy eating intentions, perceived behavioral control, attitudes, subjective norms, self-identity as a healthy eater and restrictive eating habits. After the survey was completed, CONTROL participants were weighed, asked about their ideal weight, and then they received the same set of food diary instructions as they did on Day 1/Time 1. A review of serving sizes was offered to the participant if she felt it was needed. Willett (1998) suggests that for intervention designs, days recorded for food diaries be the same before and after the intervention. Therefore participants were asked to complete food diaries on the same days as they did at Time 1.The researcher then wrote each day at the top of the four food diaries and reviewed food diary instructions with the participant as was done on Day 1.

The same protocol was followed for the EDUCATION group with the following exceptions. Following payment and inquires about food diary reporting, EDUCATION participants were asked to read nutritional educational material as it is commonly used as a standard comparison in nutrition interventions (Allicock et al., 2010; Baker et al., 2010; USDA, 2010). Participants were asked to read the USDA's *"Let's eat for the health of it"* brochure as well as two tip sheets highlighting healthy eating options (i.e., *Choose MyPlate* and *Build a Healthy* Meal, see Appendix H). The purpose of the educational material was to provide a form of standard nutritional education that is widely accessible to the average person and of which is advocated broadly, therefore, the booklet and tip sheets used in the present study highlight dietary guidelines and dietary behavior recommendations established and promoted by the USDA (2010). To ensure that

participants read the information, two questions were then asked by the researcher: "What information did you learn that you did not know before reading this material?" and "Of the information that you already knew before reading the material, what is something you would like to include in your diet?" After answering questions the participant may have had about the educational material, the web address where participants could access the information and learn more about healthy eating habits was provided. EDUCATION participants then completed an online questionnaire concerning nutrition knowledge, healthy eating intentions, attitudes, perceived behavioral control, subjective norms, and self-identity related to healthy eating. Following the same protocol as in the CONTROL condition, participants then had their weight measured, their ideal weight recorded, and were asked to complete another 4-day food diary following the same food diary day schedule as in Time 1.

The protocol for the SELF-AS-DOER participants was similar to the protocol for the EDUCATION participants. However, after participants read the nutritional educational material, SELF-AS-DOER participants were asked to complete the self-as-doer measure (Houser-Marko & Sheldon, 2006; see Appendix I). Specifically, participants were asked to construct six goals related to healthy eating behaviors. From these goals the participants created special phrases using the "-er" suffix and the verb and noun of each goal. For example, if the goal was "eat more fruit" the doer phrase became "fruit eater". The majority of participants created self-as-doer statements related to vegetable (n=23; 92%) and fruit (n = 22; 88%) consumption. Example phrases included, "veggie eater", "fruit includer", and "1/2 plate fruit and veggie eater." Approximately 40% (n=10) of participants created phrases related to whole grains, 36 % (n=9) created

phrases for low fat dairy and 24% (*n*=6) of participants created phrases related to reducing sugar-sweetened beverages. Most participants (*n*=16; 64%) created 2 or 3 phrases directly related to the study's dependent variables. The remaining participants varied with respect to how applicable their doer phrases were to the study's dependent variables (range: 0-6 phrases). Other doer phrases commonly created, but not directly related to the healthy eating outcome variables (e.g., fruit, vegetables, whole grain, low fat dairy and sugar-sweetened beverages) were phrases representing goals for particular techniques for eating behaviors (*n*=23; 92%); that is, behaviors for how food was eaten or in what forms. For example, participants created phrases such as "small plate user", "slower eater", "family eater," and "homemade meal maker." Another category of doer phrases not related to the dependent variables included phrases endorsing some form of restrictive eating (*n*=16; 64%; e.g., cutting back or eating less of non-healthy food items), and included phrases such as "less sodium consumer", "sugar reducer", and "less fried food eater." The remainder of phrases included doer identities related to eating more lean meats, controlling portion size, drinking more water, adhering to specific diet plans, trying new foods, incorporating more fiber, and using different cooking techniques. Only three of the 150 phrases created were not specific to food. However, these phrases did represent healthy behaviors (e.g., physical activity and adequate sleeping).

After participants generated self-as-doer phrases they were then asked to rate how well each phrase described themselves on a Likert scale ranging from 1 (does not describe to at all) to 5 (describes me well). Then, the researcher selected a phrase related to a dependent variable (e.g., vegetable, fruit, whole grains, etc.) and asked participants to envision themselves as the doer of the "–er" phrase which they constructed. For example,

"picture yourself being a healthy eater. What would that look like?" After participants verbally described what the doer phrase looked like to them, the research noted how the participant rated that particular phrase and then asked participants what it would take to get them to see themselves as that doer phrase to a greater degree in the next week and beyond the next week. For example, "I see that you rated yourself as a "veggie eater" as a 2. What would it take in this next week and beyond this next week to see yourself as a veggie eater to a greater degree, say a 4 or a 5?" This process was repeated for 3-4 of the generated doer phrases specifically related to the dependent variables. A summary of the task was then verbally provided to the participants and participants were encouraged to think about their goals and generated phrases as they made diet choices in the next week and beyond. A copy of the doer phrases was made and given to the participants. Participants then completed an online questionnaire with questions concerning nutrition knowledge, healthy eating intentions, attitudes, perceived behavioral control, subjective norms and self-identity. Finally, SELF-AS-DOER participants were weighed, asked to report their ideal weight, and instructed to complete another 4-day food diary, with instructions identical to those given for the CONTROL and EDUCATION participants. All participants were reminded about their scheduled third visit to the lab five weeks from this appointment. Scripts for all intervention conditions can be found in Appendix J.

In the final phase of the study (i.e., Time 3), participants were contacted approximately 4 weeks after Day 8/Time 2 and invited to the research lab. Participants received payment for their second week of participation and researchers inquired about concerns relating to the food diaries and online reports. Participants in all conditions were then asked to complete a questionnaire with questions concerning nutrition knowledge,

physical activity levels, healthy eating intentions, perceived behavioral control, attitudes, subjective norms, self-identity as a healthy eater, and restrictive eating habits. After participants completed the questionnaire, their weight and ideal weight was recorded. Then participants received instructions to keep a 4-day food diary just as they had done at Time 1 and Time 2. Instructions and food diaries were identical to those given on Day 1 and Day 8 with online FFQs being recorded for each day participants kept a food diary. Participants then scheduled a final appointment after the completion of their food diary tracking day to exchange the food diary for their final payment. At this visit, participants were also debriefed on the purpose of the study, the design, expected outcomes, and the group they were randomized to. Participants were also given a chance to review their FFQ data with the researcher, ask questions about the study, and provide feedback on their experiences as study participants.

As a form of reimbursement for participating in the present study, participants were given raffle opportunities to win one of five, $50 gift cards to Amazon.com. The number of raffle tickets a participant could earn was incremental, based on the number of study elements completed. Upon the completion of each online FFQ reporting (i.e., Day 1-8), participants received one raffle ticket for each FFQ, totaling four raffle tickets if all FFQs are reported. At the end of the second lab visit (i.e., Day 8) participants received two additional raffle tickets for completing study elements at Time 2. After completing each food diary and online FFQ for the second phase of the study, participants received two raffle tickets for each FFQ completed, for a possible total of eight tickets. After the third lab visit, participants were given one raffle ticket for each online FFQ they complete, for a total of four raffle tickets. In total, participants had the opportunity to earn

up to 18 raffle tickets for participating in all elements of the study. All participants were automatically entered in the raffle regardless of participation, but the incremental raffle tickets were only awarded upon completion of study phases. When a participant dropped out of the study, the raffle tickets earned up to that point were entered into the drawing.

Materials

Demographics. Participants were asked to report their age, year in school, relationship status, ethnicity, and physical activity level. Additionally, participants were asked to indicate if they are a smoker and if so, how many cigarettes they smoke a day. Participants were also asked to report whether they were on a special diet and if so, to describe what sort of special diet they were following.

Disordered eating. Disordered eating was measured at the time of screening using the S.C.O.F.F. (Perry et al., 2002, see Appendix K). Participants were asked to indicate yes or no to five questions concerning eating behaviors (e.g., "Do you make yourself sick because you feel uncomfortably full?" and "Have you recently lost more than 15 pounds in a three-month period?"). Participants are considered "quite likely" to have a disordered eating condition if they answer yes to two or more questions. Adequate reliability and validity, compared with the DSM-IV diagnosis criteria, has been established in similar populations (Hill, Reid, Morgan, & Lacey, 2010).

Food frequency. To measure the amount of healthy and unhealthy foods participants consume each day a modified short-form Harvard University Food Frequency Questionnaire (FFQ; Willett, 1998) was used. The FFQ includes 85 food items from eight food groups (i.e., dairy, fruit, vegetables, meat/protein, sweets/baked goods breads/cereals/starches, beverages, and miscellaneous). The FFQ for the present study

was modified from a previous version (Willett, 1998) to include more options of fruits, vegetables, and beverages. Likewise, instructions were modified to ask for one day recall rather than recall over one week. Participants were asked to indicate how many times (ranging from 0 to 6+) they used a specified serving of a food item on the day in which they completed the food diary. Open-ended options were also provided so participants could indicate how many times (and the amount) they consumed a food item that was not on the FFQ. The average consumption of fruits, vegetables, low-fat dairy, whole grains, and sugar-sweetened beverages across a 4-day food recording was computed for each participant before, after, and one month after the intervention. A composite healthy food score (i.e., the sum of each food group averaged across the 4 recording days) was also computed for each time point in order to assess global healthy food behavior change.

FFQ data were transformed into appropriate measurement equivalents. That is, low-fat dairy, fruits, and vegetables were recoded such that values were equivalent to 1 cup measurements. Whole grains were recoded to represent 1 ounce measurement and sugar-sweetened beverages were recoded such that 8 ounces was equivalent to one serving of a sugar-sweetened beverage. Serving size equivalents of food items that were not equivalent to 1 cup or 1 ounce measurements according to USDA recommendations (c.f., USDA, 2010) were recoded to match that of USDA recommendations. Specifically, leafy vegetables (e.g., lettuce, spinach, other greens, etc.) and low fat cottage cheese were recoded such that 2 cups were equivalent to 1 serving of vegetables and low fat dairy (e.g., 1 cup), respectively. Likewise, cooked breakfast cereal (e.g., oatmeal) and whole grain pasta were recoded so that ½ cup was equivalent to 1 ounce of whole grains (USDA, 2010). In regards to the validity of the FFQ, correlations between FFQ and diet

recall tend to be moderate (i.e., .5 to .7), however, as argued by Willett (1998), the strength of the relationship between FFQ and diet recall is similar to other epidemiological measures consistently used in research. Furthermore, several studies comparing the FFQ to diet records have established that the FFQ is a rather valid and robust measure of food and nutrient consumption in adult populations (Kristjansdottir, Andersen, Haraldsdottir, de Almeida, & Thorsdottir, 2006; Willett, 1998; Wolk et al., 1998). In the current study, overall healthy eating behaviors of the FFQ reports were strongly correlated with overall healthy eating behavior of food diary recording at time 1 (r =.87), time 2 (r =.78) and time 3 (r =.78). Participants were also asked to indicate how many times (0 to 6+) they: 1) ate fast food, 2) ate a prepared meal at a restaurant and 3) prepared their meal/snack at home.

Food diary. Participants recorded the date and time in which food was consumed, location where it was consumed, and the type and amount of food consumed on four days (see Appendix E). A serving size guide which compares various serving sizes with common items (i.e., 1 cup = fist; 2 tablespoons = ping pong ball) was provided in the instructions of each food diary. An example of a correctly and incorrectly completed food diary was also available for participants' review. Food diary data were calculated using serving size measurements established by the USDA (2010). One exception was that starchy foods categorized as vegetables (e.g., French fries, baked potatoes, etc.) were not considered as servings of vegetables for the current study. Each food item was transformed into respective serving sizes (e.g., cups or ounces) using the USDA nutrition calculator found on the USDA super tracker website (i.e.,

www.choosemypate.gov/SuperTracker/). Food servings were totaled for each day and averaged across the four diary tracking days.

Restrained eating. Restrained eating behaviors were assessed using the 10-item Revised Restrain Scale (Herman, Polivy, Pliner, Threlkeld, & Munic, 1978). The scale includes items such as "How often are you dieting", "Do you have feelings of guilt after over eating" and "How conscious are you of what you're eating". Four response options are available for six of the items, ranging from "not at all" to "very much" and "never" to "always". The remaining four items ask for weight gain or loss and have five numeric response options (i.e., "0 to 1" to "21+", "0 to 1" to "5.1+", and "0 to 4" to "20+"). Average scores were computed with higher scores indicating greater restrained eating behaviors. Previous research has categorized restrained and unrestrained eaters by a median split within the sample (Herman et al., 1978), but for the current study continuous restrained eating scores were analyzed to determine group differences at baseline. Therefore restrained and unrestrained categories were not computed in the current study. Herman and colleagues (1978) have demonstrated adequate validity of the restrained eating scale in a population of dieting adult women. Cronbach alphas in the present study were .71 for time 1, .65 for time 2, and .73 for time 3.

Nutrition knowledge. Questions were modified from the Nutritional Knowledge Test (NKT) developed by Samuels and colleagues (2007). Samuels et al. (2007) developed the NKT in order to assess knowledge gained from educational materials based on the Dietary Guidelines for Americans, 2005. The measure was modified to reflect the most recent USDA Dietary Guidelines for Americans, 2010 (USDA, 2010). Questions were developed and modified to specifically assess dietary and nutritional

knowledge from the educational materials used in the study (i.e., *Let's Eat for the Health of It* brochure; USDA, 2010). The measure consisted of 13 multiple-choice items reflecting nutritional and diet knowledge (i.e., "What fat do experts say is most important for people to cut down on?", Which of the following is NOT a good source of fiber?", and "Out of all grains eaten daily, what proportion should be whole grain"). Correct answers were summed for a total nutritional knowledge score. Test-rest reliability was calculated between time 2 and time 3 because it was the only phase of the study where participants in all groups were not treated differently. Test-retest reliability was strong, $r = .79$.

Theory of planned behavior. All TPB components, except self-identity, were measured according to item development recommendations outlined by Fishbein and Ajzen (2010). Formative research for measure items reflecting healthy diet behaviors has been conducted elsewhere (c.f., Armitage & Connor, 1999; Astrom & Rise, 2001) and therefore previously developed, healthy diet behavior-specific items for the present study were used (Armitage & Connor, 1999; Astrom & Rise, 2001).

***Intentions*.** Participants were asked on a 7-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree) to what degree they agreed with following items: "I intend to eat a healthy diet over the next week," "I plan to eat a healthy diet over the next week," and "I want to eat a healthy diet over the next week." Response averages were computed with higher scores indicating greater intentions to eat a healthy diet. Cronbach alpha reliabilities were .88 at time 1, .87 at time 2, and .92 at time 3.

***Attitudes*.** Direct and indirect measures of attitudes for a healthy diet were measured by presenting participants with a statement: "My eating a healthy diet in the

next week is…" and asking them to respond on a 7 point (-3 to 3+) semantic differential scale with the following attitudinal anchors: good/bad, harmful/beneficial, unpleasant/pleasant, unenjoyable/enjoyable, foolish/wise, and unnecessary/necessary. The average of the responses was computed. Higher scores indicated more positive attitudes toward healthy eating. Cronbach alpha reliabilities were .77, .79, and .94 for time 1, 2, and 3, respectively.

Perceived behavioral control. Participants were asked to respond on a 7 point-Likert scale to questions such as: "How much do you feel that whether you eat a healthy diet in the next week is beyond your control" and "I believe I have the ability to eat a healthy diet in the next week." Anchors varied with each question, but all lower points (i.e., 1) reflected less agreement, certainty, and ability and all higher points (i.e., 6) reflected more agreement, certainty, and ability. The average of responses was computed. Alpha reliabilities at all time points ranged between .76 and .92.

Subjective norms. Subjective norms were assessed by asking participants the following items: "People who are important to me think I (should not eat a healthy diet/should eat a healthy diet)", "People who are important to me would (disapprove of my eating a healthy diet/approve of my eating a healthy diet)." Participants were also asked what degree (strongly disagree to strongly agree) they agreed with the following statements: "People who are important to me want me to eat a healthy diet" and "I feel under social pressure to eat a healthy diet." Participants responded on 7-point Likert scales and an average score was created. Alpha reliabilities were .55 at time 1, .43 at time 2 and .74 at time 3. However, alpha reliabilities increased to .79, .64, and .88 at time 1, 2, and 3, respectively, after the removal of the item, "I feel under pressure to eat a healthy

diet." Given the increased reliability, the aforementioned item was removed and the total score for the measure of subjective norms no longer included this item.

Self-identity. Self-identity related to healthy eating was assessed using the healthy-eater identity measure (Strachan & Brawley, 2008). The nine item healthy-eater identity scale was modified by Strachan and Brawley (2008) from the validated Exercise Identity Questionnaire (Anderson & Cychosz, 1994) to be relevant to healthy eating behaviors. Participants ranked on a 1 (strongly disagree) to 7 (strongly agree) Likert-type scale the extent to which they agreed with statements such as "I see myself to be a healthy eater", "I have numerous goals related to healthy eating", and "Being a healthy eater is a central factor to my self-concept." An average score was computed. Strachan and Brawly (2008) have demonstrated adequate reliability and validity among a sample of adults. In the present study, Cronbach's alphas were .92 for time 1, and .95 for time 2 and 3.

Data Analysis

Intervention studies often report high attrition rates (e.g., Gratton et al., 2007). Consequently two methods for analyzing intervention study data are typically used: 1) data from participants who have dropped out of the study are simply excluded from analyses, or 2) data from participants who have dropped out are replicated at each missing time point, denoting a lack of change over time. The former method refers to an "intent-to-treat" (ITT) analysis and allows for the data to be handled in ways that represent how an intervention might happen outside the laboratory (e.g., clients might stop the intervention), thereby yielding more ecologically valid data (Fergusson, Aaron, Guyatt, & Herbert, 2002). Simply excluding data from participants who withdraw can

induce bias in analyses and study conclusions, limit generalizability, and increase type I error rates (Fergusson et al., 2002). Still, assuming a lack of change among participants who drop out of the study (and specifically, those who received the intervention) is a conservative approach which can increase type II error rates and reduce the likelihood of identifying behavioral change for participants who completed the intervention (Bubbar & Kreder, 2006; Montori & Guyatt, 2001). Therefore, data were analyzed according to both methods as a test of sensitivity. Given a preference for ITT in the literature, ITT results will be reported unless there are discrepant outcomes, in which case, both types of analysis will be reported.

Since participants completed the same measures at all three time points, ITT analysis was employed by carrying forward the most recently completed data for all subsequent missing data. For example, if a participant completed only baseline measures, baseline measures were entered for her time 2 and time 3 data. If a participant completed measures at time 2 but failed to complete measures at time 3, data for time 2 was entered for time 3 data. In order to best represent participants' diets in and in accordance with recommendations for reliable dietary analyses (Bingham & Nelson, 1991; Willett, 1998), complete information for food consumption was operationalized as participants completing at least three of the four food diaries. For participants who failed to complete at least three food diaries (either online, in a paper form or a combination of the two), but did complete cognitive measures at time 1, the mean of the group they were randomized to (i.e., CONTROL, EDUCATION, SELF-AS-DOER) was entered for their food consumption data and carried forward for all subsequent time points. As a result of ITT analyses, the assumption that there would be no change after a participant drops out of

the study in attitudes, intentions, perceived behavioral control, health eater identity, nutrition knowledge, and healthy food consumption from the time of drop out was maintained.

Descriptive analyses for all groups and time point measures were computed. BMI rates were calculated for all three time points by dividing the participant's weight in pounds (i.e., at time 1, time 2, and time 3) by two times their height recorded at time 1. This value was then multiplied by 703 (CDC, 2011). Chi-squared tests and one-way ANOVAs were computed to determine if there were differences between groups in relation to age, ethnicity, school status, relationship status, physical activity levels, BMIs, special diet status, healthy eating consumption, self-identity related to healthy eating, and restrictive eating behaviors at time 1.

To examine whether perceived behavioral control, attitudes toward healthy eating, subjective norms about healthy eating behaviors and self-identity as a healthy eater predicted intentions to eat healthy and whether a healthy eater identity predicts intentions above and beyond the other TPB components, a hierarchal multiple regression analysis on time 1 data was conducted. Perceived behavioral control, attitudes, and subjective norms at time 1, collapsed across groups, were entered in the first block and self-identity was added in the second block. To test whether the TPB components predict healthy eating behaviors and whether a healthy eater identity predicts healthy eating above and beyond the TPB components, a second hierarchal multiple regression analysis was conducted where perceived behavioral control, attitudes, subjective norms and intentions were entered in the first block and self-identity was added in the second block.

A 3(time) x 3(group) between-subjects, repeated measured ANOVA was computed to determine if there were significant changes in the outcome measures (i.e., healthy eating behaviors measured by FFQs, healthy eating behaviors measured by food diary reports, intentions to eat healthy foods, nutrition knowledge, and self-identity) over time, if there were significant differences between the groups on all outcome measures, and if the difference in outcome measures across time differed depending on group status. Assumptions of sphericity were also tested for each repeated measures ANOVA computed and when the assumption of sphericity was violated multivariate test results were used (c.f. Maxwell & Delaney, 2004). When significant main effects and interactions for time and group occurred, follow-up analyses were conducted to determine if there were significant differences in outcome measures from time 1 to time 2, from time 2 to time 3 and from time 1 to time 3 for each group. Likewise, one-way ANOVAs were performed to determine if there were significant differences between CONTROL, EDUCATION, and SELF-AS-DOER participants on all outcome measures at each time point. When results were significantly different between groups, all pairwise comparisons between CONTROL, EDUCATION, and SELF-AS-DOER participants on relevant outcome measures were computed to determine differences between the groups at each time point. Bonferroni corrections were performed for all follow-up analyses to control for type I errors.

Results

Demographic and Outcome Measure Differences among Participants who Completed or Dropped Out of the Study

There were no significant differences between participants who completed the study and participants who dropped out of the study at baseline for age, ethnicity, relationship status, year in college, whether or not they were on a special diet, intentions, attitudes, perceived behavioral control, subjective norms, healthy eater identity, and restrained eating measures. Participants who completed the study did, however, have a significantly higher nutrition knowledge score at baseline (M = 7.25, SD = 1.98) compared to participants who dropped out of the study (M = 5.55, SD = 2.26, $t(77)$ = 3.28, p = .002).

Demographic and Outcome Measure Differences between Groups at Baseline

To test the first hypothesis, that there would be no significant differences in demographic variables, BMI, physical activity levels, healthy food consumption, nutrition knowledge, restrictive eating behaviors, and self-identity between the intervention groups at the beginning of the study, chi-squared analyses and one-way ANOVAs were computed. Results demonstrated no significant differences between any of the intervention groups on all measures at baseline. Descriptive statistics can be found on Table 1 and Table 2.

Predicting Intentions from Theory of Planned Behavior Components and Self-Identity

To examine hypothesis two whether attitudes, perceived behavioral control, and subjective norms predicted intentions to eat a healthy diet and whether a health eater

identity predicted intentions above and beyond the components of the TPB, a hierarchical multiple regression was computed using time 1 data. The hypothesis was partially supported. Correlations among the variables and results of the regression analysis are presented in Table 3 and Table 4, respectively. Perceived behavioral control and self-identity predicted intentions; however, subjective norms and attitudes did not. Together, attitudes, perceived behavioral control, and subjective norms significantly predicted intentions to eat a healthy diet, explaining over 30% of the variance in intentions. Furthermore, when a healthy eater identity was added to the model, it predicted an additional 24.7% of the variance in intentions to eat a healthy diet, which was a significant contribution, $\Delta R^2 = .247$, $\Delta F(1, 74) = 41.15$, $p < .001$. When a healthy eater identity was added to the model, attitudes toward eating a healthy diet was no longer a significant predictor of intentions. Further analysis of semipartial correlations (see Table 4) suggests that health eater identity contributed the greatest unique variance in intentions, almost three times more than attitudes or perceived behavioral control.

Predicting Healthy Eating Behaviors from Theory of Planned Behavior Components and Self-Identity

To test hypothesis three that a healthy eater identity would predict healthy eating behaviors (measured by the FFQ and by food diary reports) above and beyond all components of the TPB, 12 hierarchal linear regressions were computed with attitudes, perceived behavioral control, subjective norms, and intentions entered in the first block and healthy eater identity entered in the second block. For healthy eating behaviors measured by FFQs, healthy eater identity significantly predicted overall healthy eating behaviors, low fat dairy, and fruit consumption above and beyond the TPB components.

Healthy eater identity added an additional 7% of the variance for overall healthy eating behaviors and low fat dairy consumption and it added an additional 4% of the variance for fruit consumption above and beyond that of the aforementioned TPB constructs. Healthy eater identity was not, however, a significant predictor of vegetable, whole grain, or sugar-sweetened beverage consumption.

Using data from food diary reports, healthy eater identity was a significant predictor of overall healthy eating behaviors, accounting for an additional 4.1% of the variance in healthy eating behaviors over and above other TPB components. Healthy eater identity was not, however, a significant predictor of low fat dairy, vegetable, fruit, whole grain or sugar-sweetened beverage consumption. See Table 5 and Table 6 for regression statistics for the FFQ measures and food diary reports, respectively.

The Effect of Time on Healthy Eater Identity

To test hypothesis four that SELF-AS-DOER participants would demonstrate a significant increase in healthy eater identity and that were would be no significant changes in healthy eater identity for the EDUCATION or CONTROL participants, the main effect of time and the corresponding follow-up analyses of a between subjects repeated measures ANOVA for healthy eater identity was computed. There was a significant main effect for time, $F(2,75) = 4.81$, $p = .01$, Wilks' lambda = .87, $\eta^2 = .11$. Follow-up tests demonstrated significant increases in a healthy eater identity over the course of the study for SELF-AS-DOER participants, $F(2,75) = 3.94$, $p = .02$, Wilks' lambda = .91, $\eta^2 = .10$. Specifically, SELF-AS-DOER participants had a significant increase in healthy eater identity from time 1 to time 3 (t (76) = 2.46, $p = .02$), but not from time 1 to time 2 (t (76) = 2.41, $p = .06$), or from time 2 to time 3 (t (76) = 0.94, p=

.35). As hypothesized, there were no changes in healthy eater identity for participants in the EDUCATION ($F(2,75) = 2.50$, $p = .09$, Wilks' lambda = .92, $\eta^2 = .06$) or CONTROL ($F(2,75) = .81$, $p = .45$, Wilks' lambda = .98, $\eta^2 = .02$) groups. Descriptive statistics for these variables at each time point can be found on Table 2 and Figure 3.

The Effect of Time on Intentions and Nutrition Knowledge

To test hypothesis five that EDUCATION and SELF-AS-DOER participants would demonstrate a significant increase in intentions to eat healthy foods and nutrition knowledge over the course of the study, and that CONTROL participants would have no change in the aforementioned variables, the main effects (and follow-up tests as necessary) of 2 between-subjects repeated measures ANOVAs were analyzed. For intentions there was a significant main effect of time, $F(2,152) = 6.12$, $p < .01$, $\eta^2 = .07$. Follow-up analyses demonstrated that the effect of time was significant for participants in the SELF-AS-DOER group, ($F(2,75)=3.82$, $p= .03$, Wilks' lambda= .91, $\eta^2 = .09$), but not for participants in the EDUCATION ($F(2,75) = 2.80$, $p = .07$, Wilks' lambda = .93, $\eta^2 = .07$) or CONTROL groups, $F(2,75) = 1.19$, $p= .31$, Wilks' lambda= .97, $\eta^2 = .03$. Participants in the SELF-AS-DOER group significantly increased their intentions to eat a healthy diet from time 1 to time 2, ($t(76) = 2.77$, $p=.02$), but not from time 2 to time 3 ($t(76) = 1.52$, $p = .41$) or time 1 and time 3 ($t(76) = 1.22$, $p= .67$). Means and standard deviations at each time point for can be found on Table 2 and Figure 3.

There was a significant main effect of time for nutrition knowledge, $F(2,152) = 14.89$, $p < .001$, $\eta^2 = .16$. Participants in the EDUCATION ($F(2, 75) = 8.91$, Wilks' lambda= .81 $p < .001$, $\eta^2 = .19$) and SELF-AS-DOER groups ($F(2, 75) = 8.70$, Wilks' lambda= .81, $p = < .001$, $\eta^2 = .19$) significantly increased their nutrition knowledge over the

course of the study. EDUCATION participants had a significant increase in nutrition knowledge from time 1 to time 2 (t (76) = 4.25, $p < .001$) and significantly higher nutrition knowledge at time 3 compared to their nutrition knowledge at time 1, t (76) = 2.51, $p = .01$. As predicted, the change in nutrition knowledge from time 2 to time 3 was not significant, t (76) = 2.22, $p = .09$. Like EDUCATION participants, SELF-AS-DOER participants had a significant increase in nutrition knowledge from time 1 to time 2 (t (76) = 4.14, $p < .001$) and time 1 to time 3 (t (76) = 3.01, $p < .01$), but no change in nutrition knowledge and from time 2 to time 3, t (76) = 1.57, $p = .36$. Finally, as predicted, CONTROL participants did not change in nutrition knowledge throughout the course of the study, $F(2, 75) = 0.21$, Wilks' lambda= .99, $p = .82$, $\eta^2 = .19$. Means and standard deviations at each time point can be found on Table 2 and Figure 3.

The Effect of Time on Healthy Eating Behaviors

To test the sixth hypothesis that EDUCATION and SELF-AS-DOER participants would demonstrate a significant increase in healthy food consumption over the course of the study, and that CONTROL participants would have no change in the healthy food consumption, the main effects (and follow-up tests as necessary) of 12 between-subjects repeated measures ANOVAs were analyzed. Dependent variables for each ANOVA were overall healthy eating behaviors and the average consumption of low fat dairy, vegetables, fruit, whole grains, and sugar-sweetened beverages as measured by FFQs and overall healthy eating behaviors and the average consumption of low fat dairy, vegetables, fruit, whole grains and sugar-sweetened beverages as measured by food diary reports. Means and standard deviations at each time point for all healthy food consumption behaviors can be found on Table 2 and Figures 4 and 5.

Overall healthy eating behaviors. For overall healthy eating behaviors, as measured by the FFQs, there was a significant main effect for time, $F(2,152)= 4.60$, $p =.01$, $\eta^2 =.06$. However, contrary to the hypothesis, EDUCATION ($F(2,75) = 1.91$, $p = 0.16$, Wilks' lambda= .95, $\eta^2 =.05$) and SELF-AS-DOER ($F(2, 75) = .05$, $p =.95$, Wilks' lambda = 1.00, $\eta^2 =.00$) participants did not change in overall healthy eating behaviors over the course of the study. Additionally, there was a significant decrease in overall healthy food consumption for CONTROL participants, $F(2,75)= 5.78$, $p<.01$, Wilks' lambda= .87, $\eta^2 =.13$. CONTROL participants, had a significant decrease in the total amount of healthy food consumed from time 1 to time 3, $t(76)= 3.43$, $p < .01$. No other differences between time points in the study were found for CONTROL participants (time 1 to time 2: $t(76)= 1.38$, $p = .52$; time 2 to time 3: $t(76)= 2.01$, $p = .15$). As measured by the food diary reports, there was not a significant main effect of time for overall healthy eating behaviors, $F(2,152) = 1.20$, $p =.30$, $\eta^2 =.02$.

Low fat dairy. Inconsistent with the hypothesis for low fat dairy consumption, results from the FFQ measures indicated no significant main effect for time ($F(2,75) = 1.81$, $p = .17$, Wilks' lambda = .95, $\eta^2 =.05$), and consequently no change in low-fat dairy consumption for SELF-AS-DOER participants ($F(2,75) = 0.35$, $p = 0.70$, Wilks' lambda = .99, $\eta^2 =.01$) or EDUCATION participants, $F(2,75) = 0.73$, $p = 0.48$, Wilks' lambda = .98, $\eta^2 =.02$. Additionally, there was no change in low fat dairy consumption for CONTROL participants ($F(2,75) = 1.30$, $p = 0.36$, Wilks' lambda = .97, $\eta^2 =.03$), thereby supporting hypothesis four. Results measured via food diary reports also demonstrated no significant effect of time, $F(2,152) = 1.29$, $p =.28$, $\eta^2 =.02$.

Vegetables. As measured by FFQs, there was a significant main effect for time, $F(2, 152) = 4.62$, $p = .01$, $\eta^2 = .06$. However, contrary to the hypothesis, EDUCATION ($F(2,75) = 1.06$, $p = 0.35$, Wilks' lambda = .97, $\eta^2 = .03$) and SELF-AS-DOER ($F(2, 75) = 0.49$, $p = .62$, Wilks' lambda = .99, $\eta^2 = .01$) participants did not change their vegetable consumption over the course of the study. Also inconsistent with hypothesis four, there was a significant change in vegetable consumption for CONTROL participants, $F(2,75) = 5.06$, $p = .01$, Wilks' lambda = .88, $\eta^2 = .12$. Follow-up analyses indicated that CONTROL participants ate significantly fewer vegetables at time 3 compared to time 1, $t(76) = 3.03$, $p = .01$. No other significant differences between time points were found. Food diary reports demonstrated no significant main effects of time for vegetable consumption, $F(2,75) = 1.70$, $p = 0.19$, Wilks' lambda = .96, $\eta^2 = .04$.

Fruits. As measured by FFQs, there was no significant main effect of time ($F(2, 152) = 1.76$, $p = .18$, $\eta^2 = .02$) and consequently no change in fruit consumption for EDUCATION ($F(2,75) = 1.15$, $p = .34$, Wilks' lambda = .97, $\eta^2 = .03$) or the SELF-AS-DOER ($F(2,75) = .45$, $p = .64$, Wilks' lambda = .99, $\eta^2 = .01$) participants. As hypothesized, there was no change in fruit consumption for CONTROL participants, $F(2,75) = 2.16$, $p = .12$, Wilks' lambda = .95, $\eta^2 = .05$. Results were similar for food diary reports, although the main effect of time for fruit consumption approached significance, $F(2, 152) = 2.58$, $p = .08$, $\eta^2 = .03$. As hypothesized, there was no change over time in fruit consumption for CONTROL participants, $F(2,75) = 2.40$, $p = .10$, Wilks' lambda = .94, $\eta^2 = .06$. Contrary to the hypothesis, there was no change in fruit consumption for EDUCATION ($F(2,75) = 0.48$, $p = .62$, Wilks' lambda = .99, $\eta^2 = .01$) or SELF-AS-DOER

($F(2,75) = 1.28$, p=.29, Wilks' lambda = .97, η^2 =.03) participants, as measured by the food diary reports.

Whole grains. There was not a significant main effect of time, as measured by FFQs, for whole grain consumption ($F(2, 152) = .30$, p =.74, η^2 =.00), and consequently no change in whole grain consumption for EDUCATION ($F(2,75) = .19$, p=.83, Wilks' lambda = 1.00, η^2 =.01) or SELF-AS-DOER participants (whole grains: $F(2,75) = .64$, p=.53, Wilks' lambda = .98, η^2 =.02). As hypothesized, there was no change in whole grain consumption for CONTROL participants, $F(2,75) = .85$, p=.43, Wilks' lambda = .98, η^2 =.02. Food diary reports are similar, there was not a significant main effect of time for whole grains, $F(2, 75) = .09$, p=.91, Wilks' lambda = 1.00, η^2 =.00. As hypothesized there was no significant change in whole grain consumption over time for CONTROL participants, $F(2,75) = 2.12$, p=.13, Wilks' lambda = .95, η^2 =.05.

Sugar-sweetened beverages. Results from FFQ analyses indicated a significant main effect of time, $F(2,75) = 5.58$, $p < .01$, Wilks' lambda = .87, η^2 =.13. However, contrary to the hypothesis, EDUCATION ($F(2,75) = 0.46$, $p = 0.63$, Wilks' lambda = .99, η^2 =.01) and SELF-AS-DOER ($F(2, 75) = .73$, p =.49, Wilks' lambda = .98, η^2 =.02) participants did not change their consumption of sugar-sweetened beverages over the course of the study. Also contrary to hypothesis six, CONTROL participants had a significant change in the amount of sugar-sweetened beverages they consumed over the course of the study, $F(2, 75) = 10.56$, p<.001, Wilks' lambda = .78, η^2 =.22. Follow-up analyses demonstrated that CONTROL participants consumed significantly fewer sugar-sweetened beverages at time 2 than at time 1 (t (76) = 3.77, p = .001), and significantly more sugar-sweetened beverages at time 3 compared to time 2, t (76) = 3.84, p = .001.

There was no significant difference in sugar-sweetened beverage consumption between time 1 and time 3, t (76) = .95, p = .35. Results from food diary reports are different in that there was not a significant main effect of time, (F(2, 75) = .47, p=.63, Wilks' lambda = .99, η^2 =.01) and consequently no change in sugar-sweetened beverages for CONTROL (F(2, 75) = 1.83 p=.17, Wilks' lambda = .95, η^2 =.05.), EDUCATION (F(2, 75) = .08, p=.92, Wilks' lambda = 1.00, η^2 =.00.), and SELF-AS-DOER (F(2, 75) = 1.03, p=.36, Wilks' lambda = .97, η^2 =.03) participants.

The Effect of Group on Self-Identity, Intentions, Nutrition Knowledge, and Healthy Eating Behaviors

To test hypothesis seven, that SELF-AS-DOER participants would have a significantly higher self-identity as a healthy eater, intentions, and healthy eating behaviors than EDUCATION and CONTROL participants, that EDUCATION participants would have higher intentions and healthy food consumption than CONTROL participants and that SELF-AS-DOER and EDUCATION participants would have significantly higher nutrition knowledge than CONTROL participants at time 2 and time 3, the main effects (and subsequent follow-up tests as necessary) of 15 between subjects repeated measures ANOVAs were analyzed. The dependent variables for each ANOVA were self-identity, intentions, nutrition knowledge, overall healthy eating behaviors and the average consumption of low fat dairy, vegetables, fruit, whole grains, and sugar-sweetened beverages from both FFQ measures and food diary measures. For all dependent variables, there were no significant group differences between any of the groups and therefore hypotheses seven was not supported. Means and standard deviations at each time point for all outcome measures can be found on Table 2 and Figures 3-5.

The Interaction Effects of Time and Group on Self-Identity, Intentions, Nutrition Knowledge

To test hypothesis eight, that there would be a significant interaction between time and condition such that increases in self-identity and intentions would be greatest for SELF-AS-DOER participants and that increases in nutrition knowledge would be greatest for EDUCATION and SELF-AS-DOER participants, the interaction effect of each between-subjects repeated measures ANOVA was analyzed. Results indicated that there were no significant interactions for self-identity ($F(2,75) = 1.12$, $p = .36$, Wilks' lambda = .94, $\eta^2 = .03$) and intentions ($F(4, 152) = 0.68$, $p = .61$, $\eta^2 = .02$). Interaction effects for nutrition knowledge trended toward significance ($F(4, 152) = 2.15$, $p = .08$, $\eta^2 = .05$), and when non-ITT analytic methods were used (i.e., data from participants who dropped out of the study were not analyzed), the interaction between time and group for nutrition knowledge was significant, $F(4, 132) = 2.74$, $p = .03$, $\eta^2 = .08$. Follow-up analyses of data where non-ITT analytic methods were used indicates that there was a significant effect of time on nutrition knowledge for EDUCATION ($F(2,65) = 10.83$, $p < 0.001$, Wilks' lambda = .75, $\eta^2 = .25$) and SELF-AS-DOER participants ($F(2,65) = 9.29$, $p < 0.001$, Wilks' lambda = .78, $\eta^2 = .22$), but not for CONTROL participants, $F(2,65) = .20$, $p = .82$, Wilks' lambda = .99, $\eta^2 = .01$. EDUCATION and SELF-AS-DOER participants significantly increased their nutrition knowledge from time 1 to time 2 (EDUCATION: $t(66) = 4.69$, $p < .001$; SELF-AS-DOER: $t(66) = 4.29$, $p < .001$), and from time 1 to time 3 (EDUCATION: $t(66) = 2.68$, $p = .03$; SELF-AS-DOER: $t(66) = 3.02$, $p = .03$), but there was no change in nutrition knowledge from time 2 to time 3 for either group (EDUCATION: $t(66) = 2.37$, $p = .06$; SELF-AS-DOER group: $t(66) = 1.57$, $p = .37$). As

hypothesized, there were no significant changes in nutrition knowledge over the course of the study for CONTROL participants, $F(2,65) = .75$, $p = .48$, Wilks' lambda = .98, $\eta^2 = .02$. Although the interaction effect was significant, there were no significant group differences at any time point in the study. For descriptive statistics see Table 2 and Figure 3.

The Interaction Effects of Time and Group on Healthy Eating Behaviors

To test the final hypothesis that there would be a significant interaction between time and condition such that increases in healthy food consumption would be greatest for participants in the SELF-AS-DOER condition, the interaction effect of 12 between subjects repeated measures ANOVA was analyzed. Dependent variables for each ANOVA were overall healthy eating behaviors and the average consumption of low fat dairy, vegetables, fruit, whole grains and sugar-sweetened beverages as measured by the FFQs and food diary reports. Descriptive statistics at each time point for all healthy food consumption behaviors measured with FFQs and food diaries can be found on Table 2 and Figures 4 and 5, respectively.

Overall healthy eating behaviors. The interaction effect for overall healthy eating behaviors, as measured by the FFQ, was marginally significant ($F(4, 152) = 1.95$, $p = .10$, $\eta^2 = .02$). Follow-up analyses indicated that at time 3 there are significant differences among the three groups, $F(2,76) = 3.66$, $p = .03$, $\eta^2 = .09$. At time 3, there was a significant difference between SELF-AS-DOER and EDUCATION participants (t (76) = 2.63, $p = .03$) such that SELF-AS-DOER participants had significantly higher overall healthy eating behaviors than did EDUCATION participants. There were no significant differences in overall healthy eating behaviors between EDUCATION and CONTROL

participants (t (76) = .69, p = .49) at time 3 or SELF-AS-DOER and CONTROL participants (t (76) = 1.81, p = .07), although the difference between SELF-AS-DOER participants and CONTROL participants trended toward significance.

As measured by the food diary reports, there was a significant interaction between time and group for overall healthy eating behaviors, $F(4, 152) = 5.54$, $p < .001$, $\eta^2 = .13$. Further analyses of the effect of time demonstrated that there was a significant change in overall healthy eating behaviors for CONTROL ($F(2,75) = 4.08$, p=.01, Wilks' lambda = .87, η^2 =.14), EDUCATION ($F(2,75) = 3.23$, p=.05, Wilks' lambda = .92, η^2 =.08) and SELF-AS-DOER participants, $F(2,75) = 3.46$, p=.04, Wilks' lambda = .92, η^2 =.08. CONTROL participants had a significant decrease in overall healthy food consumption from time 1 to time 3, (t (76) = 3.04, $p < .01$) and although change in overall healthy food consumption for CONTROL participants was not significant for time 2 to time 3 (t (76) = .81, p = .42), the change in overall healthy food consumption between time 1 and time 2 did approach significance, t (76) = 2.28, p = .07. Contrast tests for overall healthy eating behaviors for EDUCATION participants did not demonstrate any change in overall healthy eating behaviors at any time point in the study. However, the decrease in overall healthy eating behaviors from time 2 to time 3 approached significance, t (76) = 2.37, p = .06. Finally, whereas CONTROL and EDUCATION participants tended to decrease in their overall healthy eating behaviors over the course of the study, SELF-AS-DOER participants had a significant increase in overall healthy eating behaviors from time 1 to time 3, t (76) = 2.61, p = .03. No other changes in time were significant for SELF-AS-DOER participants.

Further analyses of the interaction effects demonstrated a significant difference among the groups at time 3, $F(2, 76) = 3.87$, $p = .03$, $\eta^2 = .09$. SELF-AS-DOER participants consumed significantly more servings of healthy foods than did CONTROL participants, $t\ (76) = 2.43$, $p = .05$. Furthermore, the difference between SELF-AS-DOER and EDUCATION participants at time 3 approached significance, $t\ (76) = 2.34$, $p = .06$. No significant differences were found between CONTROL and EDUCATION participants, $t\ (76) = 0.20$, $p = .84$.

Low fat dairy. As measured by the FFQs, the interaction effect for low fat dairy was not significant, $F(4,150) = .19$, $p = .94$, Wilks' lambda = .99, $\eta^2 = .01$. However, the interaction for low fat dairy consumption, as measured by the food diary reports, was significant, $F(4, 152) = 2.72$, $p = .03$, $\eta^2 = .07$. EDUCATION participants significantly decreased their low fat dairy consumption over the course of the study, $F(2,75) = 3.64$, $p = .03$, Wilks' lambda = .91, $\eta^2 = .09$. More specifically, they decreased their low fat dairy consumption from time 1 to time 3 ($t\ (76) = 2.69$, $p = .03$). There was no change in low fat dairy consumption for CONTROL ($F(2,75) = .44$, $p = .65$, Wilks' lambda = .99, $\eta^2 = .01$) or SELF-AS-DOER participants, $F(2,75) = 1.80$, $p = .17$, Wilks' lambda = .95, $\eta^2 = .05$. After controlling for type I error rates, no significant group differences at any time point were found.

Vegetables. As measured by the FFQs, the interaction effect for vegetables was not significant, $F(4, 152) = 1.05$, $p = .38$, $\eta^2 = .03$. However, the interaction effects for vegetable consumption measured by the food diary reports was significant, $F(4,150) = 2.37$, $p = .05$, Wilks' lambda = .88, $\eta^2 = .06$. There was a significant effect of time for EDUCATION participants ($F(2,75) = 3.22$, $p = .05$, Wilks' lambda = .92, $\eta^2 = .08$), but not

for CONTROL ($F(2,75) = 1.96$, $p=.15$, Wilks' lambda = .95, $\eta^2 = .05$) or SELF-AS-DOER participants ($F(2,75) = 1.29$, $p=.28$, Wilks' lambda = .97, $\eta^2 = .03$). EDUCATION participants had a significant decrease in vegetable consumption from time 2 to time 3, $t(76) = 2.55$, $p = .04$. Furthermore, there was a significant difference in vegetable consumption among the groups at time 3, $F(2, 76) = 3.36$, $p = .04$, $\eta^2 = .08$. However, after Bonferroni corrections the difference between SELF-AS-DOER and EDUCATION participants ($t(76) = 2.27$, $p = .08$) and SELF-AS-DOER and CONTROL participants ($t(76) = 2.18$, $p = .09$) at time 3 were only marginal. There was no significant difference between the CONTROL and EDUCATION participants at time 3, $t(76) = 0.19$, $p = .85$).

Fruits. The interaction effect of time and group on fruit consumption was not significant when measured by the FFQ, ($F(4, 152) = 1.36$, $p = .25$, $\eta^2 = .04$) or the food diary reports ($F(4, 152) = 0.88$, $p = .48$, $\eta^2 = .02$). However, when measured by the FFQs there was a marginally significant difference among the groups at time 3, ($F(2, 76) = 2.47$, $p = .09$, $\eta^2 = .06$) and the difference in fruit consumption at time 3 between SELF-AS-DOER and EDUCATION participants trended toward significance, $t(76) = 2.17$, $p = .09$. SELF-AS-DOER participants reported higher fruit consumption than did EDUCATION participants.

Whole grains. As measured by the FFQs, the interaction effect for whole grains was not significant, $F(4, 152) = 0.73$, $p = .57$, $\eta^2 = .02$. However, there was a significant interaction between group and time for whole grain consumption when measured with food diary reports, $F(4, 150) = 2.38$, $p=.05$, Wilks' lambda = .88, $\eta^2 = .06$. A marginal difference across time for SELF-AS-DOER participants ($F(2,75) = 2.84$, $p=.07$, Wilks' lambda = .93, $\eta^2 = .07$) was found, where the increase in whole grain consumption

between time 1 and time 2 approached significance, $t(76)= 2.38$, $p= .06$. No significant changes in whole grain consumption were found for CONTROL ($F(2,75) = 2.12$, $p=.13$, Wilks' lambda = .95, $\eta^2 =.05$) or EDUCATION ($F(2,75) = .18$, $p=.84$, Wilks' lambda = 1.00, $\eta^2 =.01$) participants.

There was a significant difference among the groups at time 2, $F(2, 76) = 3.61$, $p = .03$, $\eta^2 =.09$. Further analyses indicated that at time 2, SELF-AS-DOER participants consumed significantly more servings of whole grain than did CONTROL participants, $t (76)= 2.68$, $p = .03$. At time 2, there were no significant differences in whole grain consumption between SELF-AS-DOER and EDUCATION participants ($t (76)= 1.43$, $p = .16$) or EDUCATION and CONTROL participants, $t (76)= 1.32$, $p = .19$.

Sugar-sweetened beverages. The interaction effect of time and group on sugar-sweetened beverage consumption was significant when measured by the FFQ, $F(4,150) = 3.49$, $p <.01$, Wilks' lambda = .94, $\eta^2 =.09$. However, after controlling for multiple comparisons (e.g., Bonferroni corrections) there were no significant group differences at time 1 ($F(2, 76) = 1.00$, $p = .37$, $\eta^2 =.03$), time 2 ($F(2, 76) = 1.37$, $p = .26$, $\eta^2 =.04$), or time 3($F(2, 76) = .27$, $p = .77$, $\eta^2 =.01$). Results from the food diary reports demonstrate a non-significant interaction effect of time and group condition on sugar-sweetened beverages, $F(4, 150) = 1.26$, $p = .29$, Wilks' lambda = .94, $\eta^2 =.03$. The difference between groups at time 3 approached significance, $F(2, 76) = 2.80$, $p = .07$, $\eta^2 =.07$, with SELF-AS-DOER participants consuming less sugar-sweetened beverages than did CONTROL participants, $t(76)= 2.35$, $p= .06$.

Participant Feedback Related to Intervention Impact

At the completion of the study, participants were given the opportunity to provide feedback about the intervention. Although an analysis of these data was not planned prior to the implementation of the study, they were remarkable enough to warrant mention here. What follows are examples of such feedback. For example, one participant who was eager to discuss her behavior change also brought in a sample of quinoa, a whole grain seed that she incorporated into her diet. Participants also reported how the exercise of thinking of themselves as "doers" motivated them to make different health behavior choices. For example, one woman described how when at a vending machine she began to make her habitual choice of a sugary beverage, but then thought, in accordance with the doer phrases she had created, "no, I am a 'less sugar drinker' and should choose a diet beverage." Consequently, she selected a diet drink. Thinking about one's identity related to healthy eating also encouraged behavior change in situations where the imagined healthy choice was not preferred. For example, one participant asked how many servings of vegetables were in a vegetarian burger. When it was explained that vegetarian burgers contained the equivalent of about one-quarter cup servings of vegetables, she exclaimed, "You mean I choked down that veggie burger instead of a hot dog for only a quarter cup of veggies?" Some participants demonstrated an integration of the identity phrases created during the self-as-doer task. One participant, without prompting, wrote the self-as-doer phrases she created throughout the diary tracking at both time 2 and time 3. For example, when she ate carrots and celery, she wrote the phrase "veggie grabber" next to these foods to identify the healthy eater identity she was incorporating into her behavior. Another participant, in an unsolicited email following the intervention, mentioned how

excited she was to become a “leafy vegetable eater,” a doer-identity phrase she had created the day before.

Discussion

The purpose of the present study was to test whether a motivational identity (i.e., self-as-doer identity) related to healthy eating behaviors would predict intentions to eat a healthy diet and healthy eating behaviors and whether a self-as-doer identity could be induced through a targeted healthy eater identity intervention. Results supported the hypotheses that self-as-doer identity would predict intentions to eat a healthy diet above and beyond other components of the TPB and partially supported the hypotheses that self-identity would predict healthy eating behaviors above and beyond TPB components and intentions to eat a healthy diet. Self-identity was a significant predictor of overall healthy eating behaviors, but not specific healthy food groups (e.g., fruits, vegetables, etc.) or sugar-sweetened beverages. Findings for the causal effects of the self-as-doer intervention on intentions, self-identity, and healthy food consumption were mixed but provide initial evidence for the causal effect of the self-as-doer on healthy eating behavior change. What follows is a discussion of each of the major outcome variables tested in this study.

Healthy Eater Identity

Self-identity as a healthy eater was a significant predictor of intentions and overall healthy eating behaviors above and beyond attitudes, subjective norms, and perceived behavioral control. When predicting behaviors, self-identity was also a significant predictor above and beyond intentions. The current findings support previous research on the effect of self-identity on intentions and behaviors and further validate the role of self-

identity as a theoretical factor in the TPB (Astrom & Rise, 2001; Rise et al., 2010). In the current study, self-identity predicted an additional 25% of the variance in intentions, contributing to almost half of the 55% of variance that was accounted for by the total model. Moreover, the shared variance between self-identity and other constructs was low (e.g., R^2 = .06 -.14), suggesting that self-identity, specifically self-identity related to intentions for healthy eating, is a unique predictor of intentions to eat a healthy diet. Results of the current study are similar to that of previous literature (c.f., Rise et al., 2010; Armitage & Conner, 2001), and bolster the argument for the contribution of self-identity to the TPB.

Results related to actual healthy eating behaviors were not as conclusive, however. Self-identity predicted overall healthy eating behaviors over and above other TPB components but was not a significant predictor of any specific food groups (e.g., fruits, vegetables, whole grains, etc.). After controlling for attitudes, subjective norms, perceived behavioral control and intentions to eat a healthy diet, self-identity accounted for an additional 4.1% of the variance in overall healthy eating behaviors. That self-identity was not predictive of other, specific healthy eating food groups might suggest that global self-identity as a healthy eater, as was measured in the current study, is not predictive of specific behaviors. Research on the relationships between attitudes and behaviors suggests a similar notion: global attitudes about health (e.g., exercise is good for me) do not necessarily predict specific health behaviors (e.g., jogging), but attitudes about specific behaviors (e.g., jogging is good for me) do predict corresponding behaviors (e.g., jogging; Ajzen & Fishbein, 2005). Had participants been asked to respond to prompts about food group-specific identities (e.g., identities as fruit eaters,

vegetables eaters, whole grain eaters, etc.), self-identity may have been more predictive of those corresponding behaviors.

The causal effects of the self-as-doer intervention on changes in self-identity, that is, the hypotheses that a healthy eater identity would strengthen over the course of the study and that improvements in healthy eater identity would be greater for participants in the self-as-doer condition compared to those in the education and control groups, were partially supported. Participants in the self-as-doer group demonstrated improvements in healthy eater identity from baseline to one month follow-up whereas participants in the education and control groups demonstrated no change in healthy eater identity. That participants in the self-as-doer group changed from baseline to one month post-intervention and not immediately following the intervention suggests that changes in an identity as a healthy eater might happen gradually; that is, identity as a healthy eater might take time to develop. The gradual process of identity change associated with health behavior change has been supported in previous research (Kearney & O'Sullivan, 2003). In a review of qualitative studies exploring the process of changing unhealthy behaviors (e.g., smoking, drinking, unsuccessful weight or diet management), Kearney and O'Sullivan (2003) determined that identity and lasting behavior change first required critical self-assessment followed by some initial behavior change in accordance with goals developed from the critical self-assessment. After experiencing small behavioral change, the researchers found that participants began a process, albeit a slow process, of revising and refining their identities in congruence with their self-assessment goals. In the current study, a similar process might have taken place. Participants in the self-as-doer intervention condition had the opportunity to critically assess their healthy eating goals

and identities related to such goals and whether their current identities were consistent with developed goals. Having had the chance to then engage in and monitor some initial behavior change (i.e., time 1 and time 2 food tracking) might have bolstered a healthy eater identity and consequently led to the gradual development of a healthy eater identity by the completion of the study.

The finding that only those in the self-as-doer condition, and not women in the education or control group, strengthened their identity as healthy eaters provides some evidence for effects of the self-as-doer intervention on healthy eater identity development. The additional task of creating and contemplating healthy eating behavioral identities may have bolstered one's healthy eating identity above and beyond simply tracking one's diet and receiving nutrition education. However, the change over the course of the study for participants in the self-as-doer group was not a great enough change to be significantly different from healthy eater identities of participants in the control or education groups at any time point in the study. The means did, however, trend in the hypothesized direction such that women in the self-as-doer group had higher healthy eater identities after the intervention and at the one month follow-up time points compared with those of women in the education and control groups. It may have been that the self-as-doer intervention effect as I designed it was not potent enough to increase healthy eater identity for participants in the self-as-doer group more than that of those in the education or control groups. Perhaps a longer intervention, or even a second intervention session, to reinforce information on developing self-as-doer identities or to improve participants' commitment to doer identities, might have created a more meaningful effect on behavior. Furthermore, reminders about participants' goals and doer

identity statements throughout the tracking phases or at different time points in the study may have bolstered healthy eater identity development. The effect of a more intensive intervention or booster sessions could be a focus of future investigations with the self-as-doer intervention.

A healthy eater identity might also represent a construct other than identity, thereby explaining why healthy eater identity in the current study did not predict all healthy eating behaviors. That self-identity, as measured in the current study, may be measuring a construct other than identity may also explain why self-as-doer participants did not experience a change in healthy eater identity to a greater degree than did participants in the other groups. Some have argued that self-identity is a measure for past behavior or habit, such that one's current identity is formed because one has previously engaged in corresponding behaviors (Sparks, 1994; Sparks & Guthrie, 1998). For example, the way in which participants reported their healthy eater identity status could have depended on the degree to which they ate healthy foods in the past. As such, healthy eater identity in the current study might have assessed past behaviors rather than identity and for that reason, did not account for more of the variance in intentions or behaviors than what past behaviors would have contributed. Furthermore, results corresponding to the change in healthy eater identity could have been measuring change in past behavior, rather than the theorized factor of self-identity specific to healthy eating behaviors. That is, healthy eater identity at time 2 could have been a reflection of behaviors at time 1 and healthy eater identity at time 3 could have been measuring behaviors at time 2. Other researchers exploring whether self-identity measures something other than past behavior have demonstrated mixed findings. Some have found evidence that self-identity

independently predicts intentions and behaviors above and beyond past behaviors (Astrom & Rise, 2001; Hamilton & White, 2008; van den Putte, Yzer, Willemsen, & de Bruijn, 2009) although others have found no independent effects for intentions or behaviors (Moan & Rise, 2005; Smith et al., 2007). In the current study, correlations between healthy eating behaviors and healthy eater identities at all time points were only moderate (r = .29-.48), suggesting that healthy eater identity may be measuring something other than past behaviors.

Intentions

Results partially supported the hypotheses that there would be a significant change in intentions over the course of the study, between study groups, and that there would be a significant interaction such that participants in the self-as-doer group would experience the greatest change in intentions to eat a healthy diet. For women in the self-as-doer group, there was a significant increase in intentions to eat a healthy diet from baseline to after the intervention, but not from baseline to the one-month follow-up. Changes in intentions to eat a healthy diet over the course of the study were not found for participants in the control or education groups. These findings support previous research demonstrating the effect of self-identity on intentions to eat healthy foods (Astrom & Rise, 2001; Rise et al., 2010) and provide further evidence for the effect of the self-as-doer intervention to create changes in intentions to eat a healthy diet.

Women in the self-as-doer group were the only participants to increase their intentions to eat a healthy diet over the course of the intervention. This might suggest that the additional task of creating and contemplating healthy eating behavioral identities may have bolstered intentions to eat a healthy diet. However, the hypotheses that there would

be group differences and that the self-as-doer group would have the greatest amount of change were not significant, suggesting that nutrition education and the additional task of creating and contemplating healthy eating behavior identities was not enough to demonstrate change in intentions to eat a healthy diet beyond simply tracking one's diet. One reason for the non-significant group and interaction results may be due to ceiling effects. The study's targeted population, by definition, was interested in healthy diets and indeed, participants in all groups reported strong healthy eating intentions at all three time points in the study, thus leaving little room for intentions to change enough to detect a significant difference among the groups. Moreover, intentions for all groups at all time points were quite high (e.g., means ranged from 5.89 to 6.28 out of 7) and standard deviations were quite small (e.g., ranged from 0.63-1.05) suggesting a lack of variability and consequently an inability to detect change among groups. It may be beneficial to examine whether intentions to eat a healthy diet change as a result of the self-as-doer intervention in a group of participants who have more variability in motivation for diet change and their intentions to eat a healthy diet.

Nutrition Knowledge

The hypotheses that nutrition knowledge would increase from baseline to after the intervention for participants who received nutrition education (e.g., self-as-doer and education groups) and that women in these groups would have significantly higher nutrition knowledge post-intervention and at the one month follow-up compared to women who did not receive nutrition education were partially supported. Participants in the control group, as expected, did not demonstrate any change in nutrition knowledge over the course of the study. Participants in both the self-as-doer and education groups

had significant increases in nutrition knowledge from baseline to post-intervention. Furthermore, the level of nutrition knowledge acquired post-intervention remained at the one month follow-up. Findings suggest that the educational information provided to participants at the intervention phase of the study was an effective tool for increasing nutrition knowledge. Additionally, the fact that participants scored similarly at the one month follow-up indicates that the educational intervention was effective enough for participants to retain the added level of nutrition knowledge. Findings are consistent with what others have demonstrated in nutrition education interventions (c.f., Bandayrel & Wong, 2011; Carcaise-Edinboro et al., 2008; Mhurchu et al., 2007). However, in the current study, nutrition education alone was not directly related to healthy eating behaviors. That is to say, that in the present study, participants in the education and self-as-doer group both increased their nutrition knowledge, but only participants in the self-as-doer group improved their healthy eating behaviors.

Even though participants in the self-as-doer and education group improved their nutrition knowledge from baseline to post-intervention, the knowledge gained after the intervention was not significantly greater than the nutrition knowledge of participants in the control group. It may have been that general education is not enough to change nutrition knowledge significantly and that to change nutrition knowledge in a meaningful way, the information could be tailored to the individual or include a consultation component from a nutrition expert (Samuels et al., 2007; Wright, Sherriff, Shalliwal, & Mamo, 2011). Moreover, given that the participants were, in general, highly motivated, they may have either entered the study already having basic nutrition knowledge or may have been more likely than typical undergraduate woman to seek education outside of the

study. Nonetheless, trends in the data suggest that those who received nutrition education changed their nutrition knowledge and had somewhat higher levels of nutrition knowledge than those in the control group, especially immediately following the intervention.

Measurement of Healthy Eating Behaviors

In the present study, healthy eating behaviors were assessed using two forms of measurement, FFQs and food diary reports. Since valid and reliable nutrition data can be difficult to obtain, both measures were used. In general, the findings between the two measures suggest similar outcomes. However, discrepancies in outcomes between the two measures could be due to measurement error. For example, the FFQ requires respondents to report food intake according to predetermined serving sizes (e.g., 1 serving = 1 cup) and does not allow for a participant to report half servings. Likewise, participants might not have noticed or taken into account the predetermined serving sizes for each food item. For example, if a participant had 2 cups of cereal and the serving designation was only 1 cup, she might have only entered having cold cereal 1 time that day, rather than selecting 2 times because it was associated with the 1 cup measurement. Furthermore, participants might not have been able to accurately categorize their food groups if they had limited knowledge about particular foods. For instance, participants might not have known that a cereal such as Cheerios contains whole grain and therefore they should have entered that they consumed cereal with whole grains rather than simple cold breakfast cereal. The same situation could have occurred with juices and whether or not participants perceived them as 100% juice or a juice cocktail.

An initial concern with using data from food diaries was the degree to which participants would be able to accurately record amounts and descriptions of the foods. Given the amount of training and the opportunities for feedback, this concern was much less significant than initially anticipated. Overall using the food diaries for data interpretation and generalizations of the outcome may be more accurate because researchers were able to categories foods based on size and measurements according to USDA standards. Likewise, decisions about percentage of whole grains and complex meals could be made in a more standardized method across participants. Therefore, there is greater confidence in the outcomes of the food diary reports and interpretations and generalizations will be based in those data.

Self-as-Doer Identity and Overall Healthy Eating Behaviors

Results supported hypotheses that women in the self-as-doer group would experience a greater increase in overall healthy food consumption when compared with women in the education and control groups. Women in the self-as-doer group had a significant increase in overall healthy eating behaviors from baseline to one month post-intervention whereas women in the education and control groups actually decreased their healthy eating behaviors over the course of the study. Furthermore, the amount of overall healthy foods consumed at the final point of the study was significantly higher for participants in the self-as-doer group than it was for women in the control group. The difference at the one month follow-up between women in the self-as-doer and education groups was marginally significant, but the means trended in the hypothesized direction and if less conservative correction measures would have been used, the difference

between the groups would have been significant thereby suggesting that women in the self-as-doer group might have had higher rates of overall healthy food consumption.

In general, findings suggest that developing doer identities related to healthy eating behaviors can create change in overall healthy diet choices. Significant changes in healthy food consumption did not happen immediately following the intervention for participants in any group, however. That differences among the groups were not found until the final time point of the study is consistent with the findings related to identity development for participants in the self-as-doer condition. That is, healthy eater identity did not change until the follow-up analyses and consequently, if according to the self-identity theories and the hypothesis that identity change can create behavior change, then the fact that healthy food consumption did not change until the final time point may suggest that behavior change occurred in tandem or followed identity change.

Gradual changes in behavior due to time and to environment constraints such as needing to get new groceries or learning how to cook new foods (Barroso et al., 2010; Rolnick et al., 2009) may have influenced the degree to which overall behavior change was demonstrated. Participants began tracking their diets relatively soon after the intervention (e.g., the next day or within a few days). The time it took to change their environment and modify habituated behaviors (e.g., purchase groceries, try new healthy foods, learn new recipes) might have taken longer than the four day diary tracking time period in the study. Consequently, diet change in the current study was seen most vividly at the one-month follow up period. Perhaps tracking for a long period of time following the intervention may have enabled measurement of a gradual change in healthy eating behaviors following the intervention.

Contrary to the hypotheses, women in the control and education groups demonstrated a decrease in total healthy eating behaviors. This was unexpected, but perhaps the mindfulness of dietary tracking or the presence of the researcher (i.e., reporting one's eating habits to the researcher) had a direct effect on how much food they consumed or the degree to which they reported their food consumption (Streit, Stevens, Stevens, & Rossner, 1991; Zepeda & Deal, 2008). Participants may have eaten more healthy foods at baseline and post-intervention because they knew they were being monitored or had to report their diet to the researcher (i.e., Hawthone effect; Roethlisberger & Dickson, 1939). It may have been that the nuance of the task became less salient and as time passed they regressed back to their normal eating habits as was measured at the one month follow-up. Furthermore, the decrease in behaviors may not have occurred for women in the self-as-doer group as much as it did for women in the control and education groups because women in the self-as-doer group were given unique motivational and cognitive tools to sustain and even increase healthy eating behaviors whereas participants in the education and control group did not have such tools and might have regressed back to normal and less healthy eating behaviors.

Self-as-Doer Identity and Specific Food Group Behaviors

The hypotheses that there would be an increase in healthy food consumption across time and that those increases would be greater for women in the self-as-doer group as measured in specific food groups were partially supported. For fruit and sugar-sweetened beverage consumption there was no evidence to support the causal effect of the self-as-doer intervention, but there was demonstrated change for vegetables, whole grains, and low fat dairy consumption.

Results related to vegetable consumption mirror that of overall healthy eating behaviors; participants in the self-as-doer condition demonstrated an increase in vegetable consumption while participants in the education and control group demonstrated a decrease in vegetable consumption by the final time point of the study. In terms of whole grain consumption, women in the self-as-doer group increased their consumption from baseline to post-intervention whereas women in the control group decreased their consumption during these same time points, thereby creating a significant difference between these two groups after the intervention. Women in the education group demonstrated no change at all but their change scores were not significantly different from self-as-doer or control group change scores. With respect to the low-fat dairy group, results did not support the hypotheses that increases in low fat dairy would exist for the self-as-doer and education groups, that the control group would not change, and that increases in low fat dairy would be greatest for women in the self-as-doer group. Women in the education group decreased their low fat dairy consumption from baseline to follow-up and there was no change over time in low fat diary consumption for the control or self-as-doer groups. However, the change in low fat dairy consumption for women in the education group was not great enough to warrant significant group differences at any time point.

The finding that there was no change in low fat dairy or sugar-sweetened beverages for the self-as-doer group may be that neither of these behaviors are central to one's conceptualization of a healthy eater. In fact, the number of created doer phrases related to increasing low-fat diary and decreasing sugar-sweetened beverages was quite low, 6% and 4%, respectively. The absence of goals related to these corresponding

behaviors may explain why no behavior change over time and among groups was detected. Additionally, changes in low-fat dairy and sugar-sweetened beverages might not have been considered for diet change or that the focus of diet change was not measured in the current study (e.g., changes in portion sizes, reduction of unhealthy foods other than sugar-sweetened beverages, etc.). In regards to low-fat dairy, for example, many participants might have believed their current consumption of low-fat dairy was adequate and no change was needed. For participants in the current study, most forms of dairy came from milk or a milk alternative (i.e., soy or almond milk) and few participants (e.g., less than 3) were consuming whole milk on a regular basis. Future investigations might focus on availability of certain food group items and other measures of diet change including decreases of unhealthy foods as well as the increases in healthy foods.

Inconsistencies in behavior change for specific food groups might have been because participants focused their behavior change efforts on one or two behaviors rather than multiple behaviors at a time. This may explain why there were decreases followed by increases in low fat dairy and fruit consumption for participants in the self-as-doer group as well as decreases, albeit not significant, in sugar-sweetened beverages. The change from post-intervention to follow-up for fruit and low fat dairy groups might suggest that participants in the self-as-doer group may have been, to a small degree, attempting to increase fruit and low fat dairy consumption but this change was not enough to detect a significant difference. Comparing trending means of the self-as-doer group to that of the control and education groups, it appears that fruit and low fat dairy consumption followed a similar pattern of change (particularly from post-intervention to follow-up) to that of the other food groups in which participants demonstrated significant

changes (e.g., vegetables, overall healthy behavior). More specifically, as women in the education and control groups were decreasing their consumption of healthy foods, women in the self-as-doer group were increasing the amount of healthy foods they ate.

In explaining why no group differences were found and why certain hypothesized changes in behavior were not supported for any of the individual food groups, it is important to consider the influence of external barriers, particularly for this college-aged population. Even though I expected that the self-as-doer intervention would provide the motivational tools to overcome barriers and create behavior change, some barriers may have been more salient than others and consequently may have affected the degree of change and differences detected in healthy eating behavior among the groups, especially given the relatively small group sizes. For example, participants often discussed external barriers such as access to healthy food choices. Many women were restricted by the university's cafeteria meal plans which did not always offer a wide selection of fruits and vegetables. Other women discussed how the expense of purchasing healthy food items prevented them from the opportunity to eat more healthy food items (Maher et al., 2010; Rolnick et al., 2009). Still others described holidays, travel, or other events (e.g., spring break, student organization functions) that made it difficult to change their eating behaviors. For instance, one woman in the intervention group had jury duty during the second phase of the study. Although she was able to bring some fruits and vegetables with her to the courthouse, she indicated how her schedule precluded her from eating as well as she would have liked. Such barriers have been consistently demonstrated to interfere with one's healthy food consumption (Taylor et al., 2006; Rolnick et al., 2009) and could be an additional focus in continuing intervention research.

Another possible explanation for unexpected findings may be that participants lacked sufficient nutrition knowledge to engage in healthy food selection and consumption to an identifiable degree. Even though participants in the intervention group received nutritional education and resources to explore the nutrition information further, some participants may not have been educated well enough to demonstrate actual behavior change. In an exploration of nutrition knowledge before and after education in a single group of women, Samuels and colleges (2007) found that before any nutrition education, young women (*M* age = 22.3 years) had the least amount of knowledge about low-fat sources, portion sizes, and how to identify a variety of healthy foods. Moreover, only 20% of participants were able to correctly identify the recommended percentage of whole grains one should consume in a day. Following nutrition education developed by the USDA, knowledge in these areas did increase, but most participants (i.e., 57-89%) were still incorrectly identified sources of low-fat, portion sizes, and healthy food choices. Such may have been the case for participants in the current study. For example, one participant made self-as-doer goals related to whole grain and fruit consumption. In her subsequent food diaries she made food choices such as drinking fruit juice and eating granola bars because she presumed that they were made from whole fruits and whole grains. Unfortunately, she was consuming fruit drinks rather than fruit juices, which typically contain only about 10% fruit juice. Furthermore, the granola bars she consumed had only a small percentage of whole grain. Had the educational materials included information about such common misconceptions or inadequate food labeling, participants may have demonstrated a more sophisticated knowledge and hence better behavioral choices.

Taken together, the results related to specific food groups suggest that the self-as-doer intervention has potential for healthy diet behavior change, especially for vegetables and whole grains. More specifically, findings suggests that women who have had some nutrition knowledge and who engage in creating and reflecting on healthy eater identities may be prone to increase their healthy eating behaviors over time.

Generalizations, Implications, and Intervention Impact

Overall, findings of the present study support previous research in the role of self-identity and self-as-doer identity in behavior change (Brouwer & Mosack, 2011; Houser-Marko & Sheldon, 2006; Rise et al., 2010; Stryker & Bruke, 2000). Moreover, findings contribute to the extant literature by demonstrating a causal relationship between identity, and specifically the motivational identity self-as-doer, and change in healthy eating intentions, and to a lesser extent, behavior. Although not all healthy eating behaviors were changed over the course of the intervention, given that overall healthy eating behaviors changed suggests that focusing on healthy eater identities could influence general healthy diet choices. People have different food preferences and in some cases food restrictions (e.g., lactose intolerance, gluten sensitivity) so an intervention which is demonstrated to create change in a variety of healthy behaviors (or health behaviors, in general) might be more useful in applied settings. Moreover, consistent with previous research in college populations (Nelson et al., 2009), women in the current study had quite low rates of healthy food consumption (i.e., approximately 2-2.5 servings of fruit and vegetables a day on average), much lower than the recommended 3-5 servings of fruits and 4-5 servings of vegetables per day (Brunt, Rhee, & Zhong, 2008). If motivated women with poor diets were able to make significant changes in their healthy eating

behaviors as a result of the self-as-doer intervention, then the self-as-doer intervention might also provide opportunities for greater impact for other groups of people with poor diets.

Given some evidence for behavior change as a result of the self-as-doer intervention, the intervention has important implications for practice and research. The intervention itself was rather simple, requiring little training, time and use of resources. Participants engaged in the task with relative ease; only one woman had difficulty generating six goals related to healthy eating. Moreover, the intervention task resonated well with most participants, for some to the degree that they went above and beyond the expectations of the intervention (e.g., writing doer phrases in food diaries, sharing behavior changes with the researcher, etc.). Such an intervention could be easily incorporated into an education session or any diet change intervention in clinical or research contexts. The current study provides additional evidence and implications for the role of self-identity in the TPB. Researchers have begun to establish self-identity as factor which can uniquely predict intentions and behaviors (c.f., Rise et al., 2010; Armitage & Conner, 1998), but prior to this study, Houser-Marko and Sheldon (2006) were the only researchers to explore whether the experimental manipulation of self-identity, especially self-as-doer identity, could create change in intentions and behavior. Although conclusions in the current study related to intentions are tentative given the absence of some group differences following intervention manipulations, findings related to healthy eating behavior suggest that creating identities as the doer of one's goal behaviors can lead to behavior changes. Moreover, the findings of the current study support arguments proposed by identity theorists (Biddle, 1985; Stryker & Burke, 2000) that self-identity

may be a socially constructed motivation wherein individuals behave in ways that are consistent with their sense of self. In the current study, that sense of self was defined as the doer of healthy eating behaviors. More research, particularly intervention research, is needed before I would conclude that self-identity should be added to the TPB. However, the current study contributes to the growing area of research adding self-identity to the TPB by providing further evidence that self-identity, as defined and manipulated via the self-as-doer construct, is an factor different from attitudes, subjective norms, and perceived behavioral control which can predict and even cause some change in intentions and behaviors.

An intervention focused on developing how people view themselves as the doer of their healthy eating behaviors has important implications for the growing body of evidence supporting research and interventions focused on self-identity. Shepperd and colleagues (2011) have argued for the important role that self-identity has in health behavior change. Many have explored the associations and predictive ability of self-identity and health behavior (DeWall & Pond, 2011; Friese, Hofmann, & Wiers, 2011; Kwan, Caldwell, Magnan, & Bryan, 2011), but few have demonstrated causal effects. As such, the current study contributes to an important and growing field exploring how self-identity can be the focus of intervention for health behavior change and specifically with respect to healthy eating behaviors. That is, the self-as-doer intervention which aims to define the self in terms of doing a behavior may provide the unique motivational tools for health behavior diet change.

Limitations and Future Research

The study is not without limitations. Outcome measures (e.g., food diaries, FFQs, cognitive measures) were self-report and may therefore be biased and limit the ability to make generalizations. Because the stated purpose of the study was to explore healthy eating behaviors in women, participants might have over-reported healthy eating behaviors and under-reported unhealthy eating behaviors (Buzzard, 1998). Likewise, participants may have forgotten to report certain foods throughout the day or made incorrect measurement calculations. Consequently, the accuracy of nutrition analyses and overall healthy food consumption could be questionable. Rigorous food diary training occurred at the beginning of the study with feedback and clarification of diary entries provided at subsequent lab visits, however. Therefore, limitations in the degree of participants' accuracy may not be warranted (Buzzard, 1998). To improve accuracy in dietary collection, real-time dietary consumption could be collected using smart phones or by making periodic contact with the participant throughout tracking days. Additionally, biochemical data (e.g., carotenoids, fatty acids, vitamin A, C and D, iron, and sodium; Hunter, 1998; Willett & Lenart, 1998) could be collected to compare and validate food diary reporting.

The generalizability of the study is also limited by the specific population (i.e., motivated college women) recruited for the current study. However, among this study's generally motivated and healthy individuals, there was some behavior change and trends in support of the hypotheses. If healthy women generally practicing healthy behaviors are able to use the motivational tools provided by the self-as-doer intervention, then perhaps extending the intervention to participants who have more immediate health concerns

(e.g., those suffering from chronic health conditions such as hypertension, diabetes or overweight) may be as or more successful. Furthermore, for clinical populations there is often a set of specific health behaviors that need to be enacted (e.g., medication taking, exercise, healthy diets, etc.), thereby creating an environment where specific health behavior goals may be more salient for these individuals than generally healthy individuals. As such, doer identities corresponding to specific health behaviors may be easier to develop and regulate (Brouwer & Mosack, 2011). Further research employing the self-as-doer intervention in a clinical population is needed.

Limitations related to the study method in general and experimental design in particular should be mentioned. As a result of the small effect the intervention demonstrated, the study may have been underpowered to detect behavior change. Even though an *a priori* power analysis was calculated to determine the appropriate number of participants to recruit, the effect of the intervention was weaker than expected. Non-significant trends in the hypothesized directions lead me to conclude that had I enrolled more participants into the study, more significant differences likely would have been found. One reason for the small intervention effect may have been that the self-as-doer task was not salient enough to induce change. Researchers might investigate ways to strengthen the effects of the self-as-doer task. One way to do so may be to explore processes which may better orientate one toward developing a stronger self-as-doer identity. For example, one might include a self-reflective writing component focused on the application of a doer-identity to oneself. Refinements to the intervention to include other established intervention components that also focus on self-regulation and goal-orientation (e.g., motivational interviewing; Miller & Rollnick, 2002), could additionally

be made. Target behaviors might also be reconsidered. As demonstrated in the present study and in a previous study (Brouwer & Mosack, 2011), a self-as-doer identity did not predict all health and self-care related behaviors. It may be that self-as-doer identity is specific to certain behaviors. As a result, exploring the causal relationships between self-as-doer identity and health behaviors such as physical activity and stress management in both clinical and non-clinical populations may provide further information as to the nature and predictive relationship of the self-as-doer identity. Finally, the theoretical nature and causal effects of the self-as-doer are not fully understood. Exploring further how self-as-doer identity is related to other similar constructs demonstrated to affect behavior change (e.g., self-affirmation, group identity, autonomous motivation) may provide more information for the effectiveness of a self-as-doer intervention.

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Table 1

Descriptive Statistics for Participants at Baseline

	Control	Education	Self-as-Doer	Total
Number of Participants	23	28	28	79
Age in years, Mean *(SD)*	20.57 (2.57)	24.43 (7.33)	23.34 (7.19)	22.92 (6.39)
Relationship Status, *n* (%)				
Single	16 (69.6)	14 (50.0)	8 (26.6)	38 (48.1)
In a relationship	6 (26.1)	9 (32.1)	16 (57.1)	31 (39.2)
Married/Partnered	1(4.3)	5 (17.9)	3 (10.7)	9 (11.4)
Other	0	0	1 (3.6)	1 (1.3)
Education, *n* (%)				
1st year	8 (34.8)	5 (17.9)	8 (28.6)	21 (21.6)
2nd year	3(13.0)	5 (17.9)	8 (28.6)	16 (20.3)
3rd year	5 (21.7)	5 (17.9)	5 (17.9)	15 (19.0)
4th year	4 (17.4)	5 (17.9)	3 (10.7)	12 (15.2)
5th year	1 (4.3)	6 (21.4)	2 (7.1)	9 (11.4)
6th year or more	2 (8.7)	2 (7.1)	2 (7.1)	6 (7.6)
Ethnicity, *n* (%)				
African American/Black	2 (8.7)	0	4 (14.3)	6 (7.6)
Asian or Pacific Islander	1 (4.3)	3 (10.7)	0	4 (5.1)
Caucasian/White	18 (78.3)	22 (78.6)	23 (82.1)	63 (79.7)
Other or multicultural[a]	2 (8.7)	3 (10.7)	1 (3.6)	6 (7.6)
Physical Activity Level, *n* (%)				
Light	3 (13)	8 (28.6)	6 (21.4)	17 (21.5)
Moderate	12 (52.2)	9 (32.1)	16 (57.1)	37 (46.8)
Active	8 (34.8)	11 (39.3)	6 (21.4)	25 (31.6)
On a Special Diet, *n* (%)[b]	6 (54.5)	3 (27.3)	2(18.2)	11 (13.8)
Vegetarian/Pescatarian	3(42.9)	0	1 (50.0)	4 (5.1)
Restricted Caloric Intake	1 (14.3)	2 (66.7)	0	3 (3.8)
Gluten-Free	1 (14.3)	1 (33.3)	0	2 (2.5)
Other	1 (14.3)	0	1 (50.0)	2 (2.5)
Smokers, *n* (%)	0	0	4 (5.0)	4 (5.0)
Number of times per tracking day that fast food was consumed, *n* (%)				
0	73 (80.2)	76 (88.4)	86 (84.3)	235 (84.2)
1	18 (19.8)	10 (11.6)	15 (14.7)	43 (15.4)
2 or more	0	0	1 (1.0)	1 (1.0)
Number of times per tracking day that participant ate a meal prepared at a restaurant, *n* (%)				
0	55 (60.4)	54 (62.8)	63 (61.8)	172 (61.6)
1	22 (24.2)	29 (33.7)	25(24.5)	76 (27.2)
2	12 (13.2)	1 (1.2)	14 (13.7)	27 (9.7)
3 or more	2 (2.2)	2 (2.3)	0	4 (1.5)
Number of times per tracking day a snack or meal was prepared at home, *n* (%)				
0	20 (22.0)	21 (24.4)	18 (17.6)	59 (21.1)
1	20 (22.0)	16 (18.6)	30 (29.4)	66 (23.7)
2	20 (22.0)	22 (25.6)	30 (29.4)	72 (25.8)
3	17 (18.7)	15 (17.4)	17 (16.7)	49 (17.6)
4 or more	12 (15.4)	12 (13.8)	7 (6.8)	33 (11.8)

Notes. [a]Includes biracial, Indian, Middle Eastern, and South Asian ethnicities. [b]The response options for this question were open-ended and were grouped in the presented categories. $^{*}p < .05$ $^{**}p < .01$ $^{***}p < .001$.

Table 2

Means and Standard Deviations for Descriptive and Outcome Variables

	Condition								
	Control			Education			Self-As-Doer		
Variable, *M (SD)*	T1	T2	T3	T1	T2	T3	T1	T2	T3
BMI	24.48 (4.29)	24.46 (4.40)	24.54 (4.23)	25.73 (7.28)	26.53 (8.37)	25.67 (7.38)	27.16 (7.23)	26.36 (6.93)	27.03 (7.23)
Restricted eating behavior	13.96 (4.64)	14.04 (4.26)	14.22 (4.26)	15.57 (5.85)	15.32 (5.57)	15.32 (5.52)	14.61 (4.47)	14.89 (4.57)	15.04 (5.28)
Self-Identity	5.00 (1.15)	5.04 (1.28)	5.15 (1.13)	4.78 (1.45)	4.75 (1.56)	4.98 (1.46)	5.04 (1.11)	5.23 (1.18)	5.32 (1.30)
Nutrition knowledge	7.04 (2.12)	7.26 (2.14)	7.13 (2.28)	6.67 (1.72)	8.00 (1.96)	7.39 (1.93)	6.64 (2.67)	7.93 (2.58)	7.50 (2.27)
Intentions	6.10 (.81)	6.28 (.63)	6.10 (.90)	5.89 (1.05)	6.13 (.78)	6.13 (.74)	6.03 (.90)	6.28 (.71)	6.16 (.85)
Food Frequency Questionnaire:									
Overall health eating behaviors, servings	4.63 (2.57)	4.22 (2.23)	3.60 (1.89)	3.78 (1.51)	3.63 (1.70)	3.25 (1.36)	4.42 (1.99)	4.44 (2.29)	4.50 (2.02)
Low-Fat dairy, cups	.94 (.67)	.76 (.70)	.76 (.66)	.75 (.67)	.61 (.39)	.61 (.48)	.86 (.62)	.76 (.62)	.82 (.55)
Fruits, cups	1.45 (.96)	1.38 (.95)	1.10 (.69)	1.11 (.80)	1.18 (.71)	.95 (.62)	1.38 (.70)	1.28 (.72)	1.42 (1.02)
Vegetables, cups	1.24 (.78)	1.04 (.74)	.90 (.61)	1.02 (.766)	1.01 (.77)	.88 (.64)	1.12 (.72)	1.17 (.89)	1.06 (.74)
Whole grains, ounces	.99 (.93)	1.03 (.98)	.84 (.84)	.90 (.75)	.81 (.62)	.81 (.63)	1.05 (1.05)	1.23 (1.15)	1.21 (1.11)
Sugar-sweetened beverages, cups	.49 (.62)	.17 (.34)	.41 (.52)	.30 (.32)	.33 (.40)	.37 (.48)	.39 (.47)	.30 (.32)	.31 (.40)
Food Diary:									
Overall healthy eating behaviors, servings	4.42 (2.58)	3.66 (2.27)	3.41 (1.85)	4.11 (1.87)	4.18 (1.93)	3.52 (1.54)	3.95 (1.72)	4.29 (1.95)	4.73 (2.30)
Low-Fat dairy, cups	.91 (.84)	.78 (.80)	.78 (1.03)	.87 (.99)	.92 (.53)	.49 (.45)	.63 (.47)	.65 (.58)	.86 (.81)
Fruits, cups	1.14 (.78)	.92 (.74)	.88 (.53)	1.00 (.67)	.95 (.59)	.88 (.55)	.94 (.64)	.78 (.47)	.94 (.57)
Vegetables, cups	1.27 (.93)	1.19 (.84)	.98 (.57)	1.18 (.83)	1.47 (1.32)	1.02 (.63)	1.22 (.61)	1.35 (.76)	1.433 (.87)
Whole grains, ounces	1.10 (.96)	.77 (.89)	.98 (1.31)	1.05 (.69)	1.14 (.85)	1.09 (.77)	1.63 (1.07)	1.51 (1.14)	1.34 (1.41)
Sugar-sweetened beverages, ounces	6.15 (8.81)	5.06 (6.88)	6.34 (7.04)	4.63 (5.20)	4.86 (4.98)	4.63 (5.83)	3.92 (6.04)	3.26 (3.32)	2.61 (3.84)

Note: Higher scores are better, except for sugar-sweetened beverages.

Table 3

Correlation Coefficients for Theory of Planned Behavior Components and Behavioral Outcome Measures

Variables at Time 1	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1. Intentions	1															
2. Attitudes	.46***															
3. Perceived Behavioral Control	.45***	.43***														
4. Subjective Norms	.30**	.37***	.15													
5. Health Eater Identity	.67***	32**	.30**	.25*												
6. FFQ - Low Fat Diary	-.05	-.11	-.07	-.11	.15											
7. FFQ - Fruit	.51***	.21	.15	.06	.49***	.20										
8. FFQ - Vegetables	.45***	.23*	.17	.03	.42***	.13	.42***									
9. FFQ - Whole Grains	.33**	.27*	.29**	.16	.30**	.12	.18	.30***								
10.FFQ - Sugar-sweetened Beverages	-.28*	-.04	.10	-.20	-.24*	-.04	-.11	-.06	-.21							
11.FFQ-Overall Healthy Eating Behaviors	.50***	.25*	.23*	.07	.53***	.50***	.70***	.71***	.67***	-.18						
12. FD -Low Fat Diary	.14	-.10	-.12	-.08	.16	.57***	.34**	.25*	-.04	-.09	.39***					
13. FD -Fruit	.46***	.21	.27*	.01	.43***	.05	.78***	.28**	.20	-.23*	.52***	.17				
14. FD -Vegetables	.40***	.18	.09	.06	.38***	.19	.34**	.85***	.34**	-.13	.66***	.26*	.23*			
15. FD- Whole Grains	.24*	.23*	.12	.13	.25*	.12	.25*	.41***	.80***	-.21	.64***	.01	.17	.44***		
16. FD – Sugar-sweetened Beverages	-.26*	-.01	-.05	-.06	-.32**	-.14	-.28*	-.24*	-.25**	.62***	-.36***	-.09	-.26*	-.32**	-.30***	
17. FD-Overall Healthy Eating Behaviors	.50***	.25*	.23*	.06	.53***	.50***	.70***	.71***	.67***	-.18	1.00***	.39***	.52***	.66***	.64***	-.36***

Note. FFQ = food frequency questionnaire; FD = food diary reports. * $p < .05$; ** $p < .01$; *** $p < .001$.

Table 4

Hierarchical Regressions of Theory of Planned Behavior Components and Healthy Eater Identity Predicting Intentions

		Intentions					
		B	*SE*	β	sp^2	ΔR^2	ΔF
Block 1						$.31^{***}$	11.15
	Attitudes	.23	.13	.17	.02		
	Perceived Behavior Control	.30	.13	$.21^{*}$	.03		
	Subjective Norms	.08	.09	.07	.004		
Block 2						$.25^{***}$	41.15
	Healthy Eater Identity	.39	.06	$.54^{***}$	.25		
	R^2 Total					$.57^{***}$	

Note. $^{*}p < .05$ $^{**}p < .01$ $^{***}p < .001$.

Table 5

Hierarchical Regressions of Theory of Planned Behavior Components and Healthy Eater Identity Predicting Health Eating Behaviors for FFQ Measures

		Dependent Measures																	
		Low Fat Dairy						**Fruit**						**Vegetables**					
		B	*SE*	β	sp^2	ΔR^2	ΔF	B	*SE*	β	sp^2	ΔR^2	ΔF	B	*SE*	β	sp^2	ΔR^2	ΔF
Block 1						.02	.63					.28***	6.96					.22***	5.28
	Attitudes	.08	.14	-.08	.003			.04	.16	.03	.000			.09	.15	.08	.004		
	Perceived Behavior Control	.03	.14	-.03	.000			-.13	.15	-.10	.001			-.08	.14	-.06	.003		
	Subjective Norms	-.08	.10	-1.00	.001			-.13	.11	-.13	.013			-.14	.10	-.15	.020		
	Intentions	-.16	.13	-.22	.02			.36	.14	.39**	.065			.29	.13	.35*	.051		
Block 2						.07*	5.44					.04*	4.20					.02	2.28
	Healthy Eater Identity	.19	.08	.36*	.07			.18	.09	.27*	.040			.13	.09	.21	.02		
	Total R^2					.09*						.32***						.25***	

Note. Each step also contains the variables above it, such that only effects above and beyond those variables are reported. *$p < .05$ **$p < .01$ ***$p < .001$

		Dependent Measures																	
		Whole Grains						**Sugar-Sweetened Beverages**						**Overall Healthy Eating Behaviors**					
		B	*SE*	β	sp^2	ΔR^2	ΔF	B	*SE*	β	sp^2	ΔR^2	ΔF	B	*SE*	β	sp^2	ΔR^2	ΔF
Block 1						.14*	2.96					.16**	3.56					.26***	6.38
	Attitudes	.14	.19	.09	.005			.06	.10	.08	.004			.19	.38	.06	.002		
	Perceived Behavior Control	.22	.19	.15	.016			.20	.10	.27*	.051			-.02	.37	-.01	.000		
	Subjective Norms	.03	.13	.03	.000			-.08	.07	-.14	.017			-.31	.26	-.13	.013		
	Intentions	.12	.17	.12	.005			-.18	.09	-.33*	.048			.61	.34	.27	.030		
Block 2						.01	.72					.00	.31					.07**	7.34
	Healthy Eater Identity	.09	.11	.13	.008			-.03	.06	-.08	.004			.59	.22	.36***	.069		
	Total R^2					.15*						.17*						.33***	

Note. Each step also contains the variables above it, such that only effects above and beyond those variables are reported. *$p < .05$ **$p < .01$ ***$p < .001$

Table 6

Hierarchical Regressions of Theory of Planned Behavior Components and Healthy Eater Identity Predicting Healthy Eating Behaviors for Food Diary Reports

	Dependent Measures																	
	Low Fat Dairy						Fruit						Vegetables					
	B	*SE*	β	sp^2	ΔR^2	ΔF	B	*SE*	β	sp^2	ΔR^2	ΔF	B	*SE*	β	sp^2	ΔR^2	ΔF
Block 1					.09	1.80					.24***	5.75					.18**	4.04
Attitudes	-.15	.17	-.12	.009			.02	.13	.02	.002			.06	.16	.05	.001		
Perceived Behavior Control	-.25	.17	-.20	.029			.09	.13	.08	.004			-.15	.15	-.12	.011		
Subjective Norms	-.11	.12	-.11	.010			-.13	.09	-.16	.02			-.08	.11	-.09	.006		
Intentions	.21	.15	.23	.024			.23	.12	.30*	.041			.29	.14	.33*	.048		
Block 2					.01	.71					.03†	3.11					.02	2.00
Healthy Eater Identity	.08	.10	.13	.009			.133	.08	.24†	.031			.13	.09	.20	.022		
R^2 Total					.10						.27***						.20**	

Note. Each step also contains the variables above it, such that only effects above and beyond those variables are reported. †p <.10; *p < .05 **p < .01 ***p < .001

	Dependent Measures																	
	Whole Grains						Sugar-Sweetened Beverages						Overall Healthy Eating Behaviors					
	B	*SE*	β	sp^2	ΔR^2	ΔF	B	*SE*	β	sp^2	ΔR^2	ΔF	B	*SE*	β	sp^2	ΔR^2	ΔF
Block 1					.08	1.55					.09	1.74					.24**	5.94
Attitudes	.21	.19	.15	.015			.139	1.40	.13	.012			.14	.39	.05	.001		
Perceived Behavior Control	-.04	.19	-.03	.006			.53	1.37	.05	.002			-.37	.38	-.11	.008		
Subjective Norms	.02	.13	.02	.002			-.01	.97	.00	.000			-.31	.27	-.13	.013		
Intentions	.08	.17	.08	.003			-1.21	1.23	-.16	.012			.81	.34	.35*	.056		
Block 2					.01	1.02					.04†	3.29					.04*	4.21
Healthy Eater Identity	.11	.11	.15	.013			-1.45	.80	-.27†	.040			.45	.22	.28*	.041		
R^2 Total					.09						.13†						.28**	

Note. Each step also contains the variables above it, such that only effects above and beyond those variables are reported. †p <.10; *p < .05; **p < .01; ***p < .001

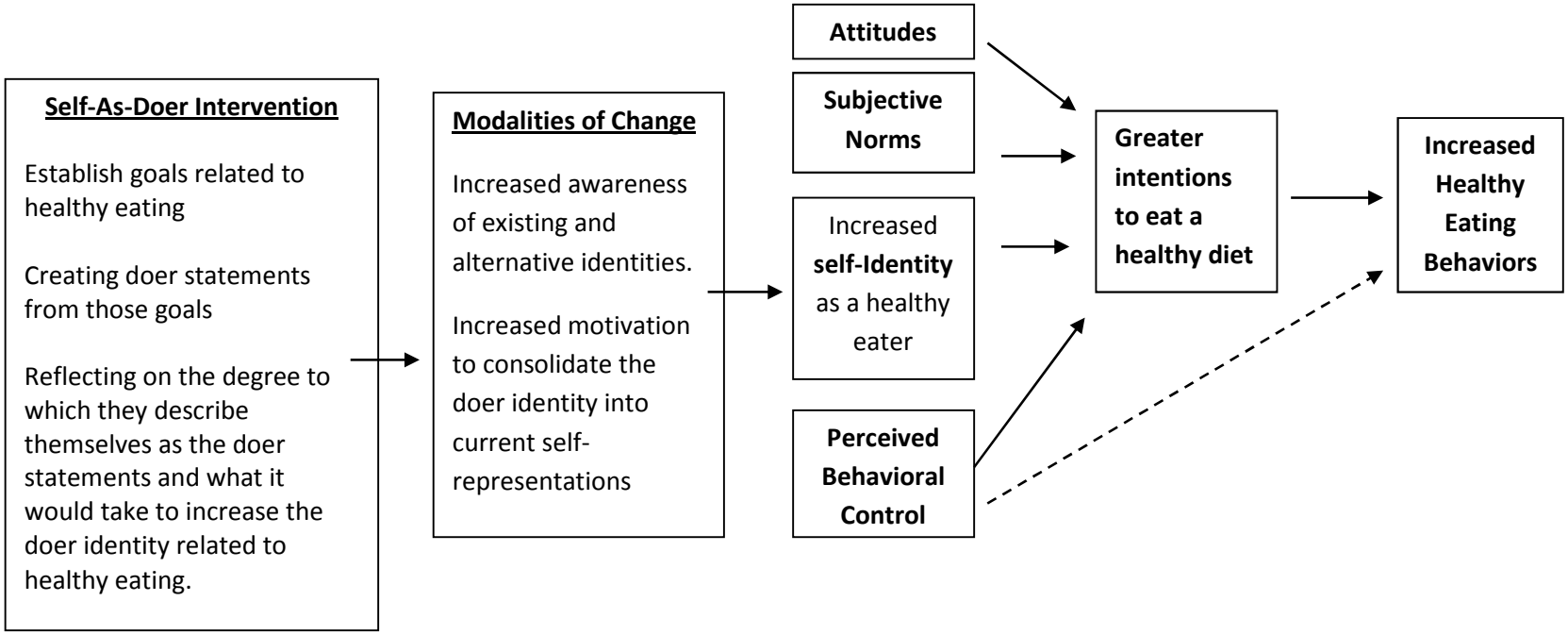


Figure 1. Self-as-doer intervention Logic Model for the Theory of Planned Behavior

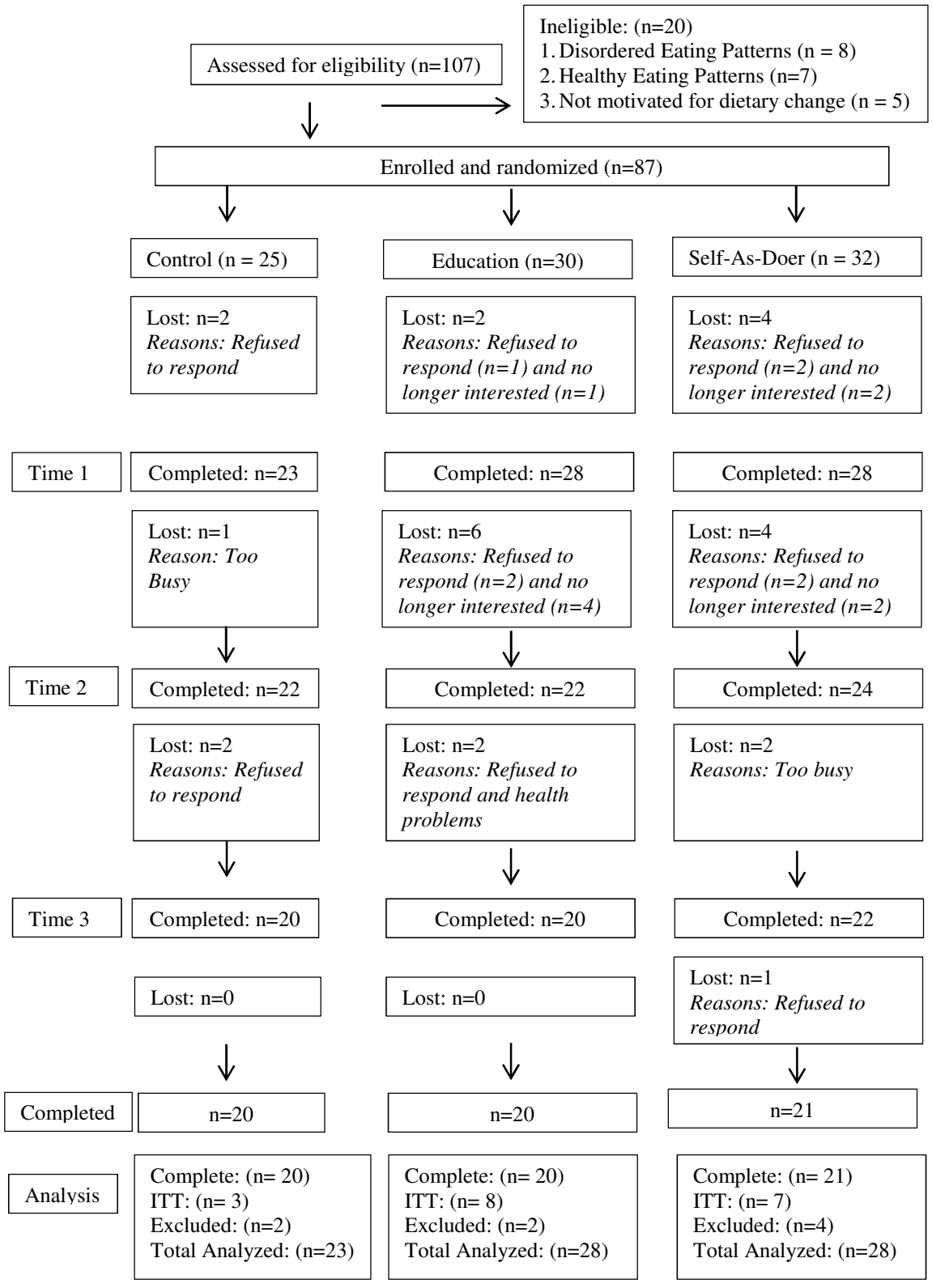


Figure 2. Flow chart for randomization and intent to treat analyses (ITT).

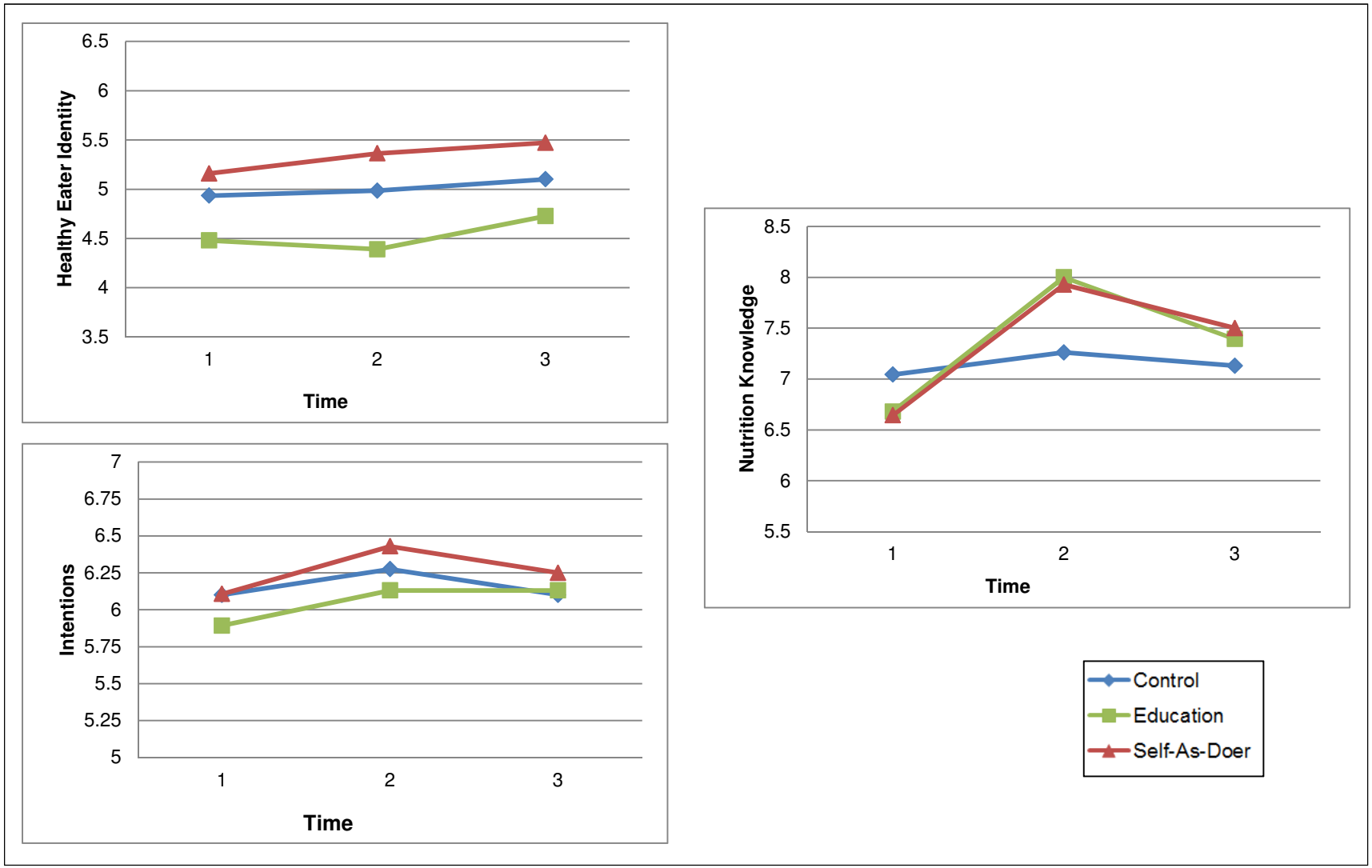


Figure 3. Changes across time in healthy eater identity, intentions, and nutrition knowledge. For healthy eater identity: the change from time 1 to time 2 for the SELF-AS-DOER participants was significant. For intentions: the change from time 1 to time 2 for the SELF-AS-DOER participants was significant. For Nutrition Knowledge: the change from time 1 to time 2 was significant for both the EDUCATION and SELF-AS-DOER participants.

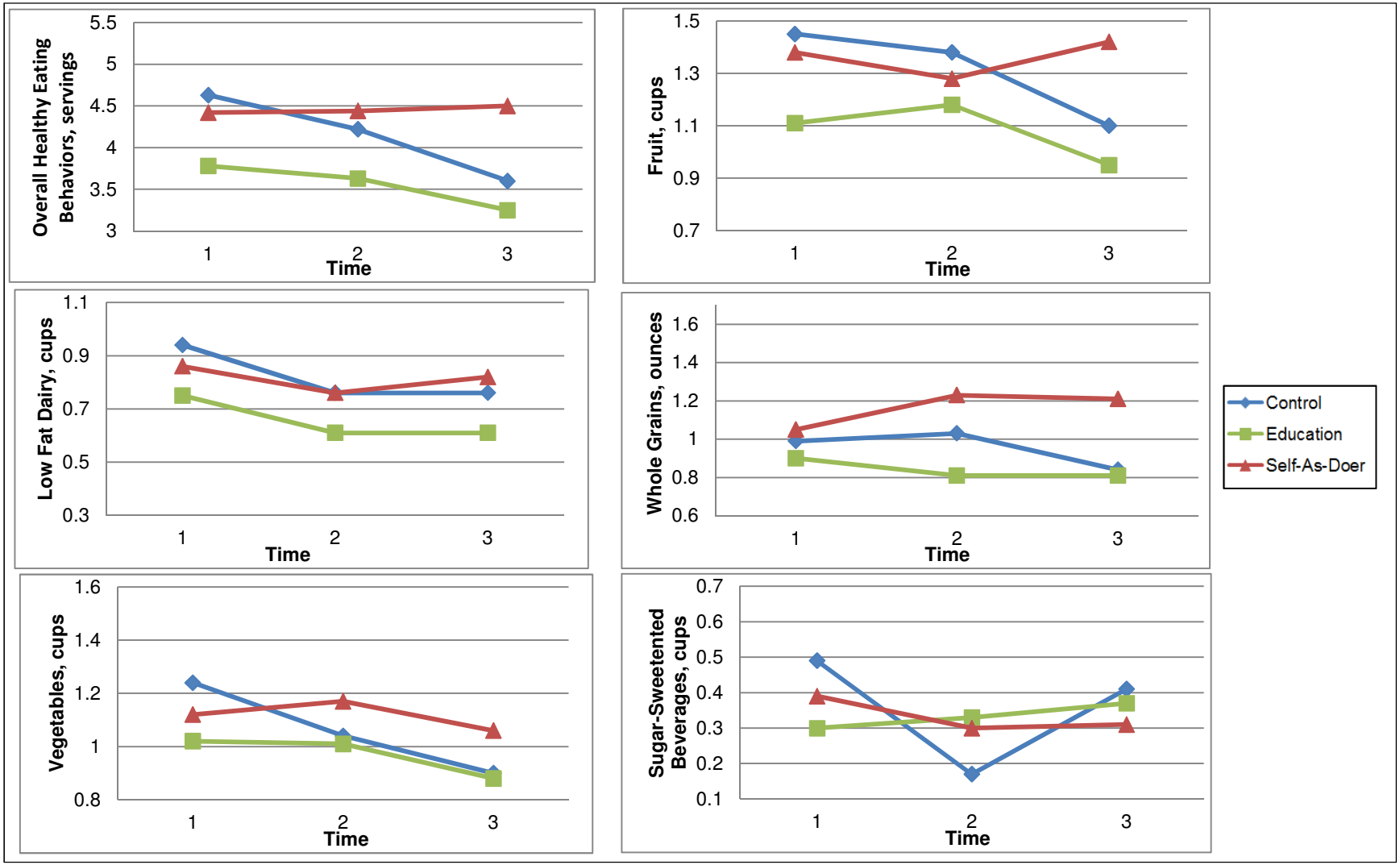


Figure 4. Changes across time in healthy food consumption from FFQs. Overall healthy eating behaviors: The change from time 1 to time 3 was significant for CONTROL participants. At time 3, SELF-as-DOER participants had more healthy eating behaviors than EDUCATION participants. Vegetables: The change from time 1 to time 3 was significant for CONTROL participants. Sugar-sweetened beverages: the change from time 1 to time 2 and from time 2 to time 3 for CONTROL participants was significant.

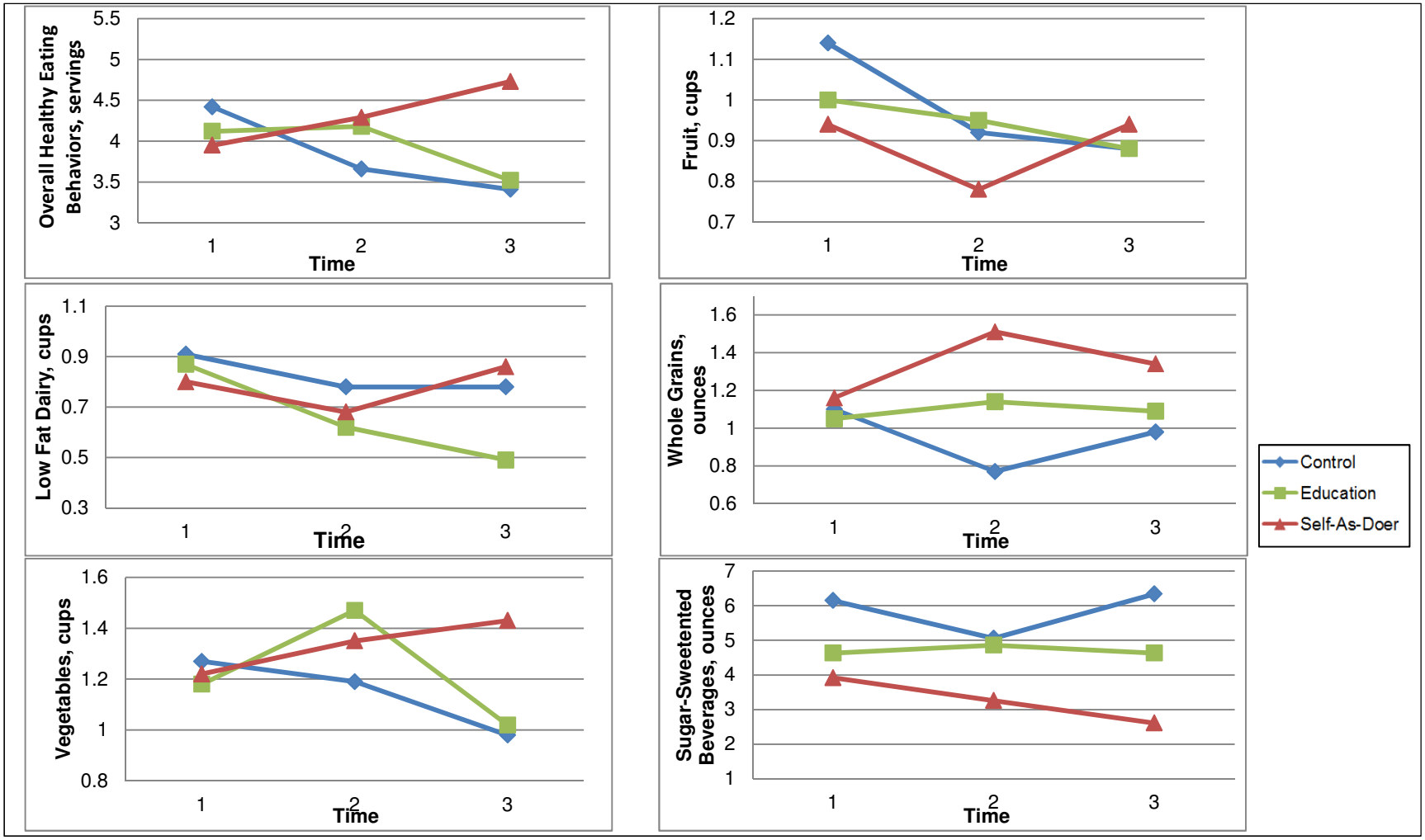


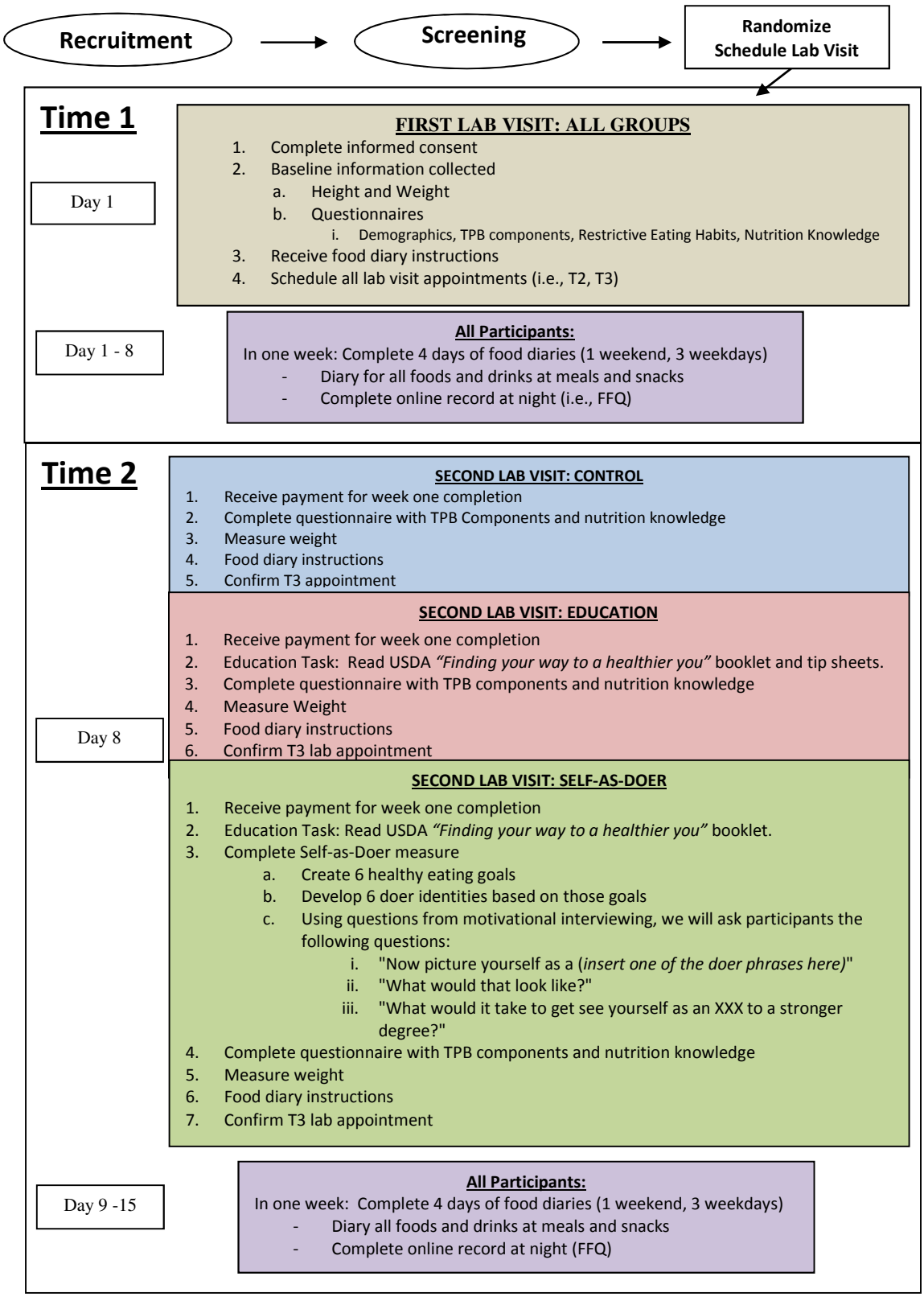
Figure 5. Changes across time in healthy food consumption from food diary reports. Overall healthy eating behaviors: The change from time 1 to time 3 was significant for SELF-AS-DOER and CONTROL participants. At time 3, SELF-AS-DOER participants had significantly more healthy eating behaviors than CONTROL participants. Low fat dairy: The change from time 1 to time 3 for EDUCATION participants was significant. Vegetables: The change from time 2 to time 3 was significant for EDUCATION participants. Differences at time 3 among groups were marginal. Whole grains: At time 2, SELF-AS-DOER participants had significantly higher consumption than did CONTROL participants.

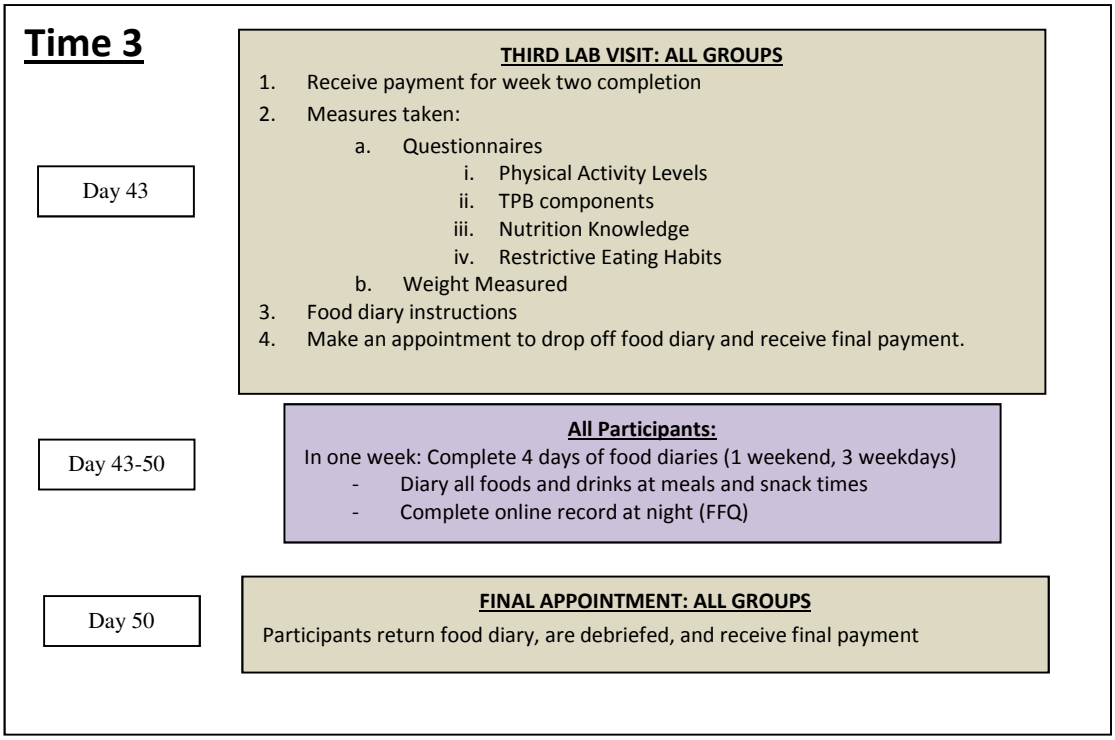
Appendix A

Study Advertisement

Appendix B

Logic Model of Study Protocol




Time 3
THIRD LAB VISIT: ALL GROUPS
1. Receive payment for week two completion
2. Measures taken:
a. Questionnaires
i. Physical Activity Levels
ii. TPB components
iii. Nutrition Knowledge
iv. Restrictive Eating Habits
b. Weight Measured
3. Food diary instructions
4. Make an appointment to drop off food diary and receive final payment.
Day 43
All Participants:
In one week: Complete 4 days of food diaries (1 weekend, 3 weekdays)
- Diary all foods and drinks at meals and snack times
- Complete online record at night (FFQ)
Day 43-50
FINAL APPOINTMENT: ALL GROUPS
Participants return food diary, are debriefed, and receive final payment
Day 50

Appendix C

Survey Demographics and Measures

Your time commitment will be about 20 minutes. Please remember that there are no right or wrong answers. Please answer the questions according to how you feel. Your responses will be kept confidential.

Instructions: *Below are a series of questions related to you and your health. Please place an "X" in the blank before the statement that best describes you, and/or fill in requested information.*

Age: {_____}

Relationship Status: {__}Single {__}In a relationship {__}Married/Partnered: {__}Divorced {__}Widowed {__} Other

Current year in college:

{__} 1st
{__} 2nd
{__} 3rd
{__} 4th
{__} 5th
{__} 6th
{__} I am not a college student

Ethnicity (mark all that apply):

{__} Asian or Pacific Islander
{__} African American/Black
{__} Native American
{__} Hispanic/Latino
{__} Caucasian/White
{__} Other: Please specify:_____

Are you a smoker? {__} Yes {__} No

If so, on average, how many cigarettes do you smoke a day? _____

Please select which of the following describes your activity level best:

{__} Light physical activity associated with typical day-to-day activities (walking around the house or to the store, cleaning, climbing stairs, etc.)

{__} Moderate physical activity equivalent to walking about 1.5 to 3 miles per day at 3 to 4 miles per hour in addition to light physical activity associated with typical day-to-day activities (walking around the house or to the store, cleaning, climbing stairs, etc.)

{__} Physical activity equivalent to walking more than 3 miles per day at 2 to 4 miles per hour in addition to the light physical activity associated with typical day to day life (walking around the house or to the store, cleaning, climbing stairs, etc.)

Are you on a special diet? {__} Yes {__} No

If yes, please explain: _____
_____.

Intentions

Instructions: *Using the scale below, please rate to what extent you agree with the following statement by circling the corresponding number next to each statement.*

	Strongly Disagree	Disagree	Mildly Disagree	Neither Agree/ Disagree	Mildly Agree	Agree	Strongly Agree
	1	2	3	4	5	6	7
1. I intend to eat a healthy diet over the next week	**1**	**2**	**3**	**4**	**5**	**6**	**7**
2. I plan to eat a healthy diet over the next week	**1**	**2**	**3**	**4**	**5**	**6**	**7**
3. I want to eat a healthy diet over the next week	**1**	**2**	**3**	**4**	**5**	**6**	**7**

Attitudes

Instructions: *Each of the following items contains two terms which can describe how you feel. Select the number between the two terms which you feel best captures your response to the following question:*

My eating a healthy diet in the next week is…..

Bad	**-3**	**-2**	**-1**	**0**	**+1**	**+2**	**+3**	Good
Harmful	**-3**	**-2**	**-1**	**0**	**+1**	**+2**	**+3**	Beneficial
Unpleasant	**-3**	**-2**	**-1**	**0**	**+1**	**+2**	**+3**	Pleasant
Unenjoyable	**-3**	**-2**	**-1**	**0**	**+1**	**+2**	**+3**	Enjoyable
Foolish	**-3**	**-2**	**-1**	**0**	**+1**	**+2**	**+3**	Wise
Unnecessary	**-3**	**-2**	**-1**	**0**	**+1**	**+2**	**+3**	Necessary

Perceived Behavioral Control

Instructions: *Please circle the response that best describes how you feel in response to each item.*

1. Whether or not I eat a healthy diet in the next week is entirely up to me.

Strongly Disagree	Disagree	Mildly Disagree	Neither Agree or Disagree	Mildly Agree	Agree	Strongly Agree
1	**2**	**3**	**4**	**5**	**6**	**7**

2. How much personal control do you feel you have over eating a healthy diet in the next week?

Very Little Control	Mostly Not in Control	Somewhat NOT in control	Neither in Control or Not in Control	Somewhat in Control	Mostly in Control	Complete Control
1	**2**	**3**	**4**	**5**	**6**	**7**

3. How much do you feel that whether you eat a healthy diet in the next week is beyond your control?

Not at all	Not really	Somewhat not so	Neutral	Somewhat so	Mostly So	Very Much So
1	**2**	**3**	**4**	**5**	**6**	**7**

4. I believe I have the ability to eat a healthy diet in the next week.

Strongly Disagree	Disagree	Mildly Disagree	Neither Agree or Disagree	Mildly Agree	Agree	Strongly Agree
1	**2**	**3**	**4**	**5**	**6**	**7**

5. To what extent do you see yourself as being capable of eating a healthy diet in the next week?

Very unlikely	Mostly Not likely	Somewhat NOT likely	Neutral	Somewhat likely	Mostly likely	Very likely
1	**2**	**3**	**4**	**5**	**6**	**7**

6. How confident are you that you will be able to eat a healthy diet in the next week?

Very unsure	Mostly unsure	Somewhat unsure	Neither sure or unsure	Somewhat sure	Mostly sure	Very sure
1	**2**	**3**	**4**	**5**	**6**	**7**

7. If it were entirely up to me, I am confident that I would be able to eat a healthy diet in the next week.

Strongly Disagree	Disagree	Mildly Disagree	Neither agree or disagree	Mildly Agree	Agree	Strongly Agree
1	**2**	**3**	**4**	**5**	**6**	**7**

Subjective Norms

***Instructions**: Below are a series of statements about what other people might think about dieting. Please choose one the response that best represents how you feel.*

1. People who are important to me think I:

. _____ (1) Should definitely not eat a healthy diet
. _____ (2) Should not eat a healthy diet
. _____ (3) Should probably not eat a healthy diet
. _____ (4) Are unsure if I should or should not eat a healthy diet
. _____ (5) Should probably eat a healthy diet
. _____ (6) Should eat a healthy diet
. _____ (7) Should definitely eat a healthy diet

2. People who are important to me would:

. _____ (1) Definitely disapprove of my eating a healthy diet
. _____ (2) Disapprove of my eating a healthy diet
. _____ (3) Probably disapprove of my eating a healthy diet
. _____ (4) Neither approve or disapprove of my eating a healthy diet
. _____ (5) Probably approve of my eating a healthy diet
. _____ (6) Approve of my eating a healthy diet
. _____ (7) Definitely approve of my eating a healthy diet

***Instructions**: Please rate on the following scale, the degree to which you agree to disagree with the following statements:*

	Strongly Disagree	**Disagree**	**Mildly Disagree**	**Neither Agree or Disagree**	**Mildly Agree**	**Agree**	**Strongly Agree**
	1	**2**	**3**	**4**	**5**	**6**	**7**
3. People who are important to me want me to eat a healthy diet			**1**	**2**	**3**	**4**	**5**	**6**	**7**
4. I feel under social pressure to eat a healthy diet.			**1**	**2**	**3**	**4**	**5**	**6**	**7**

Self- Identity

Instructions: *Use the scale provided to rate extent to which each item applies to you.*

1. I consider myself to be a healthy eater.

STRONGLY DISAGREE STRONGLY AGREE
1 2 3 4 5 6 7

2. When I describe myself to others, I usually mention my efforts to practice healthy eating.

STRONGLY DISAGREE STRONGLY AGREE
1 2 3 4 5 6 7

3. I have numerous goals related to healthy eating.

STRONGLY DISAGREE STRONGLY AGREE
1 2 3 4 5 6 7

4. Being a healthy eater is a central factor to my self-concept

STRONGLY DISAGREE STRONGLY AGREE
1 2 3 4 5 6 7

5. I need to eat a healthy diet to feel good about myself

STRONGLY DISAGREE STRONGLY AGREE
1 2 3 4 5 6 7

6. Others see me as someone who practices healthy eating.

STRONGLY DISAGREE STRONGLY AGREE
1 2 3 4 5 6 7

7. For me, being a healthy eating is something I work on daily.

STRONGLY DISAGREE STRONGLY AGREE
1 2 3 4 5 6 7

8. I would feel a real loss if I were unable to eat healthy on a daily basis (e.g. for financial or access reasons)

STRONGLY DISAGREE STRONGLY AGREE
1 2 3 4 5 6 7

9. Healthy eating is something I think about daily.

STRONGLY DISAGREE STRONGLY AGREE
1 2 3 4 5 6 7

Restrictive Eating Scale

***Instructions*:** *Please circle the item that best answers the question for you.*

1. How often are you dieting?

   Never Rarely Sometimes Usually Always

2. What is the maximum amount of weight (in pounds) you have ever lost within one month?

   0 to 4 5 to 9 10 to 14 15 to 19 20+

3. What is your maximum weight gain within a week (in pounds)?

   0 to l 1.1 to 2 2.1 to 3 3.1 to 5 5.1+

4. In a typical week, how much does your weight fluctuate (in pounds)?

   0 to l 1.1 to 2 2.1 to 3 3.1 to 5 5.1+

5. Would a weight fluctuation of 5 pounds affect the way you live your life?

   Not at all Slightly Moderately Very much

6. Do you eat sensibly in front of others and splurge alone?

   Never Rarely Often Always

7. Do you give too much time and thought to food?

   Never Rarely Often Always

8. Do you have feelings of guilt after overeating?

   Never Rarely Often Always

9. How conscious are you of what you're eating?

   Not at all Slightly Moderately Very Much

10. How many pounds over your desired weight were you at your maximum weight?

    0 to l 2 to 5 6 to 10 11 to 20 21+

Nutrition Knowledge Questionnaire

Instructions: *Please answer the following questions to the best of your ability.*

1. How much of your plate should be fruits and vegetables?
    a. One-quarter
    b. One-half
    c. Two-thirds
    d. Three-quarters

2. Out of all grains eaten daily, how much of your grains should be whole grains?
    a. One-quarter
    b. One-half
    c. Two-thirds
    d. Three-quarters

3. Which fat do experts say is most important for people to cut down on?
    a. monounsaturated fat (found in: olive oil, peanut oil, canola oil, nuts, and seeds)
    b. polyunsaturated fat (found in: corn oil, sunflower oil, soy oil, cottonseed oils)
    c. saturated fat (found in: butter, cream, shortening, meat products)
    d. all of the above

4. Which of the following best describes why whole wheat bread is recommended over white bread?
    a. It is refined
    b. It is enriched
    c. It has fiber
    d. The bran and germ have been added

5. What is the recommended alcoholic beverage limit for women who are not pregnant?
    a. 0 drinks per day
    b. 1 drink per day
    c. 2 drinks per day
    d. 1-2 drinks per week
    e. 3-5 drinks per week

6. Where can you find information about the nutrient content (e.g., sugar, salt, saturated fat, calories) in foods you purchase at the store?
    a. Food List Source at the grocery story
    b. Nutrition Facts Label on most food packages
    c. Ingredients List on most food packages
    d. A and B
    e. B and C
    f. All of the above

7. Is there more calcium in a glass of whole milk than in a glass of skimmed milk?
    a. Yes
    b. No

8. Which of the following is NOT a good source of fiber?
    a. Broccoli
    b. Beans
    c. Fruit
    d. Fish

9. Which of these would be the healthiest dessert?
    a. baked strawberry pie
    b. baked apples sprinkled with cinnamon.
    c. whole grain crackers and cheddar cheese
    d. carrot cake with cream cheese topping
    e. Low-fat ice cream
    f. Not sure

10. When preparing foods, you should use which of the following as a healthier option:
    a. Hydrogenated oil
    b. Low-fat stick margarine
    c. Canola oil
    d. Butter
    e. Not sure

11. Which of the following is the healthiest source of protein?
    a. Whole milk
    b. Pizza
    c. Breaded Fish
    d. Low-fat yogurt
    e. Not sure

12. Which of the following nutrients are found in fruits and vegetables :
    a. Potassium
    b. Calcium
    c. Fiber
    d. A and B
    e. A and C
    f. All of the above

13. Which of the following products contains 100% whole-grain?
    a. Multi-grain muffins
    b. 100% bran bread
    c. Wheat Thins
    d. 100% wheat bread
    e. All of the above
    f. None of the above

Appendix D

USDA Food Group Serving Guidelines

For each food group or subgroup,[a] recommended average daily intake amounts[b] at all calorie levels. Recommended intakes from vegetable and protein foods subgroups are per week. For more information and tools for application, go to MyPyramid.gov.

Calorie level of pattern[c]	**1,000**	**1,200**	**1,400**	**1,600**	**1,800**	**2,000**	**2,200**	**2,400**	**2,600**	**2,800**	**3,000**	**3,200**
Fruits	1 c	1 c	1½ c	1½ c	1½ c	2 c	2 c	2 c	2 c	2½ c	2½ c	2½ c
Vegetables[d]	1 c	1½ c	1½ c	2 c	2½ c	2½ c	3 c	3 c	3½ c	3½ c	4 c	4 c
Dark-green vegetables	½ c/wk	1 c/wk	1 c/wk	1½ c/wk	1½ c/wk	1½ c/wk	2 c/wk	2 c/wk	2½ c/wk	2½ c/wk	2½ c/wk	2½ c/wk
Red and orange vegetables	2½ c/wk	3 c/wk	3 c/wk	4 c/wk	5½ c/wk	5½ c/wk	6 c/wk	6 c/wk	7 c/wk	7 c/wk	7½ c/wk	7½ c/wk
Beans and peas (legumes)	½ c/wk	½ c/wk	½ c/wk	1 c/wk	1½ c/wk	1½ c/wk	2 c/wk	2 c/wk	2½ c/wk	2½ c/wk	3 c/wk	3 c/wk
Starchy vegetables	2 c/wk	3½ c/wk	3½ c/wk	4 c/wk	5 c/wk	5 c/wk	6 c/wk	6 c/wk	7 c/wk	7 c/wk	8 c/wk	8 c/wk
Other vegetables	1½ c/wk	2½ c/wk	2½ c/wk	3½ c/wk	4 c/wk	4 c/wk	5 c/wk	5 c/wk	5½ c/wk	5½ c/wk	7 c/wk	7 c/wk
Grains[e]	3 oz-eq	4 oz-eq	5 oz-eq	5 oz-eq	6 oz-eq	6 oz-eq	7 oz-eq	8 oz-eq	9 oz-eq	10 oz-eq	10 oz-eq	10 oz-eq
Whole grains	1½ oz-eq	2 oz-eq	2½ oz-eq	3 oz-eq	3 oz-eq	3 oz-eq	3½ oz-eq	4 oz-eq	4½ oz-eq	5 oz-eq	5 oz-eq	5 oz-eq
Enriched grains	1½ oz-eq	2 oz-eq	2½ oz-eq	2 oz-eq	3 oz-eq	3 oz-eq	3½ oz-eq	4 oz-eq	4½ oz-eq	5 oz-eq	5 oz-eq	5 oz-eq
Protein foods[d]	2 oz-eq	3 oz-eq	4 oz-eq	5 oz-eq	5 oz-eq	5½ oz-eq	6 oz-eq	6½ oz-eq	6½ oz-eq	7 oz-eq	7 oz-eq	7 oz-eq
Seafood	3 oz/wk	5 oz/wk	6 oz/wk	8 oz/wk	8 oz/wk	8 oz/wk	9 oz/wk	10 oz/wk	10 oz/wk	11 oz/wk	11 oz/wk	11 oz/wk
Meat, poultry, eggs	10 oz/wk	14 oz/wk	19 oz/wk	24 oz/wk	24 oz/wk	26 oz/wk	29 oz/wk	31 oz/wk	31 oz/wk	34 oz/wk	34 oz/wk	34 oz/wk
Nuts, seeds, soy products	1 oz/wk	2 oz/wk	3 oz/wk	4 oz/wk	4 oz/wk	4 oz/wk	4 oz/wk	5 oz/wk	5 oz/wk	5 oz/wk	5 oz/wk	5 oz/wk
Dairy[f]	2 c	2½ c	2½ c	3 c	3 c	3 c	3 c	3 c	3 c	3 c	3 c	3 c
Oils[g]	15 g	17 g	17 g	22 g	24 g	27 g	29 g	31 g	34 g	36 g	44 g	51 g
Maximum SoFAS[h] limit, calories (% of calories)	137 (14%)	121 (10%)	121 (9%)	121 (8%)	161 (9%)	258 (13%)	266 (12%)	330 (14%)	362 (14%)	395 (14%)	459 (15%)	596 (19%)

Appendix E

Food Diary Instructions and Templates

Food Diary Instructions:
You are asked to keep an accurate record of the food you are eating for four days. One of these days is a weekend day (Saturday or Sunday) and three days are week days (i.e., Monday – Friday). Please be as truthful and detailed as possible. Include healthy and non healthy items at meal and snack times. Below are instructions for each category. There is also an example of a good filled in food diary and an example of an inaccurate food diary.

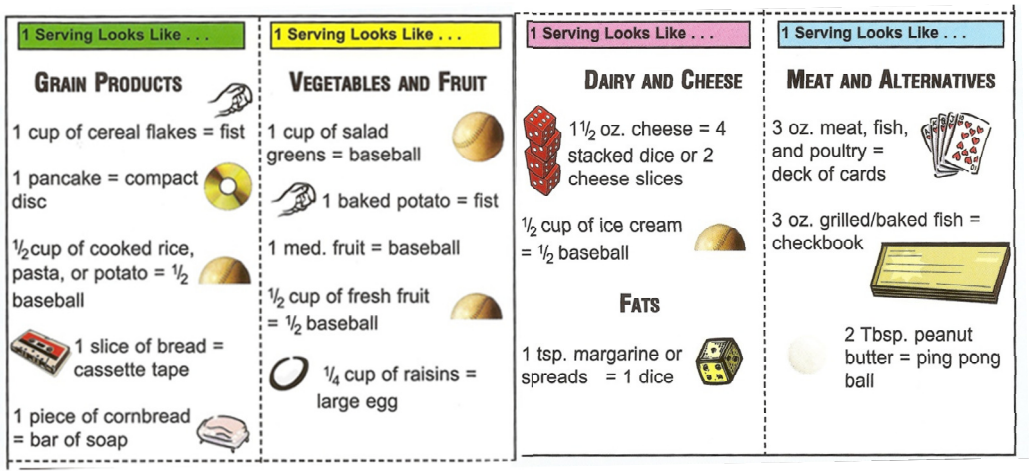
Date and Time: Write the date and time of day you ate the food.

Location: Write what room or part of the house you were in when you ate. If you ate in a restaurant, fast-food chain, your desk, or your car, write that location down.

Food or Beverage Consumed: In this column, write down the type of food you ate or drank. Be as specific as you can. Don't forget to write down "extras," such as butter, oils, salad dressing, mayonnaise, sour cream, sugar and ketchup. Please include brand names when possible, or indicate if an item was homemade.

How much: In this space, indicate the amount of the particular food item you ate. Measure or estimate the size (e.g., 2" x 1" x 1"), the volume (e.g., 1/2 cup), the weight (e.g., 2 ounces), and/or the number of items (e.g., 12) of that type of food. For more information on estimating portion size when exact weight or measures are not available, these rules of thumb may help:

- Three ounces of meat, poultry, or fish = a deck of playing cards
- One-half cup of fruit, vegetables, pasta, or rice = half a baseball, a small fist, or a light bulb
- One ounce of cheese = your thumb or two dominos
- One cup of milk, yogurt, or chopped fresh greens = a small hand holding a tennis ball
- A teaspoon of butter or margarine = the tip of your thumb to the first joint
- Two tablespoons of peanut butter = a ping pong ball
- One ounce of chocolate = 1 package of dental floss
- One-half teaspoon of oil = 1 thimble



Incorrect Diary (*and how to correct it*).

Date and Time	Location	Meal or Snack	Food or Beverage Consumed	Amount
9/18/2011 8 am	home	Breakfast	Milk (*indicate what type – 1%, 2%, etc)*	6 oz
			Strawberries	4 medium
			Sandwich (*list amounts of sandwich ingredients)*	1
9/18/2011 10 am	In class	Snack	Soda (*indicate if it was regular or diet)*	1 can
			Peanuts (*estimate the amount as ¼ cup or a certain number)*	handful
1 pm	Cafeteria	Lunch	Taco Bell (*describe what kind of meal/taco))* Chips (*describe what kind and how much)*	1 1 bag
			Cookie (*give brand name or type)*	
5 pm	Palermo's	Dinner	Pizza (*describe kind and how large)*	Medium
			Alcoholic drink (*give brand name or type and how many oz, if mixed drink or if single shot or double)*	2 bottles

Correct Diary

Date and Time	Location	Meal or Snack	Food or Beverage Consumed	Amount
9/18/2011 8 am	home	Breakfast	Milk (1%)	6 oz
			Strawberries	4 medium
			Peanut butter and jelly sandwich made with Jelly	 1 tsp 1 Tbsp
			Whole grain bread	1 slice
9/18/2011 10 am	In class	Snack	Mountain Dew	12 oz
			Salted peanuts	24 halves (1/4 c.)
9/18/2011 1 pm	Cafeteria	Lunch	Taco Bell softshells	2
			Doritos – nacho cheese	1 ¾ oz bag
			Sugar cookie, 3' diameter	1
9/18/2011 5 pm	Palermo's	Dinner	Palermo's Pizza – Pepperoni 6in' Beer – Miller Light (12 oz bottle)	6 oz 2

DAY OF WEEK_____ **MONTH**_____ **DATE**_____

Date and Time	Location	Meal or Snack	Food or Beverage Consumed	Amount

Appendix F

Script for Food Diary Instructions

The participant was presented with a Food Diary which contains the food diary instructions. The food diary was handed to the participant and the researcher said:
"For this study you will be asked to track all of the food, drinks, snacks and anything you eat or drink for 4 days in this next week. It is very important for you to know that you being able to complete this task is very important for the study. Now we fully realize that life is difficult and tracking everything you eat and drink can be difficult. We ask that you do the best that you can in all circumstances. There will be times when you forget to take the diary along or forget certain things you eat. Its okay and we ask that you make your best guess, even if it is on the following day. It is, however, especially important for you to complete this data when you are not doing well or not enjoying the activities as part of this study. You can tell us about that at the end of the study. Do you understand? *If not, provide clarification.* Do you think that you will be able to do this?

So three of the four days will be week days and 1 of these days will be a weekend day. You can chose which days you would like to track your food consumption. These days will need to be the exact same days for each of the 3 times that you track your diet for this study." "Which three weekdays would be the best for you to keep track of all your food?" *Wait for participant response.* "Which weekend would be the best day for you to track your food?"

Participant responses were then be recorded on the "Food Tracking Form" The day and date was written at the top of each of the 4 blank food diary days in the Food Diary. Next the researcher directed the participant to the "Food Diary Instructions" and said:
"Throughout the day you will be writing down everything that you eat, drink, or snack on, healthy and unhealthy foods. We would prefer if you do this as close to the time you are eating or drinking the food as possible. If you forget or don't have the food diary with you, please fill it out as soon as possible. Again, we are flexible and in the times where you aren't able to fill it out, please provide your best guess later."

The researcher then read the instructions on the instruction page and when discussing serving sizes said:

“So often people say that recording serving sizes accurately is one of the hardest parts of keeping track of what you eat. To help you with that process we have provided several rules of thumb.”

The researcher then pointed to the serving size rule of thumb examples and said:

“For example 3 oz of meat is about the size of a deck of cards - so the palm of your hand. Or ½ cup of fruit, veggies, or rice is about the size of half a baseball or a light bulb. Some have said that 1 ounce of cheese is about the size of your thumb and 1 cup is about the size of your fist. Use these if you need help.”

The researcher then asked if the participant had any questions and provided answers if needed. Then the researcher took out the practice diary and said:

"So this is what the food diary looks like. There will be four of these in your food diary for you to record your diet.” "What I would like, us to do now is practice. So, can you think about what you had to eat yesterday and fill out this blank diary just as you would as if you were filling it out for the study? I will stop you in a few minutes and we will talk about any questions you might have.”

The participant then filled out the diary. When she was finished the researcher reviewed the diary and asked:

“What was difficult about completing that task?”

After the participant had a chance to respond, the researcher acknowledged the difficulty and said:

“Others have also noted that difficulty. Many have said that remembering all the details of your diet is the hardest part of the task. This is one reason why we encourage you to take the diary with you and record while you are eating, or as soon after you are eating as possible.”

Then the researcher again reviewed the completed food diary, pointing out records that met the criteria of the food diary instructions (e.g., described extra items on her sandwich, used appropriate measurements) and encouraged the participant to be more detailed with records that were less descriptive (e.g., noted whether juice was 100% or a cocktail juice, if bread was 100% whole wheat or white). After the participant had all her questions answered the researcher turned to the correct and incorrect food diary pages in the food diary and said:

"In the diary we also have an example of a correct and incorrect diary so that you can have a reference to use when you are recording, especially when you are eating something that you may not know at what level of detail to record it."

The researcher then reviewed the correct and incorrect forms of completing a food diary and highlighted the important details for this food diary record exemplified in the correct food diary pages (e.g., diet vs regular drinks, white vs wheat bread, using measurements, etc.) Finally, the researcher showed the participant the blank diary pages in the food diary and said:

"Here are the blank food diaries where you will complete your food diary tracking. See here I have written each day at the top of the diary so you will not forget which day to record your diet on. Does this make sense? Do you have any questions?"

After all questions had been answered the researcher began the serving size demonstration and said:

"I'd like to do a little demonstration with you to help you with serving sizes."

The researcher then took out a plate and put 1 cup of grapes and ½ cup of carrots on the plate and said:

"So let's say you are having grapes and carrots for lunch. If you were to record this in your food diary, in terms of cup measurements, what would you guess the grapes to be? The carrots?"

The correct response was provided. Then the researcher took out a chocolate pudding cup, placed it on the plate and said:

'Let's say you have chocolate pudding for desert. How many ounces would you guess were in this pudding cup?"

Again, the correct response was provided. The researcher repeated this demonstration with a yogurt cup. Next the researcher took out three different sized plastic glasses (12 oz, 16 oz, and 28 oz) and asked the participant to guess how many ounces were in each glass. Following the plastic glass demonstration, the researcher took out two glasses (12 oz and 8 oz), made from glass, and one wine glass (12 oz) and asked the participant to guess how many ounces were in each. When the participant indicated that she felt more confident about serving sizes the researcher said:

"We would like you to be as specific as possible with your food diary, even when it comes to sizes. We understand that sometimes it is very difficult to know the exact amount. We also understand that there will be times when it is really difficult to keep track of every single thing you ate. Do the best you can. We would appreciate your best guess rather than no guess at all."

The researcher then addressed any questions or concerns the participant had and then said:

So each day starts at 12:01 am and ends at 11:59 pm. At the end of each day you will receive an email with a link to complete a quick - 5 min survey of your daily food consumption using your food diary. Some have found it harder to fill out the food diary, so if you've forgotten some of the specifics of your diet or even if you didn't do it at all that day, filling out the online food survey will help you remember what you ate and drank. However, others have found it easier to complete the online food survey with the help of the food diary. So try your best to complete the food diary accurately and completely, but always always always complete the online food survey whether you have your food diary to help you or not. You can complete the online form the next day, but do be sure to complete it with the day you were supposed to keep your food diary in mind. It

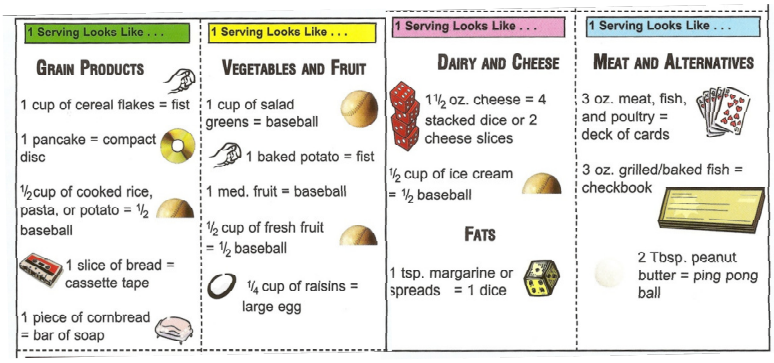
is really important that you complete this each day. It is a way for us to know how you are doing each day and to help you if you forgot anything."

The researcher then handed the participant their food diary and reminded the participant on what days she would be keeping track in the food diary.

Appendix G

Food Frequency Questionnaire

Instructions: "For each food listed, check the box indicating how often you have used the amount specified *TODAY*. Please note the amounts of each food. To help you determine the amount and serving sizes use the reference box below indicating how much, for example, 8 oz. or 1 cup is approximately equivalent to. You may use your food diary to assist you in answer these questions."



FOOD AND AMOUNTS	Number of times food was used/consumed today						
	6+	5	4	3	2	1	0
Dairy Foods							
Skim or low fatmilk (8 oz. glasses)							
Whole milk (8 oz. glasses)							
Soy milk (8 oz. glasses)							
Regular Yogurt, (1 c.)							
Low-Fat Yogurt, (1 c.)							
Ice cream (½c.)							
Low-fat Ice cream (½c.)							
Cottage cheese (½c.)							
Low fat-cottage cheese							
Hard cheese, plain or as part of a dish (slice or servings)							
Low-fat hard cheese, plain or as part of a dish (slice or servings)							
Soft Tub Margarine (pats added to food or bread)							

Butter or stick margarine (pats added to food or bread)							
Fruits							
Fresh apples or pears (1)							
Oranges (1)							
Orange or grapefruit juice (small glass)							
Peaches, apricots or plums — (fresh, 1/2-C. canned, or dried)							
Bananas (1)							
Berries (strawberries, blueberries, blackberries, raspberries – fresh, ½ c. canned or dried)							
Grapes (green or red – approx. 15)							
Kiwi Fruit (1 fruit without skin)							
Melon (cantaloupe, honey dew, watermelon – ½ c.)							
Other fruits (fresh, or 1/2c. canned)							
Vegetables							
String beans (½-c.)							
Broccoli (1/2-c.)							
Cabbage, cauliflower, brussel sprouts (½-c)							
Carrots (whole or ½-c. cooked)							
Corn (ear or ½-.c)							
Spinach or other greens (½-c.)							
Peas or lima beans (½-c. fresh, frozen or canned)							
Yellow (winter) squash (½.c.)							
Sweet potatoes (1/2-c.)							
Beans or lentils, dried (½c.)							
Tomatoes (1) or tomato juice (4 oz.)							
Iceberg or head lettuce							
Tofu or soybeans (1/2 c.)							

Meats/Protein							
Lean chicken, without skin (6—8 oz.)							
Chicken, with skin (6—8 oz.)							
Hamburgers (1)							
Hot dogs (1)							
Processed meats (sausage, salami, bologna etc. (piece or slice)							
Bacon (2 slice servings)							
Beef, pork or lamb as a sandwich or mixed dish (stew, casserole, lasagna, etc.)							
Beef pork or lamb as a main dish (steak, roast, ham, etc. 6-8 oz.)							
Fish (not breaded; 6-8 oz.)							
Fish (breaded; 6-8 oz)							
Shrimp, lobster, scallops (6-8 oz)							
Eggs (1)							
Breads, Cereals, Starches							
Cold breakfast cereal (1/2 c.)							
Cold breakfast cereal with whole grain (1/2c.)							
Cooked breakfast cereal (e.g., oatmeal, 1/2c)							
White bread (slice)							
Dark or whole grain bread (slice)							
Pasta or rice (e.g., spaghetti noodles, etc. – 1/2c.)							
Whole Grain pasta or brown rice (e.g., spaghetti noodles, etc.)							
Potato or corn chips (small bag or 1 oz.)							
Low-fat or Baked potato or corn chips (small bag or 1 oz.)							
French fried foods (e.g., fries, onion rings, cheese curds, 4 oz.)							
Potatoes, mashed (1/2-c.) or baked (1)							

Crackers (1 oz. approx 8-10 crackers)							
Whole grain crackers (e.g., wheat crackers, Triscuits, wheat thins) (1 oz. approx 8-10 crackers)							
Pizza (slice)							
Sweets, Baked Goods							
Chocolate (1 oz)							
Candy without chocolate (1 oz)							
Pie (slice)							
Cake (slice)							
Cookies (1)							
Doughnuts (1)							
Candy Bars (e.g., Snickers, Milky way 1 bar)							
Miscellaneous							
Peanut butter (1 Table spoons)							
Mayonnaise (1 Tablespoon)							
Jams, jellies, syrup or honey (1 tablespoon)							
Beverages							
Water (glasses)							
100% Fruit/Vegetable juice (8 oz glasses)							
Coffee, black (cups)							
Coffee with cream, milk, milk or other additives (e.g., frappachino, cups)							
Tea (cups)							
Beer (bottles or cans)							
Wine (glasses)							
Liquor - whiskey, gin, etc. (drinks)							
Mixed drink (e.g., margarita, pina colada, liquor + juice)							
Soda/Pop or carbonated drink (e.g., Coke, Pepsi, root bear, ginger ale, etc., glasses/cans)							

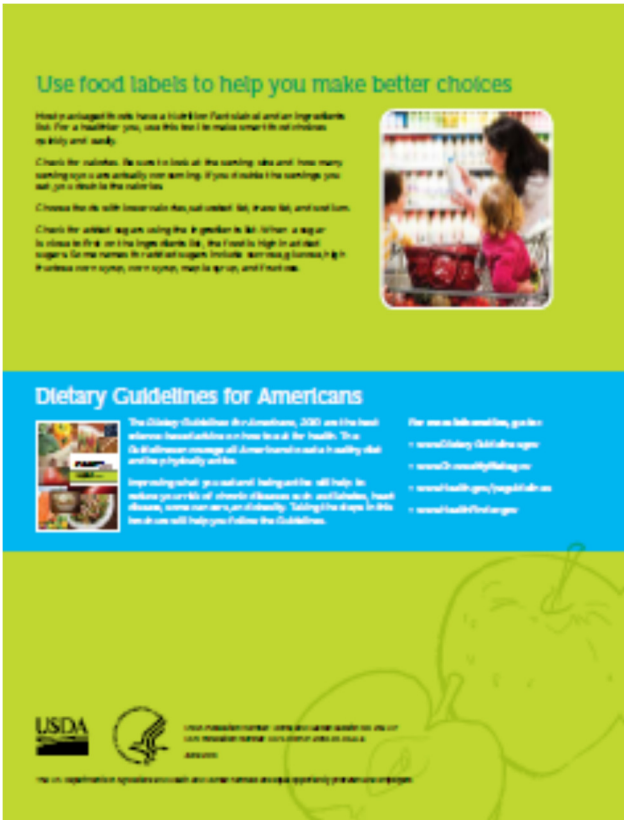
Low calorie carbonated drink (e.g., diet soda, glasses/cans)							
Fruit-flavored punch or non-carbonated beverage (e.g., Gatorade, PowerAde) (glasses)							
Diet or Low-Calorie Fruit-flavored punch or non-carbonated beverage (e.g., Gatorade, PowerAde) (glasses)							
Other Items:							
How many times did you eat fast food today (i.e., Taco Bell, McDonalds, Kopps, etc.)	6+	5	4	3	2	1	0
How many times today did you eat a prepared meal at a restaurant?	6+	5	4	3	2	1	0
How many times did you prepare your meal/snack at home today?	6+	5	4	3	2	1	0
Did you complete your food diary for today?	Yes	No					
Did you use your food diary to help you complete this questionnaire?	Yes	No					

If there are any food items that you ate today that are not on this list please list them here and indicate how many times you used the food item today.

FOOD AND AMOUNTS	Number of times food was used/consumed today						
	6+	5	4	3	2	1	0

Appendix H

Nutritional Education Intervention Materials



10 tips
Nutrition Education Series

build a healthy meal

10 tips for healthy meals

A healthy meal starts with more vegetables and fruits and smaller portions of protein and grains. Think about how you can adjust the portions on your plate to get more of what you need without too many calories. And don't forget dairy—make it the beverage with your meal or add fat-free or low-fat dairy products to your plate.

1 make half your plate veggies and fruits

Vegetables and fruits are full of nutrients and may help to promote good health. Choose red, orange, and dark-green vegetables such as tomatoes, sweet potatoes, and broccoli.

2 add lean protein

Choose protein foods, such as lean beef and pork, or chicken, turkey, beans, or tofu. Twice a week, make seafood the protein on your plate.

3 include whole grains

Aim to make at least half your grains whole grains. Look for the words "100% whole grain" or "100% whole wheat" on the food label. Whole grains provide more nutrients, like fiber, than refined grains.

4 don't forget the dairy

Pair your meal with a cup of fat-free of low-fat milk. They provide the same amount of calcium and other essential nutrients as whole milk, but less fat and calories. Don't drink milk? Try soymilk (soy beverage) as your beverage or include fat-free or low-fat yogurt in your meal.

5 avoid extra fat

Using heavy gravies or sauces will add fat and calories to otherwise healthy choices. For example, steamed broccoli is great, but avoid topping it with cheese sauce. Try other options, like a sprinkling of low-fat parmesan cheese or a squeeze of lemon.

6 take your time

Savor your food. Eat slowly, enjoy the taste and textures, and pay attention to how you feel. Be mindful. Eating very quickly may cause you to eat too much.

7 use a smaller plate

Use a smaller plate at meals to help with portion control. That way you can finish your entire plate and feel satisfied without overeating.

8 take control of your food

Eat at home more often so you know exactly what you are eating. If you eat out, check and compare the nutrition information. Choose healthier options such as baked instead of fried.

9 try new foods

Keep it interesting by picking out new foods you've never tried before, like mango, lentils, or kale. You may find a new favorite! Trade fun and tasty recipes with friends or find them online.

10 satisfy your sweet tooth in a healthy way

Indulge in a naturally sweet dessert dish—fruit! Serve a fresh fruit cocktail or a fruit parfait made with yogurt. For a hot dessert, bake apples and top with cinnamon.

USDA Center for Nutrition Policy and Promotion

Go to www.ChooseMyPlate.gov for more information.

DG TipSheet No. 7
June 2011

10 tips
Nutrition Education Series

choose MyPlate

10 tips to a great plate

Making food choices for a healthy lifestyle can be as simple as using these 10 Tips.
Use the ideas in this list to *balance your calories*, to choose foods to *eat more often*, and to cut back on foods to *eat less often*.

1 balance calories

Find out how many calories YOU need for a day as a first step in managing your weight. Go to www.ChooseMyPlate.gov to find your calorie level. Being physically active also helps you balance calories.

2 enjoy your food, but eat less

Take the time to fully enjoy your food as you eat it. Eating too fast or when your attention is elsewhere may lead to eating too many calories. Pay attention to hunger and fullness cues before, during, and after meals. Use them to recognize when to eat and when you've had enough.

3 avoid oversized portions

Use a smaller plate, bowl, and glass. Portion out foods before you eat. When eating out, choose a smaller size option, share a dish, or take home part of your meal.

4 foods to eat more often

Eat more vegetables, fruits, whole grains, and fat-free or 1% milk and dairy products. These foods have the nutrients you need for health—including potassium, calcium, vitamin D, and fiber. Make them the basis for meals and snacks.

5 make half your plate fruits and vegetables

Choose red, orange, and dark-green vegetables like tomatoes, sweet potatoes, and broccoli, along with other vegetables for your meals. Add fruit to meals as part of main or side dishes or as dessert.

6 switch to fat-free or low-fat (1%) milk

They have the same amount of calcium and other essential nutrients as whole milk, but fewer calories and less saturated fat.

7 make half your grains whole grains

To eat more whole grains, substitute a whole-grain product for a refined product—such as eating whole-wheat bread instead of white bread or brown rice instead of white rice.

8 foods to eat less often

Cut back on foods high in solid fats, added sugars, and salt. They include cakes, cookies, ice cream, candies, sweetened drinks, pizza, and fatty meats like ribs, sausages, bacon, and hot dogs. Use these foods as occasional treats, not everyday foods.

9 compare sodium in foods

Use the Nutrition Facts label to choose lower sodium versions of foods like soup, bread, and frozen meals. Select canned foods labeled "low sodium," "reduced sodium," or "no salt added."

10 drink water instead of sugary drinks

Cut calories by drinking water or unsweetened beverages. Soda, energy drinks, and sports drinks are a major source of added sugar, and calories, in American diets.

USDA Center for Nutrition Policy and Promotion

Go to www.ChooseMyPlate.gov for more information.

DG TipSheet No. 1
June 2011
USDA is an equal opportunity provider and employer.

Appendix I

Self-as-Doer Measure

Now that you have read about healthy eating, we would like you to complete this task. For the survey below I would like you to think about 6 goals related to healthy eating. Please write them on the first line/or in the space after each number (1, 2, 3, 4). Leave the second line/space (1b, 2b, etc.) blank until further instructions.

1._____ 1b. _____

2._____ 2b. _____

3._____ 3b. _____

4._____ 4b. _____

5._____ 5b. _____

6._____ 6b. _____

Further Instructions:

Every personal goal contains both a *verb* and an *object*.

For example, for the goal "to eat more fruits" the verb is ***eat*** and the object is ***fruits***.

For the goal "to consume less salt" the verb is ***consume less*** and the object is ***salt***.

I would like you to think about the verb and object in each of the healthy eating goals you have and create a *special phrase* using the "er" suffix. Place this in the second blank above (1b, 2b, 3b, etc.).

This phrase will refer to a *person who does the goal*.

For example, the goal "to eat more fruits" might be rephrased "fruit eater".

The goal "to consume less salt" might be rephrased "less salt consumer".

Complete this task and then read the rest of these directions (example statements can be used).

Now that you have written down your goals and the special phrase please indicate how well the special phrase describes or fits you using the scale given below. Please put the number on the line/space in front of each number below corresponding to the above numbers.

How well does the 'er' phrase describe you?

Does Not Describe Me Well At All	Does Not Describe Me Well	Neutral	Describes Me Well	Describes Me Very Well
1	2	3	4	5

_____ 1. _____ 3. _____ 5.

_____ 2. _____ 4. _____ 6

Appendix J

Scripts for Control, Education, and Self-as-Doer Conditions

Control Condition

Prior to the appointment with the participant, the researcher prepared the participant folder. Participants were welcomed to the lab and thanked for participating in the study thus far. Payment was then given for her first week of completion. The food diary from Time 1 was collected, reviewed with the participant, and then stored in the participant folder. The researcher addressed any questions about food diary reporting and then said:

"Today you will be asked to complete a few questionnaires asking you about your diet and some of your emotions related to food. We will also take your weight and provide you with some new food diaries"

The researcher logged-on to Qualtrics and directed the participant to complete the questionnaires. While the participant was completing the survey, the researcher prepared the new food diary by writing the three week days and one weekend day on the new blank food diary pages. The researcher also recorded these days on the "Food tracking form." When the participant was finished, her weight was taken and recorded on the "Height/Weight form." The participant was also asked what her ideal weight was and this was recorded on the height/weight form. Then the researcher said:

"You will again be asked to keep a food diary for 4 days. It is very important that these days are the same days that you kept the food diary for last week. Please record all foods, healthy and unhealthy, at meal and snack times if possible. I have written these days at the top of each diary. Will you be able to complete theses on these days? *Wait for participant response.* "So each day starts at 12:01 am and ends at 11:59 pm. As we did before, we will send you an email with a link to complete a quick - 5 min survey of your daily food consumption at the end of each day. It is really important that you complete this each day. It is a way for us to know how you are doing each day and to help you if you forgot anything.

The researcher then confirmed the Time 3 appointment and rescheduled if necessary. This scheduled appointment was written and/or confirmed on the "Appointment form." The researcher then reminded the participant that she would receive her second payment when she came to the Time 3 appointment. The researcher thanked the participant for coming and filed the participant folder in the locked filing cabinet.

Nutrition Education Condition

Prior to the appointment with the participant, the researcher prepared the participant folder. Participants were welcomed to the lab and thanked for participating in the study thus far. Payment was then given for her first week of completion. The food diary from Time 1 was collected, reviewed with the participant, and then stored in the participant folder. The researcher addressed any questions about food diary reporting and then said:

"Today you will be asked to complete a few questionnaires asking you about your diet and some of your emotions related to food. We will also be providing you with some information about healthy eating, taking your weight and providing you with some new food diaries"

The researcher then handed the participant the USDA "Let's Eat for the Health of It" brochure and the 2 tip sheets and said:

"Please take a few minutes to read this booklet and tip sheets thoroughly." *To ensure that the participant read the information thoroughly the researcher then said:* "As you read this information, please think about the following things: 1) is there any information that you did not know before reading the brochure and tip sheets? And 2) of the information that you already know, what things would you like to incorporate into your daily eating habits."

The researcher allowed the participant to read the brochure and tip sheets and in the meantime put the web address where the tip sheets and brochure could be found in the

participant's food diary. When she was finished the researcher asked the participant to respond to the two items she was suppose to think about while reading the materials. Then the participant was given a chance to ask any questions and told that she was not able to keep the brochure or tip sheets, but that the web address where this information could be located was put in her food diary. Then the researcher logged-on to Qualtrics and directed the participant to complete the questionnaires.

While the participant was completing the survey, the researcher prepared the new food diary by writing the three week days and one weekend day on the new blank food diary pages. The researcher also recorded these days on the "Food tracking form." When the participant was finished, her weight was taken and recorded on the "Height/Weight form." The participant was also asked what her ideal weight was and this was recorded on the height/weight form. Then the researcher said:

"You will again be asked to keep a food diary for 4 days. It is very important that these days are the same days that you kept the food diary for last week. Please record all food, healthy and unhealthy, at meal and snack times if possible. I have written these days at the top of each diary. Will you be able to complete theses on these days? *Wait for participant response.* "So each day starts at 12:01 am and ends at 11:59 pm. As we did before, we will send you an email with a link to complete a quick - 5 min survey of your daily food consumption at the end of each day. It is really important that you complete this each day. It is a way for us to know how you are doing each day and to help you if you forgot anything.

The researcher then confirmed the Time 3 appointment and rescheduled if necessary. This scheduled appointment was written and/or confirmed on the "Appointment form." The researcher then reminded the participant that she will receive her second payment when she came to the Time 3 appointment. The researcher thanked the participant for coming and filed the participant folder in the locked filing cabinet.

Self-As-Doer Condition

Prior to the appointment with the participant, the researcher prepared the participant folder. Participants were welcomed to the lab and thanked for participating in the study thus far. Payment was then given for her first week of completion. The food diary from Time 1 was collected, reviewed with the participant, and then stored in the participant folder. The researcher addressed any questions about food diary reporting and then said:

"Today you will be asked to complete a few questionnaires asking you about your diet and some of your emotions related to food. We will also be providing you with some information about healthy eating, taking your weight and providing you with some new food diaries. Finally, we have a short writing task we would like you to complete."

The researcher then handed the participant the USDA "Let's Eat for the Health of It" brochure and the 2 tip sheets and said:

"Please take a few minutes to read this booklet and tip sheets thoroughly." *To ensure that the participant read the information thoroughly the researcher then said:* "As you read this information, please think about the following things: 1) is there any information that you did not know before reading the brochure and tip sheets? and 2) of the information that you already know, what things would you like to incorporate into your daily eating habits?"

The researcher allowed the participant to read the brochure and tip sheets and in the meantime put the web address where the tip sheets and brochure could be found in the participant's food diary. When she was finished the researcher asked the participant to respond to the two items she was suppose to think about while reading the materials. Then the participant was given a chance to ask any questions and told that she was not able to keep the brochure or tip sheets, but that the web address where this information could be located was put in her food diary. The researcher then hand the self-as-doer measure to the participant and said:

“Now that you have read about healthy eating, I would like you to complete this task. *The researcher then read the instructions on self-as-doer measure handout.* Please create 6 goals related to healthy eating and put them in the blanks marked 1 through 6.”

The researcher waited for the participant to develop and write 6 goals down. After she had completed the goals, the researcher said:

“Every personal goal contains both a verb and an object. For example, for the goal "to eat more fruits" the verb is eat and the object is fruits. For the goal "to consume less salt" the verb is consume less and the object is salt. I would like you to think about the verb and object in each of the healthy eating goals you have and create a special phrase using the "er" suffix. Place this in the second blank above (1b, 2b, 3b, etc.). This phrase will refer to a person who does the goal. For example, the goal "to eat more fruits" might be rephrased "fruit eater". The goal "to consume less salt" might be rephrased "less salt consumer. You can use these example statements if you would like".

After the participant completed all doer phrases, the researcher asked her to rate on a scale of 1 to 5 how well each phrase described her and to place the numbers in the corresponding blanks. When the participant completed rating the each phrase, the researcher reviewed her ratings and said:

"Now picture yourself as a (*insert one of the doer phrases here)*" "What would that look like?" What would it take to get see yourself as a XX to a stronger degree?"

This step was repeated for at three of the doer phrases. A summary of the task was then provided to the participant and the participant was encouraged to think about the generated goals and identity phrases as she made diet choices in the next week and beyond the next week. The participant was given a chance to ask questions and a copy of the doer phrases was made and put in the participant’s folder. The measure completed by the participant was put in her food diary. Then the researcher logged-on to Qualtrics and directed the participant to complete the questionnaires.

While the participant was completing the survey, the researcher prepared the new food diary by writing the three week days and one weekend day on the new blank food diary pages. The researcher also recorded these days on the "Food tracking form." When the participant was finished, her weight was taken and recorded on the "Height/Weight form." The participant was also asked what her ideal weight was and this was recorded on the height/weight form. Then the researcher said:

"You will again be asked to keep a food diary for 4 days. It is very important that these days are the same days that you kept the food diary for last week. Please record all food, healthy and unhealthy, at meal and snack times if possible. I have written these days at the top of each diary. Will you be able to complete theses on these days? *Wait for participant response.* "So each day starts at 12:01 am and ends at 11:59 pm. As we did before, we will send you an email with a link to complete a quick - 5 min survey of your daily food consumption at the end of each day. It is really important that you complete this each day. It is a way for us to know how you are doing each day and to help you if you forgot anything.

The researcher then confirmed the Time 3 appointment and rescheduled if necessary. This scheduled appointment was written and/or confirmed on the "Appointment form." The researcher then reminded the participant that she will receive her second payment when she came to the Time 3 appointment. The researcher thanked the participant for coming and filed the participant folder in the locked filing cabinet.

Appendix K

The Diet Study Screening and Tracking Forms

The Diet Study Screening Form

ID:_____

Thank you for your interest in our study about healthy eating behaviors. We would like to ask you a few questions to determine if you are eligible for the study. Would this be alright? If you are eligible, we will then schedule a time for you to come into the research lab.

1. What is your name? _____
   Record participant's name and ID in the Participant Database document

   *Please note as to whether or not the participant on the phone is a woman. If the participant is **not a woman**, the participant **does not qualify**.*

2. How old are you?_____ (*If younger than **18**, the participant **does not qualify**)*

3. This study will last approximately 6 weeks. Will you be available to participate for approximately 6 weeks? Y or N (*If "**no**" the participant **does not qualify**)*

Now we would like to ask you a few questions about your diet.

1. Can you describe to me what your eating habits are like on a normal day? Please be as descriptive as possible and include all beverages as well as foods and snacks.

2. Are you thinking about changing your eating behaviors? **Y** **N**
3. Are you currently doing anything to change your diet? **Y** **N**
   a. *If participant answers "**no**" to **BOTH** – she **does not qualify***
   b. **If YES**: Can you describe to me what you are doing to change your diet? I'm going to be taking some notes, so please talk slowly and be as descriptive as possible.

Now I'm going to ask a few specific questions about certain types of food you might eat and how often you might eat them. Please be as honest as possible.

4. On a scale of 1 to 5, 1 being never and 5 being all the time, how often do you:
   Don't read each number to the participant; these are just in case they ask:
   1 = Never; 2 = Not very often; 3 = Sometimes; 4 = Often; 5 = All the time

   1. **Eat at least 3 servings or pieces of fruit a day?_____**

2. Drink at least 3 cups of coffee a day?_____
3. **Eat at least 4 servings of vegetables a day? _____**
4. Dink at least 2 Regular sodas/pops a day?_____
5. **Eat bread, pasta, cereal or crackers that are made from whole grain? _____**
6. Eat fast food at least once a day?_____
7. **Drink or eat low-fat milk, yogurt or cheese? _____**
8. **Eat seafood or lean meat?_____**

*Add up all **bolded** items, if participant scores between 21-25 she **DNQ** .*

Now I would like to ask you some questions about your beliefs about your eating behaviors. Please answer yes or no to the following questions:

Yes	No	
		Do you worry you have lost control over how much you eat?
		Have you recently lost more than 15 pounds (one stone) in a three-month period?
		Do you believe yourself to be fat when others say you are too thin?
		Would you say food dominates your life?
		Do you make yourself sick because you feel uncomfortably full?

*If participant answers **yes** to **more than two** questions they **DNQ**. Refer them to the UWM Psychology Clinic.*

5. Are you currently recording what you eat with any tools (e.g., iPhone, online webpage, notebook, etc.)?
   Y or N If yes, what are you using: _____

Read if participant Does Not Qualify:

Thank you for your interest in our study and for taking the time to answer these questions. Unfortunately you do not qualify for this study. We thank you for your time.

Read if participant Qualifies:

Thank you for taking the time to answer these questions. It looks like you do qualify for participation in this study. What I would like to do now, is set up an appointment for you to come to our research office for the first phase of the study. You should plan on approximately 45 minutes to an hour once you get to the appointment, although the actual appointment might be shorter. What date/time works for you? *Schedule an appointment.*

Appointment Date:_____ **Time**:_____

I or someone else from our research lab will be calling to remind you about the appointment. What is the best way to contact you about this reminder appointment?

*Record **phone number** and **email address** on the Participant Database Document*

What is the best way and time to reach you? _____

Thank you again for showing interest in this study. We look forward to meeting you at your visit.

Office Use Only:

RA Name:_____

If participant qualifies, roll the dice and circle which group she is randomized to.

Randomized Group:	Control	Education	Self-as-doer
(Dice Roll):	(1 or 4)	(2 or 5)	(3 or 6)

The Diet Study Food Tracking Form

This form will be used to keep track of the days that participants chose to track their food intake

Name:_____ **ID:**_____

Reminder Preference: E-mail or Text-message

Phone:_____ **E-mail**:_____

Time 1: Date:_____

Tracking Days	Reminder Sent	Survey Link Sent	Complete Survey

Time 2: Date:_____

Tracking Days	Reminder Sent	Survey Link Sent	Complete Survey

Time 3: Date:_____

Tracking Days	Reminder Sent	Survey Link Sent	Complete Survey

The Diet Study Appointment Form

This form will be used to keep track of the days that participants are to come in for an appointment

Name:_____**ID:**_____

Reminder Preference: E-mail or Text-message

Phone:_____ **E-mail**:_____

Lab Visit #	Date	Time	Date Reminder Sent	RA	Rescheduled Date	Rescheduled Time	Rescheduled Reminder Sent
1							
2							
3							
Other…							

The Diet Study Height/Weight Form

Use this form to record the height and weight of participants

Name:_____**ID:**_____

Time	Date Recorded	Height	Weight	Ideal Weight
T1				
T2		**X**		
T3		**X**		

Amanda M. Brouwer

University of Wisconsin-Milwaukee
Department of Psychology (414) 229-5401
PO Box 413 abrouwer@uwm.edu
Milwaukee, Wisconsin 53201

EDUCATION

University of Wisconsin-Milwaukee, Milwaukee, WI
Ph.D., Psychology
Major: Experimental Health and Social Psychology August 2012
Minors: Quantitative Methods, Neuroscience
Dissertation*: Motivating Healthy Diet Behaviors: The Self-As-Doer Identity*
Cumulative GPA: 4.0

M.S., Psychology December 2009
Thesis: *Self-as-Doer for Diabetes: Development and Validation of a Disease-Specific Motivational Measure*
Cumulative GPA: 4.0

Graduate Certificate in Public Health August 2010

Northwestern College, Orange City, IA
B.A., Psychology, *summa cum Laude* May 2007
Thesis: *Predictors of Self-Care Behaviors in Diabetes: Self-Efficacy and Self-As-Doer*
Cumulative GPA: 3.98
Psychology GPA: 4.0

HONORS AND AWARDS

First Year Student Success Award March 2012
Outstanding Student Abstract Award April 2010
Society of Behavioral Medicine: Ethnic Minority and Multicultural Special Interest Group
Chancellor's Graduate Student Award, UW-Milwaukee May 2008 – May 2010
American Psychological Association Student Travel Award August 2009
UWM Graduate School Graduate Student Travel Award September 2008
Psi Chi National Honor Society in Psychology May 2004 - Present
Carl and Hazel Lindskoog Clinical Psychology Scholarship May 2007
Northwestern College Collegiate Academic Scholarship August 2003 – May 2007
Northwestern College Dean's List August 2003 – May 2007

TEACHING EXPERIENCE

Assistant Professor of Psychology August 2012-present
Winona State University, Winona, MN
- Teach undergraduate courses in introductory and health psychology
- Advise undergraduate students
- Serve on departmental and university committees

Lecturer – Social Psychology
University of Wisconsin – Milwaukee, Milwaukee, WI Fall 2010-2012
- Prepare and lead discussion of topics in social psychology
- Develop learning assessments and assignments
- Manage and organize discussion sections and teaching assistants

Associate Adjunct – Advanced Statistics and Research Methods
Cardinal Stritch University, Milwaukee, WI Summer 2011

- Developed lesson plans and learning evaluations related to statistical theory and advanced statistics (e.g., Mixed Designs, Multiple Regression, Logistic Regression, Factor Analysis)
- Mentored students in the development of their research design and statistical analyses for their master's thesis project
- Instructed students in writing in APA style and performing analyses using SPSS

Associate Adjunct – Introduction to Psychology
Bryant and Stratton College, Milwaukee, WI Fall 2010

- Created lesson plans to facilitate student learning about psychological theory and research
- Facilitated student learning through in-class demonstrations and reflective writing exercises
- Utilized small, ethnically diverse class environment to create meaningful discussions of course materials from different perspectives

Guest Lecturer – Health Psychology
University of Wisconsin – Milwaukee, Milwaukee, WI Spring 2010, 2011

- Prepared and led class lecture and discussion for undergraduate students
- Discussed psychosocial topics related to health psychology, specifically diabetes
- Engaged students in motivational exercises to introduce and teach how motivation impact health behaviors

Teaching Assistant Experiences:

Teaching Assistant – Research Methods
University of Wisconsin – Milwaukee, Milwaukee, WI Fall 2010, Spring 2011

- Prepared and led discussion sections for graduate and undergraduate students
- Instructed students in basic and advanced research design and analysis
- Instructed students in writing research reports in APA style

Teaching Assistant – Advanced Psychological Statistics
University of Wisconsin – Milwaukee, Milwaukee, WI Fall 2008, 2009

- Prepared and led discussion sections for graduate and undergraduate students
- Instructed students in basic and advanced statistics, sampling theory, and psychological testing procedures
- Instructed students in statistical packaging software (SPSS)
- Taught statistics through the lens of psychology research methods

Teaching Assistant – Experimental Design
University of Wisconsin – Milwaukee, Milwaukee, WI Spring 2009, 2010

- Prepared and led discussion sections for graduate and undergraduate students
- Instruct students in advanced statistics, multiple linear regression, logistic regression, and factor analysis
- Instructed students in statistical packaging software (SPSS)
- Taught statistics through the lens of psychology research methods

Student Assistant Fall 2006
Northwestern College, Orange City, IA
Supervisor: Jennifer Feenstra, Ph.D.
Development of a Teaching Manual for R. F. Baumeister & B. J. Bushman (2008). *Social Psychology and Human Nature,* Thomson Wadsworth Publishing

- Outlined chapter readings
- Defined vocabulary and authored examples of social psychological phenomena
- Contributed to the creation of teaching resources and learning activities

Teaching Assistant August 2004-May 2007
Northwestern College, Orange City, IA

- Co-authored Psychology Department Handbook
- Developed an electronic and paper-based psychological measurement library
- Assisted in Introduction to Psychology laboratory activities
- Assisted in grading, filing, and other office duties

Peer Tutor
Northwestern College, Orange City, IA January 2005-May 2005
Human Anatomy and Physiology & Personality Psychology

- Facilitated group exam study sessions
- Assisted students on an individual basis with course work and study habits
- Reviewed and provided feedback on semester paper assignments

RESEARCH INTERESTS

I have broad interests in the social psychological factors that influence health and health behaviors, particularly for people living with or at risk for chronic disease. Specifically, I am interested in how factors such as social identity, the self, social support, and self-efficacy affect goals and motivation to perform self-care behaviors among persons with diabetes, hypertension, cardiovascular disease, and HIV.

CURRENT RESEARCH

I am exploring how an identity as the "doer" of one's behavior (i.e., "self-as-doer") provides motivation to enact health behaviors. I began this line of research by piloting the self-as-doer (Houser-Marko & Sheldon, 2006) in a population of persons with diabetes. I have demonstrated that the self-as-doer is a significant predictor of diabetes self-care behavior frequency and that it operates as a significant intervening variable in the relationship between self-efficacy and diabetes self-care behaviors for persons with Type I or Type II diabetes. Furthermore, I have developed and validated a diabetes-specific self-as-doer measure which I expect to use in future research with diabetic samples. I am currently exploring how the self-as-doer might be used as an intervention among non-clinical samples of young women who are interested in improving healthy eating behaviors.

RESEARCH EXPERIENCE

HIV Communication Study, *University of Wisconsin-Milwaukee, Milwaukee, WI*
Quantitative Data Manager, May 2010-present
Supervisor: Katie Mosack, Ph.D., Department of Psychology, Patient Advocacy and Research Lab

- Supervise junior graduate students and undergraduate students in IRB submissions, general study protocol, data collection and management procedures, interviewing, and coding.
- Contribute to IRB applications and devise study protocol
- Interview HIV-positive participants
- Manage data collection and management
- Conduct statistical analyses
- Collaborate with qualitative coding team to develop social support and social support elicitation behavior coding system and coding communication behaviors for social support and social support elicitation behaviors
- Contribute to manuscript and grant application development

Threat Detection Study, *University of Wisconsin-Milwaukee, Milwaukee, WI*
Qualitative Data Analysis Consultant*,* September 2011-present
Supervisor: Shawn Cahill, Assistant Professor, Department of Psychology.

- Provide instruction on Consensual Qualitative Research methods for undergraduate and graduate students
- Advise and contribute to data analysis and thematic development of study data
- Contribute to manuscript

Veterans Affairs Health Study, *Clement Zablocki VA Medical Center, Milwaukee, WI*
Research Assistant, April 2010-present
Supervisor: Jeffrey Whittle, MD., MPH, Professor of Medicine, Patient Care & Outcomes Research Group

- Participate on a qualitative coding team to evaluate outcomes of a hypertension self-care behavior intervention for US military veterans
- Create coding structure for qualitative data analysis
- Develop grounded theory models to determine programmatic impact of the intervention
- Contribute to manuscript and grant application development

Russian Immigrant Women's Health Study, *University of Wisconsin-Milwaukee, Milwaukee, WI*
Project Coordinator, June 2008-present
Supervisor: Katie Mosack, Ph.D., Department of Psychology, Patient Advocacy and Research Lab

- Lead project meetings
- Train undergraduate and graduate research assistants in quantitative survey administration and blood pressure monitoring
- Supervise undergraduate research assistants in the use of SPSS, including data entry and statistical analysis
- Manage quantitative databases and perform statistical analyses
- Contribute to the production of conference presentations
- Lead manuscript development and dissemination

Experiences of Adolescents with Type II Diabetes Study, *University of Wisconsin-Milwaukee, Milwaukee, WI*
Research Assistant, January 2010-May 2012
Supervisor: Anthony Hains, Ph.D., Professor, Department of Educational Psychology

- Code qualitative in-depth interview data with adolescents with Type II diabetes
- Collaborate with qualitative coding team to code domains using Consensual Qualitative Research methodology
- Coordinate and contribute to the manuscript development

Cognitive and Emotional Indicators of Type I Diabetes Study, *University of Wisconsin-Milwaukee, Milwaukee, WI*
Research Assistant, January 2010-May 2012
Supervisor: Anthony Hains, Ph.D., Professor, Department of Educational Psychology

- Developed research measures, study protocol, and IRB submissions
- Recruit participants from Children's Hospital
- Administer quantitative surveys
- Assist in preparation and writing of manuscripts

Type I Diabetes Lipohypertrophy Study, *University of Wisconsin-Milwaukee, Milwaukee, WI*
Research Assistant, January 2010-May 2012
Supervisor: Anthony Hains, Ph.D., Professor, Department of Educational Psychology

- Contribute to the development of study protocol and IRB submissions
- Recruit participants at a local diabetes clinic
- Conduct participant interviews
- Assist in preparation and writing of manuscripts

Vocation, Identity, Spirituality, and College Adjustment Study, *Northwestern College, Orange City, IA*
Research Assistant, January 2005-August 2007
Supervisor: Jennifer Feenstra, Ph.D., Associate Professor, Department of Psychology

- Contributed to research design, measurement, and IRB submission
- Conducted literature reviews
- Administered quantitative surveys
- Managed databases, conducted statistical analyses
- Contributed to manuscript development

Vocation Scale and Correlates Study, *Northwestern College, Orange City, IA*
Research Assistant, January 2004-August 2007
Supervisor: Jennifer Feenstra, Ph.D., Associate Professor, Department of Psychology

- Conducted literature reviews
- Collaborated with research team to develop a measure of vocation
- Managed data collection and performed statistical analyses for the validation of the measure
- Contributed to manuscript development

Chronic Illness, Spirituality and Social Support Study, *Northwestern College, Orange City, IA*
Co-Investigator, August 2007–December, 2007
Supervisor: Ruth Daumer, Ed.D., MSN, BSN, AAS, Associate Professor of Nursing

- Evaluated supportive behaviors in a chronic illness social support group
- Developed skills for performing qualitative methods
- Authored a qualitative research proposal on factors contributing to positive health behaviors for persons with chronic illness

Volunteering Study, *Northwestern College, Orange City, IA*
Research Assistant, January 2004–December 2006
Supervisor: Jennifer Feenstra, Ph.D., Associate Professor, Department of Psychology

- Contributed to study design and IRB submission
- Coordinated the administration of quantitative surveys and conducted interviews
- Managed databases, conducted statistical analyses
- Led manuscript development and dissemination

PROFESSIONAL EXPERIENCES

Institutional Review Board Member
University of Wisconsin – Milwaukee, Milwaukee, WI August 2009-2012

- Review proposed research studies from all UWM departments for safety and ethical treatment of participants/subjects
- Propose ethical considerations and recommend changes to research to ensure participant safety
- Meet with a board of colleagues to discuss research studies requiring full board review

Campus Representative
American Psychological Association of Graduate Students May 2010-2012

- Communicate professional and political issues to psychology graduate students
- Coordinate reciprocal communication between graduate students and the American Psychological Association
- Facilitate communication between graduate students and the state and provincial associations

Student Research Award Reviewer
Association of Psychological Society Student Caucus February 2010-2012

- Review proposed research studies for the Student Research Award
- Critique merit and research quality of proposed research
- Provide feedback and suggestions for future submissions to student researcher concerning research, writing and overall proposal qualities

Graduate Student Teaching Association Regional Representative
American Psychological Association – Division 2 August 2009-2012

- Promote GSTA activities and membership at regional and national conferences
- Plan and participate in programs and development of the GSTA

Website Administrator
University of Wisconsin – Milwaukee, Milwaukee, WI September 2008-August 2012

- Design layout of Dr. Mosack's laboratory website
- Maintain changes to graphics, text, and format of laboratory website

American Public Health Conference Abstract Reviewer
Public Health Education and Health Promotion Committee January 2011, 2012

- Reviewed proposed research studies for the 2011 APHA Annual Convention
- Critiqued merit and research quality of proposed research

Co-Facilitator – Chronic Illness Support Group
Orange City Area Health System, Orange City, IA. August 2006-December 2006

- Led group discussions focusing on life with chronic illness
- Assessed the development and needs of each group member to promote their quality of life while living with a chronic illness

Co-Facilitator – Diabetes Social Support Group
Sioux Center Community Hospital, Sioux Center, IA September 2004-April 2005

- Organized meetings
- Led group discussion on the quality of life with diabetes.
- Facilitated communication about recent diabetes technology and tools to help young people cope with a diagnosis of diabetes

SPECIALIZED RESEARCH TRAINING AND SOFTWARE SKILLS

Qualitative Methods in Social Science Research Workshop
University of Wisconsin-Milwaukee,
Center for Addiction and Behavioral Health Research July 2011

- 8-hour training workshop for qualitative research methods including observational field work, qualitative research interviews, and coding qualitative data

Observational Social Support Coding Workshop
Iowa State University, Ames, IA September 2010

- 8-hour training workshop for using the Social Support Behavioral Code; Social Support Elicitation Behavioral Code; Iowa Family Interaction Rating Scales to code dyadic interactions

SPSS (highly proficient)
NiVio (highly proficient)
LISREL
Noldus Observer
Questionnaire Develop Systems – NOVA
Microsoft Web Developer

PUBLICATIONS AND MANUSCRIPTS

Brouwer, A. M., & Mosack, K. E. (in press). Self-As-Doer for diabetes: Development and validation of a diabetes-specific measure of doer identification. *Journal of Nursing Measurement.*

Brouwer, A. M., Salamon, K. S., Olson, K., Yelich-Koth, S., Fox, M., Fleischman, K., Hains, A., Davies, H., & Kichler, J. (in press). Adolescents and Type 2 Diabetes Mellitus: A qualitative analysis of the experience of social support. *Clinical Pediatrics.*

Wendorf, A. R., **Brouwer, A. M.,** & Mosack, K. E. (in press). Stress and culture. In R. A. R. Gurung (Ed.). *Multicultural approaches to health and wellness in America.* Santa Barbara, CA: Praeger.

Salamon, K. S., **Brouwer, A. M.,** Fox, M., Olson, K., Yelich-Koth, S. L., Fleischman, K., . . . Hains, A. (2012). Experiencing type 2 diabetes mellitus (T2DM): Qualitative analysis of adolescents' concept of illness, adjustment, and motivation to engage in self-care behaviors. *Diabetes Educator,* Advanced online publication. doi:10.1177/0145721712445214

Mosack, K. E., Wendorf, A. R., **Brouwer, A. M.,** Patterson, L., Ertl, K., Whittle, J…Fletcher, K. F. (in press*).* Veterans service organization engagement in "POWER: A peer-led hypertension intervention. *Chronic Illness.*

Brouwer, A. M., & Mosack, K. E. (2011). "I am a blood sugar checker": Intervening effects of the self-as-doer identity on the relationship between self-efficacy and diabetes self-care behaviors. *Self and Identity.* Advance online publication. doi: 10.1080/15298868.2011.603901.

Fletcher, K., Ertl, K., Mosack, K. E., **Brouwer, A. M**., Morzinski, J., & Whittle, J. (2011). How to engage the members of veterans service organizations in a health promotion project: Lessons learned from the POWER program. *VA Website.*

Feenstra, J. S., & **Brouwer, A. M.** (2008). Christian vocation: Defining relations with identity status, college adjustment, and spirituality. *Journal of Psychology and Theology, 36,* 83-93.

Under Review

Brouwer, A. M., Mosack, K. E., Wendorf, A. R., & Sokolova, L. (2012). *Patterns of missing data in immigrant health research: A survey project with elderly Russian-speaking women living with hypertension.*

Mosack, K. E., Patterson, L., **Brouwer, A. M.,** Wendorf, A. R., Ertl, K., Eastwood, D., . . . Whittle, J. *Evaluation of a peer-led hypertension intervention for veterans: Health effects on peer leaders.*

Abstracts

Brouwer, A. M., Wendorf, A. R., & Mosack, K. E. (2012). The Self-As-Doer for Diabetes: A disease-specific motivational measure for diabetes self-care behaviors. [Abstract]. *Annals of Behavioral Medicine, 43,* (Suppl.), s18.

Brouwer, A. M., Salamon, K., Olson, K., Yeilch-Koth, S., Fox, M., Fleishcman, K., . . . Kichler, J. (2012). The experience of social support: A qualitative analysis of adolescents with type II diabetes. [Abstract]. *Annals of Behavioral Medicine, 43,* (Suppl.), s18.

Brouwer, A. M., Patterson, L., Wendorf, A. R., Ertl, K., Mosack, K. E., Whittle, J., Morzinski, J., & K. Fletcher. (2012). Evaluation of a peer-led hypertension intervention for veterans: Health effects on peer leaders. [Abstract]. *Annals of Behavioral Medicine, 43,* (Suppl.), s97.

Wendorf, A.R., Bilkey, S., Ehlert, K., Wollach, D., **Brouwer, A.M.,** & Mosack, K.E. (2011). Medication-taking attitudes and beliefs among HIV-positive adults with comorbid depressive disorders: a qualitative study. [Abstract]. *Annals of Behavioral Medicine, 41,* (Suppl.), s166.

Brouwer, A. M. (2008). Diabetes self-care beliefs and the self-as-doer: Exploring behavioral identification. [Abstract]. *Psychology and Health, 23,* (Suppl.), 74.

Brouwer, A. M., Wendorf, A. R., Espil, F., Sokolova, L., Kucheras, S., & Mosack, K. E. (2010). Exploring cultural themes in missing data: A survey project examining correlates of hypertension among Russian speaking immigrant women. [Abstract]. *Annals of Behavioral Medicine, 39,* (Suppl.), s136.

Brouwer, A. M., Wendorf, A. R., & Mosack, K. E. (2010). Psychosocial differences in type 1 and type 2 diabetes: The self-as-doer. [Abstract]. *Annals of Behavioral Medicine, 39,* (Suppl.), s173.

In Preparation

Mosack, K. E., **Brouwer, A. M.,** Petroll, A. E., & Stevens, P. (2012). *Health care disparities among same-gender involved women: Is provider knowledge of sexual orientation associated with health care quality?*

Anderson, R., **Brouwer, A. M.,** Wendorf, A. R., & Cahill, S. *Threat detection and decision-making in a date rape scenario: Exploring qualitative themes*

Feenstra, J. S., & **Brouwer, A. M.** *Construction and validation of the Vocation Assessment Scale*.

Feenstra, J. S., **Brouwer, A. M.,** & Krueger, M. *Does volunteering make a difference?: The effects of volunteering on self-esteem, self-efficacy, optimism, and Christian vocation.*

PRESENTATIONS

Salamon, K. S., **Brouwer, A. M**., Olson, K. A., Fox, M., Fleischman, K. A., . . . Kichler, J. C. (August 2012). Type 2 Diabetes Mellitus (T2DM) Experiences: Qualitative Analysis of Adolescents' Concept of Illness, Adjustment and Motivation to Engage in Diabetes Self-Care Behaviors. *Poster to be presented at the Annual Convention of the American Psychological Association, Orlando, FL.*

Mosack, K. E., **Brouwer, A. M**., Kulland, A., & Wendorf, A. R. (May 2012). Using the health belief model to predict adherence among Russian-speaking immigrant women. *Poster presented at the Association of Psychological Science Convention in Chicago, IL.*

Salamon, K. S., **Brouwer, A. M.,** Olson, K. A., Fox, M., Fleischman, K. A., . . . Kichler, J. C. (April 2012). Type 2 diabetes mellitus (T2DM) experiences: Qualitative analysis of adolescents' concept of illness, adjustment and motivation to engage in diabetes self-care behaviors. *Poster presented at the Regional Conference of the Society of Pediatric Psychology, Milwaukee, WI.*

Brouwer, A. M., Wendorf, A. R., & Mosack, K. E. (April, 2012). The Self-As-Doer for Diabetes: A disease-specific motivational measure for diabetes self-care behaviors. *Poster presented at the Society of Behavioral Medicine Conference in New Orleans, LA.*

Brouwer, A. M., Salamon, K., Olson, K., Yeilch-Koth, S., Fox, M., Fleishcman, K., . . . Kichler, J. (April 2012). The experience of social support: A qualitative analysis of adolescents with type II diabetes. *Poster presented at the Society of Behavioral Medicine Conference in New Orleans, LA.*

Brouwer, A. M., Patterson, L., Wendorf, A. R., Ertl, K., Mosack, K. E., Whittle, J., Morzinski, J., & K. Fletcher. (April 2012). Evaluation of a peer-led hypertension intervention for veterans: Health effects on peer leaders. *Poster presented at the Society of Behavioral Medicine Conference in New Orleans, LA.*

Brouwer, A. M., & Mosack, K.E. (November 2011). Does the length of time living with illness predict illness identity?: Predicting self-as-doer identity in persons with Type II diabetes. *Poster presented at the American Public Health Association Conference in Washington, DC.*

Anderson, R., Wendorf, A. R., **Brouwer, A. M.,** Cahill, S., & Mosack, K. E. (November 2011). Threat detection and decision-making in a date rape scenario: Exploring qualitative themes. *Poster presented at the Association for Behavioral and Cognitive Therapies Conference in Toronto, Ontario, Canada.*

Wendorf, A.R., Bilkey, S., Wollach, D., Ehlert, K., Woolverton, L., **Brouwer, A. M.,** & Mosack, K.E. (August 2011). Facilitators and barriers to medication adherence among HIV-positive patients with comorbid depressive disorders: A qualitative study. *Poster presented at the American Psychological Association Convention in Washington, D.C.*

Brouwer, A. M. (April 2011). Self-efficacy, self-as-doer, and diabetes self-care behaviors: Intervening effects of the self-as-doer. *Oral presentation to be given at the Society of Behavioral Medicine Conference in Washington DC.*

Wendorf, A.R., Bilkey, S., Ehlert, K., Wollach, D., **Brouwer, A. M.,** & Mosack, K.E. (April 2011). Medication-taking attitudes and beliefs among HIV-positive adults with comorbid depressive disorders: a qualitative study. *Poster presented at the Society for Behavioral Medicine annual meeting in Washington, D.C.*

Brouwer, A. M., & Mosack, K. E. (November 2011). Does Length of Time Living With Illness Predict Illness Identity?: Predicting Self-as-Doer Identity in Persons with Type II Diabetes. *Poster submitted to the American Public Health Association Conference in Washington DC.*

Wendorf, A. R., Bilkey, S., Wollach, D., Ehlert, K., Woolverton, L., Mosack, K. E., & **Brouwer, A. M.** (August 2011). Facilitators and barriers to medication adherence among HIV-Positive patients with comorbid depressive disorders: A qualitative study. *Poster will be presented at the American Psychological Association Conference in Washington, DC.*

Brouwer, A. M., & Mosack, K. E. (November 2010). Self-as-doer and self-determinism: New perspectives for motivational differences in type 1 and type 2 diabetes self-care. *Poster presented at the American Public Health Association annual conference in Denver, CO.*

Brouwer, A. M., Wendorf, A. R., Bilkey, S. & Mosack, K. E. (August 2010). New perspectives in predicting diabetes self-care behaviors: The self-as-doer. *Poster presented at the American Psychological Association annual conference in San Diego, CA.*

Brouwer, A. M., Wendorf, A. R., & Mosack, K., E. (April 2010). Psychosocial differences in Type 1 and Type 2 Diabetes: The Self-As-Doer. *Poster presented at the Society of Behavioral Medicine annual conference in Seattle, WA.*

Brouwer, A. M., Wendorf, A. R., Espil, F., Sokolova, L., Kucheras, S., & Mosack, K. (April 2010). Exploring cultural themes in missing data: A survey project examining correlates of hypertension among Russian-Speaking immigrant women. *Poster presented at the Society of Behavioral Medicine annual conference in Seattle, WA. Awarded the Student Meritorious Abstract Award and the Ethnic Minority and Multicultural Special Interest Group Student Abstract Award.*

Brouwer, A. M. (November 2009). Self-efficacy and self-as-doer: New perspectives in diabetes self-care behavior management. *Round-table discussion presented at the American Public Health Association annual conference in Philadelphia, PA.*

Brouwer, A. M., Wendorf, A.R., & Mosack, K.E. (August 2009). Hypertension in Russian Immigrant Women: Complementary Therapy Usage and Acculturation. *Poster presented at the American Psychological Association annual conference, Toronto, Ontario, Canada.*

Brouwer, A. M., Wendorf, A.R., & Mosack, K.E. (August 2009). Hypertension in Older Russian Immigrant Women: Cultural Identity and Illness Beliefs. *Poster presented at the Association for Psychological Science annual conference, San Francisco, CA.*

Wendorf, A.R**., Brouwer, A. M.,** Espil, F.M., Mosack, K.E. (April 2009) Depression and Adherence: Hypertension in Older Russian Immigrant Women. *Poster presented at the Association for Psychological Science annual conference, San Francisco, CA.*

Brouwer, A. M. (April 2009). Predicting self-care behaviors in diabetes: Self-efficacy, social support and self-as-doer. *Poster presented at the Midwestern Psychological Association Conference in Chicago, IL.*

Brouwer, A. M. (September 2008). Diabetes self-care beliefs and the self-as-doer: Exploring behavioral identification. *Poster presented at the European Division of Health Psychology Conference in Bath Spa, England.*

Brouwer, A. M. (April 2008). Predictors of self-care behaviors: Self-efficacy and self-as-doer. *Poster presented at the Wisconsin Psychological Association in Madison, WI. Awarded third place.*

Brouwer, A. M. (April 2007). Pricking and poking: Predictors of self-care behaviors in diabetes. *Oral presentation given at the Siouxland Undergraduate Research Conference in Sioux City, IA.*

PROFESSIONAL AFFILIATIONS

Association of Graduate Students in Psychology, University of Wisconsin-Milwaukee
- President (October 2009-September 2010)
- Vice-President (October 2008-September 2009)
- Secretary (October 2007-September 2008)

American Diabetes Association

American Psychological Association
- Health Psychology Division (38)
- Society for Teaching Psychology Division (2)

American Public Health Association

Association for Psychological Science

Midwestern Psychological Association

Society of Behavioral Medicine

REFERENCES

Dr. Katie Mosack
Assistant Professor of Psychology
University of Wisconsin - Milwaukee
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Dr. Anthony Hains
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Dr. Raymond Fleming
Professor of Psychology
University of Wisconsin-Milwaukee
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Milwaukee, WI 53201
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Dr. Asuncion Miteria Austria
Professor of Psychology
Chair and Director of Clinical Training
Cardinal Stritch University
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amaustria@stritch