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Use and Perspectives of a Social Marketing Campaign to Improve Fruit and Vegetable Intake

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USE AND PERSPECTIVES OF A SOCIAL MARKETING CAMPAIGN TO IMPROVE FRUIT AND VEGETABLE INTAKE

A dissertation submitted in partial fulfillment of the requirements for the degree of Doctor of Philosophy at Virginia Commonwealth University

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Abstract

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The current study evaluated the development and acceptability of a social marketing campaign to improve emerging adults' fruit and vegetable (FV) intake. A social marketing campaign was developed through focus groups with 24 college students. Materials were implemented in two dining locations at Virginia Commonwealth University. Sales of carrots, apples, and chips were collected in three phases: baseline, implementation of the campaign, and washout. In addition, surveys were collected from 303 diners across all phases and locations. Results indicated an increase in carrot sales, decrease in sales of chips sold with a meal, and mixed findings regarding sales of apples and chips sold alone. Intercept surveys indicated the marketing materials were perceived positively, and clearly understood. Statistical analysis of self-report measures revealed that perceptions of one's health status and autonomy were associated with fruit and vegetable (FV) intake and overall nutrition knowledge. The implementation of a social marketing campaign to encourage FV intake appeared to influence sales of both healthy and non-healthy food items. It is vital for future campaigns and policies to highlight autonomy for health behavior decision-making.

Use and Perspectives of a Social Marketing Campaign to Improve Fruit and Vegetable Intake

The importance of a proper diet for improved health and decreased disease risk is well known. However, many North Americans report numerous barriers to the consumption of a balanced diet including taste preference, convenience, expense of healthy foods, time for preparation, and confusion about optimal nutrition choices (Glanz, Basil, Maibach, Goldberg, & Snyder, 1998). Despite the abundance of weight-loss programs and diet interventions designed to improve individuals' nutritional intake (especially fruit and vegetable consumption), most Americans do not meet the recommended dietary guidelines (Ammerman, Lindquist, Lohr, & Hersey, 2002; Krebs-Smith, Guenther, Subar, Kirkpatrick, & Dodd, 2010). In recent years, health researchers have advocated a public policy approach to dietary change, suggesting that manipulating the environment with efforts such as social marketing might make it easier for individuals to resist unhealthy foods and improve their nutritional habits (Lee & Kotler, 2011; Thompson et al., 2003).

Dietary Intake

Proper nutrition plays an important role in decreasing many chronic health risks (WHO Diet, 2013). A healthy diet involves consuming sufficient amounts of essential nutrients and water. Essential nutrients are obtained from many different foods, necessitating a balance of fats, proteins, and carbohydrates (WHO Diet). Individuals must also consume enough calories to support energy, and adequate micronutrients to meet the needs of the human body, without causing toxicity or excessive weight gain (WHO Diet).

The United States Department of Agriculture (USDA) and Department of Health and Human Services (DHHS) issue Dietary Guidelines for American citizens every five years

(Dietary Guidelines for Americans, 2011). These guidelines have evolved over time to reflect the current culture and health of the nation. First published in 1894, the guidelines have undergone six iterations (i.e., How to Select Food, the Basic 7, the Basic 4, Food Guide Pyramid, MyPyramid, and MyPlate). The frequency with which these dietary guidelines have changed makes it difficult for consumers to remain up to date with nutritional recommendations (USDA Center for Nutrition Policy and Promotion, 2013). The Dietary Guidelines published in 2010 emphasize: (1) sustaining a caloric balance to achieve and maintain a healthy weight and (2) consuming nutrient-dense foods and beverages.

MyPlate, implemented in 2011, is the most recent dietary guideline program issued by the USDA and DHHS. Specific MyPlate recommendations include filling half your plate with fruits and vegetables, choosing whole-grain carbohydrates at least half the time, consuming a variety of lean proteins, increasing intake of fat-free or low-fat milk and milk products, choosing foods that are high in dietary fiber, meeting nutrient needs within a personalized and appropriate caloric range, monitoring all foods and beverages consumed, and following food safety recommendations. In addition, the World Health Organization (WHO) releases dietary recommendations (WHO Diet, 2013). Their most recent suggestions include: (1) achieve energy balance (calories consumed versus calories expended) and a healthy weight, (2) limit energy intake from total fats and consume more unsaturated fats (rather than saturated fats and trans-fatty acids), (3) increase consumption of fruits and vegetables, legumes, whole grains and nuts, (4) limit the intake of sugars, and (5) limit salt consumption from all sources and ensure that salt is iodized. As evident, the consumption of fruits and vegetables is a key component of both the USDA/DHHS and WHO dietary guidelines.

Importance of fruit and vegetable intake. Beyond the vital nutrients that fruits and

vegetables (FV) provide, a diet high in these foods is associated with decreased risk of adverse health outcomes, including certain forms of cancer. Block, Patterson, and Subar (1992) conducted an exhaustive analysis of approximately 200 studies that examined the relation between FV intake and cancers of the lung, colon, breast, cervix, esophagus, oral cavity, stomach, bladder, pancreas, and ovary. Researchers discovered a statistically significant protective effect of FV intake in 128 of 156 (82%) dietary studies. In the majority of investigations, individuals with low FV intake (lower one-fourth of the population) experienced about twice the risk of cancer compared with those with high intake, after controlling for confounding variables. For lung cancer, protective effects of FV intake were found in 24 of 25 studies, after controlling for smoking (in most studies). Fruits, in particular, were significantly protective against cancers of the esophagus, oral cavity, and larynx (28 of 29 studies were significant). There existed strong evidence of a protective effect of FV consumption in cancers of the pancreas and stomach (26 of 30 studies), and in colorectal and bladder cancers (23 of 38 studies). For cancers of the cervix, ovary, and endometrium, a significant protective effect was shown in 11 of 13 studies. In sum, there exists a strong and consistent base of research highlighting the importance of FV intake for the reduction of cancer risk.

In addition to certain forms of cancer, FV intake is associated with decreased risk for heart disease, metabolic syndrome, diabetes, and obesity (Bazzano, 2006; Feldeisen & Tucker, 2007; Hodge, English, O'Dea, & Giles, 2007). Moreover, an increased intake of FVs is linked to other health promoting behaviors such as increased physical activity, lower rates of smoking, and lower rates of alcohol dependence (Joshipura et al., 1999; Serdula et al., 1996; Subar, Harlan, Mattson, 1990; Subar et al., 1995).

In light of the clear health benefits of increased FV intake, the USDA/DHHS and WHO

distribute recommendations for specific amounts of FV to eat daily. The Centers for Disease Control and Prevention provides an online calculator for estimating the recommended servings of FV intake by age, gender, and activity level (Centers for Disease Control and Prevention, 2012). For example, a six-year old female who participates in less than 30 minutes of physical activity per day is advised to consume 1 cup of fruit and 1.5 cups of vegetables whereas a 50-year old male who engages in more than 60 minutes per day of exercise should consume 2.5 cups of fruit and 3.5 cups of vegetables daily. The current study focuses on emerging adults, or individuals between the ages of 18 and 25 (Arnett, 2000). Current FV intake guidelines for emerging adults are presented in Table 1.1 (Centers for Disease Control). Research indicates that few young adults (~10%) are achieving these recommendations (Krebs-Smith et al., 2010). The following section describes the unique developmental period of emerging adulthood and provides a rationale for investigating health behaviors of individuals in this age range. In addition, the health-related behaviors of this group most relevant to the current study are briefly reviewed.

Table 1.1

Fruit and Vegetable Intake Recommendations for Emerging Adults by Gender and Physical Activity Level.

Amount of Physical Activity	**Male**	**Female**
Less than 30 Minutes Per Day	2 c. fruit 3 c. vegetables	2 c. fruit 2.5 c. vegetables
30-60 Minutes Per Day	2.5 c. fruit 3.5 c. vegetables	2 c. fruit 3 c. vegetables
More than 60 Minutes Per Day	2.5 c. fruit 4 c. vegetables	2 c. fruit 3 c. vegetables

Emerging Adulthood

Within the past 60 years, there have been significant demographic shifts in the United States, including increased rates of post-secondary education and delays in marriage and childbirth. These changes have led several authors to suggest that there is now a unique

developmental stage, labeled “emerging adulthood” (Arnett, 2000; Nelson, Story, Larson, Neumark-Sztainer, & Lytle, 2008). Emerging adulthood typically includes individuals between the ages of 18-25, and is characterized by milestones such as leaving home and increased autonomy in decision-making (Arnett). Yet, many emerging adults are not financially self-sufficient or stable in their residence and employment, precluding them from being considered fully independent. This age group is largely understudied; however this developmental stage might be key in the formation of health-promoting behaviors and lifelong habits (Nelson et al.). Because many (41%) emerging adults are enrolled in post-secondary education, research on college students is included in the following review (National Center for Education Statistics, 2010).

Two main aspects of emerging adulthood that have implications for the current study are identity development and greater interpersonal influence. Identity development, or the exploration of new ideals and behaviors to express individuality, might enable emerging adults to incorporate healthy lifestyle behaviors into their self-concept. Research has shown that seeing oneself as engaging in healthy behaviors during emerging adulthood is an important indicator of long-term behavior change and health promotion (Miller, Ogletree, & Welshimer, 2002; Storer, Cychosz, & Arnett, 1997). Moreover, other psychological factors such as self-efficacy for living independently are developed during emerging adulthood, further highlighting the importance of this developmental period for creating and maintaining healthy lifestyle patterns (Schwartz, Cote, & Arnett, 2005). In addition to important identity development milestones, emerging adulthood is a time for changing support systems. These changing support systems (such as peers) might exert novel interpersonal influences on health behaviors and ideals (Nelson, et al., 2008). Additionally, decreased family connection and increased peer interaction might affect

health behavior decisions (Nelson et al.).

Emerging adulthood and health behaviors. The transition from adolescence to emerging adulthood has significant implications for dietary intake and weight-related behaviors. National data suggest that, during this period, individuals are particularly vulnerable to the development of obesity, and unhealthy diet and physical activity patterns (Nelson et al., 2008). The college setting shares many characteristics with the "toxic environment" described by Horgen and Brownell (2002). These authors use this term to describe the obesogenic nature of modern Western society, characterized by easy access to dense, high-caloric foods presented in very large portions, and an emphasis on sedentary behavior (Horgen & Brownell). It is, therefore, perhaps not surprising that approximately a third of college students are overweight (American College Health Association, 2009), and overweight and obesity rates appear to be increasing dramatically among 18-29 year olds, compared with other age groups (7.1% to 12.1% from 1991 to 1998; Mokdad et al., 1999).

Emerging adults experience lifestyle changes that dramatically influence the quantity and quality of not only their dietary intake but also their physical activity. For example, 33.6% of adolescents meet recommended guidelines for physical activity (150 minutes of moderate activity per week); however, only 12.7% of emerging adults meet these guidelines (Gordon-Larsen, Nelson, & Popkin, 2004). Decreases in physical activity are most pronounced between the ages 15 and 18 and continue through age 21. Research shows that physical activity continues to follow a downward trajectory into adulthood (Caspersen, Pereira, & Curran, 2000). Therefore, emerging adulthood serves as an important time to promote and establish long-lasting patterns of increased physical activity.

As mentioned previously, data from the American College Health Association indicate that 90% of students eat less than the recommended two cups of fruit and two-three cups of vegetables per day (American College Health Association, 2009). A longitudinal study found that total FV intake decreased significantly (>½ serving per day) during the five-year period after high school that characterizes most of emerging adulthood (Niemeier, Raynor, Lloyd-Richardson, Rogers, & Wing, 2006). Moreover, fast-food consumption markedly increases during this period. Indeed, fast food consumption is greater in individuals aged 20-39 compared with all other age groups. During the USDA's Continuing Survey of Food Intakes by Individuals, which involves a two-day dietary recall, 52% of 20-39 year olds reported eating fast food on one or both days of the recall (Paeratakul, Ferdinand, Champagne, Ryan, & Bray, 2003).

Importance of the College Campus for Dietary Interventions

With nearly 12.6 million emerging adults enrolled in postsecondary institutions, college campuses provide an important environment within which to understand, create, and implement interventions to improve emerging adults' dietary intake (National Center for Educational Statistics, 2010). College campuses serve a wide range of individuals from diverse socioeconomic and racial/ethnic backgrounds. Therefore, interventions conducted in campus settings provide vital information on a wide range of emerging adults. The following section reviews unique elements of a campus environment that might contribute to poor dietary habits in emerging adults.

Independence and nutritional habits. As mentioned previously, college students are defining and forming their identities (Hudd et al., 2000; Nelson et al., 2008). Peer relationships play an influential role in this process (Hudd et al.). Within the interpersonal context, researchers have outlined three theories that might explain how college students make personal

choices: (1) perceived peer norms, (2) social comparison, and (3) social facilitation.

College students strive to gain acceptance by peers and subsequently might adopt the habits of their particular group, regardless of whether these habits are positive or negative (Sieving, Perry, & Williams, 2000; West, Sweeting, & Ecob, 1999). Perceived norms and standards of nutrition in college students are likely to impact their dietary choices (Schwartz, 1977). For example, some students might feel as though everyone is eating unhealthily and that this is the standard. Social comparison can have a major influence on health and nutrition decision-making (Luszczynska, Gibbons, Piko, & Tekozel, 2004).

Social comparison is the tendency to compare oneself to others, noting similarities and differences (Gibbons & Buunk, 1999). The drive for self-enhancement is considered the most important underlying factor in social comparison (Gibbons and Buunk). This drive might lead college students to increase exercise and improve their dietary intake to look better compared with others. However, social comparison can also have the opposite effect (Gibbons & Gerrard, 1997). For example, young adults might see peers eating unhealthily and being relatively inactive and, subsequently, behave in the same manner because, "everyone is doing it." Therefore, social comparison plays a significant role in the adoption (or rejection) of health-promoting behaviors (Gibbons & Gerrard).

Indeed, some research has suggested that the mere presence of others can derail personal health-promotion. For example, social facilitation studies indicate that the presence of others can change what, and how much, people eat (Herman, Roth, & Polivy, 2003). People tend to eat more when in groups than when alone (Bellisle, Dalix, & de Castro, 1999; de Castro, 1990, 1991, 1994; de Castro, & Brewer, 1992). Moreover, social facilitation is evident when people believe they are being evaluated on the basis of their intake and food choice (Leary, Tchividijian,

& Kraxberger, 1994). Therefore, the impact of peers could override an individual's intention to make better dietary choices. Peers often accompany college students when they eat and could be considered a generalized environmental factor. Social facilitation might also provide a positive influence by encouraging others to engage in health-promoting behaviors, and making it easier to do so with the support of peers (Heaney & Israel, 2002). In addition to these peer influences, physical and behavioral aspects of the college environment could impact students' food selection.

College environment and barriers to healthy living. Several factors influence college students' food selection including taste, cost, nutrition, convenience, and perceived influence on weight control (Davy, Benes, & Driskill, 2006; Greaney et al., 2009; Horacek & Betts, 1998; Nelson, Kocos, Lytle, & Perry, 2009). The physical and social environment of college is somewhat unique, and can prove both beneficial and detrimental to dietary choices. As mentioned previously, many aspects of the "toxic environment" are pervasive on college campus including the accessibility and marketing of high calorie, high fat, commercially processed foods, large portions, increased snacking, and the tendency to eat meals away from home (Brownell & Horgen, 2004; Nestle, 2002).

Notably, the most readily available and economical food options tend to be less nutritious yet more palatable, with high fat and sugar content (Brownell & Horgen, 2004). Healthier options are likely to be more expensive, less convenient, and require more time and energy to prepare (Drewnowski & Barratt-Fornell, 2004; Drewnowski & Damon, 2005). Moreover, college students have been found to have poor nutritional knowledge and thus, might not be well-prepared to make positive dietary selections, especially in an environment that aggressively

markets lower cost, and generally less healthy, alternatives (Barr, 1984; Thomsen, Terry, & Amos, 1987; Van den Reek & Keith, 1984).

Students might be particularly likely to eat out because making meals requires time, energy, and money (Davy et al., 2006; Greaney et al., 2009; Nelson et al., 1999). Specifically, cooking takes effort and time away from studying and extracurricular activities. Further, more nutritious foods are perceived as comparatively expensive and often are simply not purchased by college students who generally have significant financial limitations. In general, students report purchasing cheap and easy food, which is typically nutritionally deficient (Strong, Parks, Andersen, Winnett, & Davy, 2008).

Where students live also appears to play a significant role in the quality of their nutritional choices. Brevard and Ricketts (1996) found that students who live off-campus included more protein in their diet and, in general, had fundamentally different food selection habits that might be beneficial to their health. It is estimated that 46.3% of college students live on campus (American College Health Association, 2009). Unfortunately, the typical college campus offers primarily fast food and other less healthy restaurant options (Greaney et al., 2009; Strong et al., 2008). In addition, many students rely on campus dining centers for their meals. These dining centers are typically presented as "all-you-can-eat" establishments. One study found that eating breakfast and lunch at such centers on campus was the largest predictor of first-year weight gain (Levitsky, Halbmaier, & Mrdjenovic, 2004). In addition, because of the "all-you-can-eat" design of dining centers, students are likely less aware of appropriate portion sizes (Levitsky & Youn, 2005). Most concerning is that college students' consumption is particularly devoid of basic nutrition. Although college students might have the intention and desire to make healthy nutritional choices, the options available likely inhibit healthy dietary habits.

In addition to these physical and environmental barriers, many college students face social and behavioral barriers to developing healthy dietary habits. For example, many students experience stress related to living independently and managing their academic endeavors (Damush, Hays, & DiMatteo, 1997). Students view themselves as experiencing much more stress than other adults (Cartwright et al., 2003). Perceived stress, in turn, is linked with eating and subsequent weight gain and obesity. For example, Jackson and Knight (2006) found that stressful social and economic living conditions, coupled with limited access to potential physical and emotional resources to manage those conditions, contributed to behavioral responses to stress and harmed overall health.

This association between stress and unhealthy eating is also manifested in college students' snacking behaviors; undergraduates report snacking more often during midterms and finals, and when bored (Gore, Foster, DiLillo, Kirk, & West, 2003; Oliver & Wardle, 1999). This suggests that college students might be particularly likely to consume non-nutritious food to cope with stress and escape negative emotions (Heatherton & Baumeister, 1991; Tanofsky-Kraff et al., 2008). In addition, low self-esteem is associated with poor food selection among college students (Huntsinger & Luecken, 2004). Poor self-esteem might reduce feelings of self-efficacy and motivation to make healthy choices. Conversely, college students with better self-images might be more likely to choose healthier dietary options (Martin, Leary, & O'Brien, 2001).

The environmental, social, and behavioral factors influencing food selection in college are well known and have led to the popular belief that most college students are destined to gain the "freshman fifteen" (Levitsky et al., 2004). Although the evidence is somewhat inconsistent, numerous studies have provided evidence of rapid and statistically significant weight gain within the first year of college (Anderson, Shapiro, & Lundgren, 2003; Holm-Denoma, Joiner, & Vohs,

2008; Gow, Trace, & Mazzeo, 2010; Levitsky et al.). Numerous successful intervention programs have been created to address this issue, including face-to-face psychoeducation (Stice, Orjada, & Tristan, 2006), psychoeducation plus behavioral skills (Hivert, Langlois, Berard, Cuerrier, & Carpentier, 2007), and multi-pronged approaches that utilize self-monitoring, feedback, and psychoeducation (Gow et al.). Such individual interventions might help prevent weight gain; however, there remains a need to enhance nutritional choices for all college students and prevent weight gain in the first place.

Overall, the interplay among environmental, interpersonal and intrapersonal dynamics provides a rich conceptual framework within which to examine the nutrition choices of college students. Care must be taken to understand and include elements of the unique developmental stage of emerging adulthood, social influences, the potentially "toxic" food environment of the college campus, the importance of time, taste, and convenience, and psychological factors such as increased stress and low motivation to eat healthily. Other important factors that must be considered in the promotion of healthy eating are nutrition knowledge, awareness, and the practical application of important dietary information.

Health Decisions and Nutritional Selection

Nutrition knowledge can be broken down into two distinct categories: declarative and procedural. Declarative knowledge includes basic facts such as the nutrient content of particular items (e.g., fiber content of fruit or calories in a specific food). Procedural knowledge represents an awareness of how to implement declarative knowledge in daily life (e.g., composing a balanced meal, choosing the healthier option among two choices; Miller & Achterberg, 2000; Worsley, 2002). Therefore, it is vital for consumers to not only *understand* nutritional information but also to have the *ability* to draw on that knowledge when making dietary choices.

Dietary selections are largely influenced by individual demographics, lifestyle and health factors, nutrition knowledge, and social-psychological factors (Carlson & Gould, 1991; Contento & Murphy 1990; Jensen, Kesavan, & Johnson, 1992; Kristal & Hedderson, 2001; Morton & Guthrie 1997; Shepherd & Stockley, 1987; Tuorila & Pangborn, 1988). Thus, researchers have emphasized the need for more theoretically-based interventions focused on improving dietary decisions.

Nutrition education and awareness. The United States (U.S.) Government established dietary recommendations and guidelines as well as labeling regulations with The Nutrition and Labeling Act (NLEA) of 1990 (NLEA, 1990). Largely focused on declarative knowledge, the first objective of the NLEA is to regulate and require nutrition composition labeling on food packaging. A second objective of the NLEA is to increase consumer education and knowledge of basic nutrition information as well as the importance of beneficial dietary selection (NLEA; Porter & Earl, 1990).

As mentioned previously, in conjunction with the NLEA, the USDA and DHHS re-establish daily dietary recommendations every five years for children and adults over the age of two (Dietary Guidelines for Americans, 2011). These guidelines form the basis of NLEA initiatives, labeling, and education. The importance of disseminating this knowledge cannot be emphasized enough. For example, a rudimentary awareness of the recommended daily consumption of unsaturated fat, cholesterol, and sodium, as well as the consequences and benefits of these nutrients, is considered key to making informed nutritional decisions (Levy, Fein, & Stephenson, 1993). Therefore, initiatives to increase consumers' knowledge of nutrition information and recommended guidelines could improve food selection. Because of the NLEA's labeling initiatives, most people in the United States have been exposed to simple nutrition

information and dietary messages. Yet, procedural use of this information is found to be modest (Patterson, Haines, & Popkin, 1994).

Despite the availability of nutrition information, consumers generally do not understand or utilize this knowledge effectively and, at times, ignore it (Moorman, 1990; Rotfeld, 2008a, 2008b; Rotfeld, 2010). Some researchers have hypothesized that the dissonance between awareness of information and its use is due to factors such as: (1) low motivation to use the information, (2) lack of understanding of the information, and (3) difficulty incorporating the information into one's daily life (Jacoby et al.). Therefore, nutrition interventions should address motivation and include procedural knowledge that would facilitate the translation of nutrition information into daily life.

Social-psychological factors. To develop interventions for improved interpretation and application of nutritional knowledge and improved dietary choices, researchers must understand the interpersonal and intrapersonal factors that influence health decisions. Social and psychological factors influencing the application of nutritional knowledge and food selection include health literacy, health value, and autonomy in health decision-making.

Health literacy is defined as the extent to which individuals have the ability to obtain, process, and understand basic health information needed to make beneficial health decisions (U.S. Department of Health and Human Services, 2000). It is estimated that 90 million U.S. adults have limited health literacy. Individuals from lower socioeconomic groups and those with limited English-language proficiency are less health-literate than their peers (Kutner, Greenberg, Jin, Paulsen, & White, 2006). Further, low health literacy is associated with health disparities such as poor nutrition and weight gain (Howard, Sentell, & Gazmararian, 2006; Osborn, Paasche-Orlow, Davis, & Worth, 2007; Sentell & Haplin, 2006). Thus, although individuals

might encounter nutritional information on a day-to-day basis, their ability to understand and implement the information in their lives might be limited. Health literacy is just one factor that influences an individual's understanding and use of health information. Other social-psychological factors such as health value, locus of control, self-esteem, and self-efficacy will be reviewed in the following paragraphs.

Health value can be described as an overall belief that a specific health-promoting behavior is preferred over an alternative that might include risky health behaviors (Palank, 1991; Sands, Archer, & Puleo, 1991; Sapp & Jensen, 1998). Individuals with a more positive health value towards nutrition will presumably make better dietary decisions. Research suggests that when a high value is placed on health, and the individual sees the benefits of change, s/he develops stronger intentions to act in health-promoting ways (Palank; Sands et al.; Sapp & Jensen).

A related factor is health locus of control, or an individual's perception of control over his/her health. Three separate aspects of one's belief about health control can be measured: Internal, Chance, and Powerful Others. If individuals believe they can influence their health, and that their behavior has a positive effect on their health, they have "Internal" beliefs. In contrast, "Chance" and "Powerful Others" beliefs reflect the idea that health is under the control of fate, destiny, or other people (Wallston, Wallston, & De Vellis, 1978). Those who tend to have an internal locus of health control take more action with their health decisions and have better overall health behaviors (Bodecs, Horvath, Szilagyi, Nemeth, & Sandor, 2010). For example, an internal locus of control is associated with success in weight management programs and healthier food selection (Abusabha & Achterber, 1997; Byrne, 2002; Richman, Loughman, Drouler, Steinbeck, & Caterson, 2001).

More subtle mechanisms influencing dietary choice within the individual are self-esteem and self-efficacy; most researchers see these two constructs as related. Individuals with higher self-esteem typically place a higher value on their health and express stronger intentions to maintain their lifestyle in the future (Kelly, Zyzanski, & Alemagno, 1991; Rosenstock, 1974). Conversely, low self-esteem may be the result, or cause of, poor health choices (Hudd et al., 2000). Furthermore, an internalized identity as a "healthy eater" who is concerned about their diet, is associated with intentions to make healthy food selections (Armitage & Conner, 1999; Astrosm & Rise, 2001; Sparks & Guthrie, 1998; Sparks, Shepherd, Wieringa, & Zimmermanns, 1995).

Self-efficacy for health behaviors is strongly related to self-esteem and is defined as the overarching belief that one can successfully engage in health-promoting behaviors (Bandura, 1997, 2004). Self-efficacy drives behavioral choices, even in the presence of environmental demands (Bandura). Individuals with higher self-esteem generally have greater self-efficacy to make changes that promote their health (McAuley, Pena, & Jerome, 2001). Further, individuals with high self-efficacy are more likely to use complex nutrition knowledge and information, such as food labels, to implement a healthy eating plan (Brug, Lechner, & de Vries, 1995; Rimal, 2000; Satia, Galanko, & Neuhouser, 2005). Therefore, individuals who feel they have the ability and means to do so will be more likely to make healthier nutritional choices (Motl et al., 2002; Rodgers, Hall, Blanchard, McAuley, & Munroe, 2002; Schwarzer & Fuchs, 1996).

Self-determination theory. A health behavior model with particular relevance to college students is self-determination theory (SDT; Deci & Ryan, 1985). Developed from experiments designed to understand how external factors (praise, rewards, etc.) influence intrinsic motivation (achievement of goals for inherent satisfaction and needs fulfillment), SDT

is considered a theory of personality and self-motivated behavior change (Deci & Ryan, 1980). SDT evolved to explain how extrinsic motivational factors are internalized and might help an individual learn to self-regulate behaviors and make autonomous decisions in daily life (Deci & Ryan, 1985; 2000). Decisions made autonomously are more stable than decisions made with or by others, are implemented with greater care and quality, and are more likely to foster positive experiences (Ryan & Deci, 2000). Central to SDT is the belief that people have an innate organizational tendency toward growth, integration of the self, and the resolution of psychological discrepancies (Ryan, 1995; Ryan & Deci). SDT pays careful attention to social and cultural factors that might help or hinder the development intrinsic motivation for decision-making (Deci & Ryan, 1985; Ryan & Deci), making this approach particularly well-suited for research with college students.

SDT proposes that an autonomy-supporting environment will foster the satisfaction of three related needs: autonomy, competence, and relatedness. When the three aforementioned needs are met, intrinsic motivation (also known as self-determined motivation) will guide behavior and improve cognitions, behaviors, and overall well-being and, in theory, improve health behavior (Deci & Ryan, 1985). Competence refers to control, mastery, and the belief in one's efficacy to make autonomous decisions. Relatedness is the need to interact and be connected with others. Lastly, autonomy in the context of SDT, is defined as the innate need to be an active and instrumental agent of one's life (Deci & Ryan). Autonomy is seen not simply as an individual need in SDT, but rather as a mechanism that supports both relatedness and competence. Therefore, satisfying the need for autonomy is mediated by actions intended to satisfy competence and relatedness needs (Deci & Ryan). This holds particular relevance to college students who are frequently faced with the task of autonomous decision-making in the

context of trying to achieve competence in living independently and seeking connectedness with peers who are now the prominent social force in their lives. Overall, the three central needs interact to foster intrinsic motivation and increased self-regulation of behaviors.

Ryan, Deci, and Williams (2008) conducted a review of interventions for improved health behaviors using SDT. Findings suggested that support and autonomous self-regulation were vital for a variety of psychological and physical health outcomes including depression, anxiety, somatization, quality of life, tobacco cessation, physical activity, weight loss, diabetes management, oral health, and medication adherence. Relevant to the current study, physical activity and nutrition have been studied within the framework of SDT. Williams and colleagues (1996) enrolled participants in a weight loss program for patients with morbid obesity. Their study involved a 26-week program including a very low-calorie liquid diet for the first 13 weeks, with the gradual introduction of normal foods over the final 13 weeks. Treatment also included once-weekly group sessions with 12-15 individuals to discuss challenges involved in the weight loss process, facilitate peer support, and provide techniques for self-monitoring diet, physical activity, and weight. Researchers found that those with greater autonomous self-regulation for the program had better program attendance and reductions in body mass index (BMI). Notably, autonomous self-regulation for the program predicted long-term BMI change more than one year after the end of treatment. Consistent with Williams and colleagues' results, Pelletier and colleagues (2004) found that autonomous (versus controlled) regulation of eating patterns was associated with healthier eating and greater well-being in college students.

Silva and colleagues (2009) examined the effect of an SDT-based, one-year weight management intervention on SDT-relevant psychosocial mediators (perceived need support, treatment self-regulation, locus of control, intrinsic motivation, etc.), physical activity, and body

weight and composition. Participants were 239 women who participated in either an intervention focused on encouraging autonomous forms of exercise regulation and intrinsic motivation, or a general health education program. At the end of the program, the SDT intervention group manifested greater weight loss and higher levels of physical activity compared with the general health education group ($p < 0.001$). Moreover, the SDT group evidenced more autonomous self-regulation (for treatment and for exercise) and perceived a more autonomous treatment climate. These results indicate that increasing individuals' beliefs of autonomy, competence, and social support (relatedness) promotes positive behavior change.

Although few studies have analyzed the use of SDT in the general public for improved dietary choice alone, these studies indicate that utilizing this framework offers promise for future research and public policy. Many health policies attempt to motivate individuals through the use of contingencies of reward and punishment. Although the intention is positive, this controlling, fear-based approach to public health policy tends to promote defiance, resentment, and poorer psychological health. Moreover, these appeals are largely ineffective (Assor, Roth, & Deci, 2004; Deci & Ryan, 1985; Ryan & Deci, 2000; Ryan & Grolnick, 1986). In contrast, autonomy-supportive policies do not use pressure to manipulate individuals' experiences or behaviors but, instead, help them make choices within contexts in which they are provided relevant information and quality alternatives (Moller, Ryan, & Deci, 2006). A policy that is supportive of autonomy provides meaningful information in a way that is not intended to frighten or pressure. Autonomy-supportive communications based on SDT allow people to carefully consider what is right for them. This encourages people to be directed by their own competencies and values, and can prompt change that is more likely to be maintained over time because the approach

facilitates internalization of extrinsic motivation, and the development of intrinsic motivation, and autonomous self-regulation (Moller et al.).

Nutrition Policy

National efforts. College students are not the only group impacted by obesity and poor food selection. The deterioration of dietary habits and subsequent increases in chronic health conditions among adults in the United States are a major focus of social discussion and policy. Obesity is associated with the most prevalent and costly medical problems seen in daily practice (Graham, 1999; Ludwig & Pollack, 2009). It is estimated that the economic cost of obesity and inactivity account for approximately 9.4% of the national health-care expenditures in United States (Graham), and obesity-attributable costs amounted to more than $100 billion in 2009 (Ludwig & Pollack).

As mentioned previously, the NLEA of 1990 provided a regulatory framework for nutrition labeling and education; however, consumer information, education, and protection have been a focus of research since the late 1960's (Baltas, 2001; Cowburn & Stockley, 2003; Drichoutis, Lazridis, & Nayga, 2006). Health, economic, and social factors have driven the dissemination of nutritional knowledge to influence consumers' dietary choices and public policy. It is therefore vital to understand the scientific basis for these policy decisions, identify their outcomes, and use these data to inform future policy directions.

Policy interventions are typically categorized into three main frameworks: downstream, upstream, and midstream (McKinlay, 1995). Downstream efforts include approaches such as counseling and self-help programs targeting individuals with identified risk factors for particular health issues (e.g., improper diet, sedentary lifestyle, obesity, diabetes; McKinlay). Downstream efforts typically have high costs relative to their reach and efficacy (Ammerman, Lindquist,

Lohr, & Hersey, 2002). Upstream approaches involve national campaigns and policy regulations that occur at a macro-level to strengthen social norms and support for health behaviors. The macro-environment includes a range of settings outside of the home (e.g., schools, restaurants, cafeterias, community settings) and is not limited to one particular context (McKinlay). Macro-environmental changes include taxing or subsidizing select foods, manipulating the rapidity and ease with which food is obtained, and restricting access to foods (Faith, Fontaine, Baskin, & Allison, 2007).

"Healthy People 2020" represents a large upstream policy initiative to increase the overall health of U.S. citizens (Healthy People 2020, 2012). In particular, "Healthy People 2020":

> Provides science-based, 10-year national objectives for improving the health of all Americans…Healthy People has established benchmarks and monitored progress over time in order to: encourage collaborations across communities and sectors, empower individuals toward making informed health decisions, and measure the impact of prevention activities (para. 1).

One of the main components of "Healthy People 2020" (2012) is a focus on "Nutrition and Weight Status," which includes specific objectives such as emphasizing the benefits of eating a healthy diet, maintaining a healthy body weight, and a focusing on individual health-promoting behaviors. Additionally, specific objectives related to nutrition and weight status focus on policies and environmental changes that promote healthy dietary behaviors in settings such as schools, worksites, health care organizations, and communities (Healthy People 2020). Examples of specific objectives include (1) state-level incentive policies for food retail, retail access to foods recommended by Dietary Guidelines for Americans, (2) reducing food insecurity,

(3) increasing fruit, vegetable, and whole grain intake, and (4) reducing the number of children, adolescents, and adults with obesity (Healthy People 2020). These objectives provide a foundation and support for clinical research and subsequent policy changes such as nutritional labeling.

The third form of policy initiatives is midstream approaches (McKinlay, 1995). Midstream efforts are population-level interventions such as school and community-based designs focused on changing or preventing destructive health behaviors. Midstream initiatives typically involve organizational partnerships and are conducted in the natural environment in which health decisions are made (McKinlay). One such example is point of purchase (POP) marketing (McKinlay; Orleans, 2000). All three frameworks (downstream, upstream, and midstream) have been implemented in the fields of public health, marketing, and consumer behavior. These fields have provided important research on the effectiveness of these frameworks and their use in creating and evaluating nutrition-related public policy, with a primary emphasis on understanding the effectiveness of nutritional labeling.

Nutrition labeling. With the adoption of the NLEA, the labeling of nutrition information on food packaging became a normative and regulated practice. Extensive research has investigated how on-package labeling (e.g., content and wording), socio-demographic characteristics (e.g., age, gender, socioeconomic status), and personal factors (e.g., health motivation and ability) influence the effectiveness of nutrition labeling (Hieke & Taylor).

On-package labeling includes both qualitative and quantitative information about nutritional content, recommendations, disclosures, and health claims found on food packaging (Hieke & Taylor, 2012). NLEA requires display of certain nutritional information such as percent daily value, caloric content, and ingredients (NLEA, 1990). Research has indicated that

the content and wording of labels influences consumers' utilization of nutritional information and food selection. Consumers prefer labels containing detailed information such as values of certain nutrients or adjective descriptors (e.g., "high/low") for ease of comprehension (Asam & Louis, 1973; Freiden, 1981; Lenahan et al., 1973; Scammon, 1977; Viswanathan & Hastak, 2002); simple and succinct information is most likely to be used (Kendall, 1986).

The benefit of on-package labeling in any form is largely determined by individual literacy for nutritional information. Viswanathan, Hastak, and Gau (2009) found that high-literate individuals were the only ones to benefit from on-package labeling and formatting, and that comprehension of such information required prior exposure to and *proficiency* with nutritional knowledge for on-package labeling. Percent daily values are generally unhelpful, as individuals have a difficult time converting these facts into actual serving sizes and portions (Block & Perachhio, 2006; Li, Miniard, & Barone, 2000). In addition, although consumers report preferring a large amount of detailed information, this breadth of details can overwhelm them and result in decreased ability to understand and use on-package labeling (Block & Peracchio; Burton, Biswas, & Netemeyer, 1994; Levy, Fein, & Schucker, 1996; Scammon, 1977).

Overall, succinct, qualitative information is preferred over more comprehensive (and less interpretable) quantitative information (Burton, Craig, & Netemeyer, 2000; Scammon, 1977; Viswanathan, 1994, 1996). Therefore, caloric and other nutritional information as typically presented on packaging and menus might not be the most effective way to influence consumers' health information knowledge and utilization.

Certain socio-demographic factors have also been associated with utilization of nutrition labels. Some research has identified a negative relation between age and application of

nutritional information suggesting that, as people age, they search for information less diligently and accurately than younger individuals (Cole & Balasubramanian, 1993; Wang, Fletcher, & Carley, 1995a). Thus, younger individuals might be more receptive to nutritional education and policy efforts. Education is another socio-demographic factor found to influence nutrition comprehension. Individuals with higher educational levels tend to use food labels more than their less-educated peers (Klopp & McDonald, 1981). A higher level of education might result in increased awareness of the importance of nutrition, and an enhanced ability to comprehend and interpret food labels (Feick, Hermann, & Warland, 1986; Nayga, Lipinski, & Savur, 1998; Wang, Fletcher, & Carley, 1995a, 1995b). It is also likely that higher educational levels are confounded with higher socio-economic status (Hieke & Taylor, 2012). People with greater economic resources are more likely to have the ability to pick and choose among various foods. Nonetheless, because of the relation between educational level and use of nutritional information, some argue that nutrition policy efforts should be tailored to specific educational levels, while still others believe a universal (and easily interpretable) message should be used to reach the greater public.

Consumers' comprehension of nutritional information is also influenced by motivational factors such as health beliefs and self-efficacy. Wang, Fletcher, and Carley (1995a) found that the importance of nutrition to the individual is positively associated with his/her comprehension of nutrition labeling information. Moreover, Feick, Hermann, and Warland (1986) found that an individual's perception of the effect of the specific food on his/her future health was positively linked to use of the nutritional information. In contrast, Nayga (2000) and Nayga, Lipinski, and Savur (1998) did not find that nutritional knowledge or importance influenced actual behavior. Many have recommended advances in labeling beyond the NLEA requirements such as front-of-

package (FOP) labeling and menu labeling to influence individual nutritional choices when eating outside the home (Heike & Taylor, 2012). This might be particularly important for college students who, as mentioned previously, consume most of their meals outside of their residence, rely on dining halls, and rarely prepare their own meals (Davy et al., 2006; Greaney et al., 2009; Nelson et al., 2009).

Menu labeling. In addition to nutrition composition labeling on packaged food, menu labeling has become a hotly debated policy topic in recent years. Over the last three decades, the average American's yearly expenditures on food purchases outside the home have risen 20%, and now account for nearly half of all yearly food costs (Lin et al., 1999). Bates, Burton, Higgins, and Howlett (2011) found that calorie content of menu items might be underestimated by more than 20%. Another study found that even individuals with high nutritional knowledge underestimated calorie amounts by an average of 200-600 calories (Backstrand, Wootan, Young, & Hurley, 1997). Miles and Scaife (2003) found that once patrons were made aware of the nutritional and caloric content of foods, they were less likely to report intentions to repurchase foods perceived as less healthy, suggesting that nutrition information strengthens the association between the perceived healthfulness of the item and repurchase intentions.

The Patient Protection Act of 2010 includes a section that requires calorie labeling on restaurant menus that are part of a chain with 20 or more locations doing business under the same name. However, restaurants can simply provide the information on pamphlets distributed upon customer request and/or online rather than on the physical menu displayed in stores (Patient Protection Act, 2010). Some fast-food restaurants have implemented these changes by placing nutritional information on food packaging itself or on tray liners, only accessible to consumers after they have ordered the food. Other restaurants have introduced new products for health-

oriented consumers (e.g., salads, grilled chicken). The acceptability of these products was initially positive, but might be limited, as people already inclined to choose healthy options seek and purchase these menu items, or do not typically dine out at fast-food restaurants (Consumer Reports, 1996; Warner, 2005).

Consumer perceptions of the acceptability of menu labeling are not well known. Major criticisms of menu labeling have come from those arguing for freedom of consumers' choice, those in the food industry that fear reduced sales and income due to menu labeling, those who advocate for eating disorders prevention, and those who argue that menu labeling is too focused on weight management (Puhl & Heuer, 2010; Schwartz & Henderson, 2009). In particular, food corporations are opposed to menu labeling and argue that the nutritional composition of their menu items is available on the Internet or by request. Although nutritional information is available by request, this process requires consumers to seek out the information before visiting the restaurant (Berman & Lavizzo-Mourey, 2008). Corporations also argue that they offer menu information on after-purchase packaging or tray liners. As noted, this approach does not help consumers make decisions before purchasing foods and beverages (Consumer Reports, 1996; Warner, 2005). Major restaurants also contend that the nutritional analysis needed to present accurate information is a major cost burden yet, these claims are not well-supported as many view the cost of analyses as insignificant compared with the potential effect on revenue (Berman & Lavizzo-Mourey).

Further arguments against menu labeling come from advocates of individuals with eating disorders, who argue that increasing awareness of caloric content might make some individuals overly conscious of their food selection, leading to an increase in disordered eating behaviors such as extreme dietary restriction, or promoting stigma of overweight individuals if they choose

higher calorie items (Puhl & Heuer, 2010; Schwartz & Henderson, 2009). Lastly, some argue that menu labeling promotes the message that nutritional information is presented for the sole purpose of weight management rather than a focus on healthy lifestyle choices and preventive health measures (Bates et al., 2011; Hawks & Gast, 2000).

Social marketing. To address nutrition and healthy lifestyle initiatives, many researchers and policy makers have turned to social marketing (Kotler & Zaltman, 1971; Lee & Kotler, 2011). In contrast to traditional marketing efforts aimed at satisfying consumers' needs and wants, social marketing is defined as efforts to alter a target audience's attitudes and/or behaviors as well as thoughts and values (Lee & Kotler). Social marketing attempts to promote the acceptability of an *idea* rather than a product. Therefore, many in public health have used social marketing to influence improved voluntary health decisions such as smoking, physical activity, safe sex practices, and nutrition choices, and largely consider behavior change as the primary marker of a successful social marketing campaign (Holdsworth & Haslam, 1988; Maibach, Rothschild, & Novelli, 2002; Thompson, Parrott, & Nussbaum, 2003). Social marketing focuses on: (1) the importance of understanding your audience, (2) delineating a clear, active behavioral step you want the audience to take, (3) understanding the allure of competing behaviors and offering the audience an appealing exchange in return for trying the new behavior, and (4) reliance on the four P's of social marketing described below (Turning Point, 1997). The following section describes the process, goals, and specific strategies used in social marketing.

Social marketing is most effective when researchers understand the target audience's perceived barriers to performing the desired behavior and, subsequently, market an appropriate exchange behavior (small, feasible change) that enhances the perceived benefits to the target audience and makes it more likely for these individuals to engage in the behavior (Turning Point,

1997). Therefore, the social marketer's goal is to, "make the environment more favorable for the desired behavior through the development of choices with comparative advantage, favorable cost-benefit relationships, and time and place utility" (Thompson et al., 2003, p. 237).

Social marketing seeks to increase awareness, engagement, behavior, social norms, and well-being (Luca & Suggs, 2010). Social marketing is further characterized by six benchmarks: (1) behavior change (clear focus on behavior and specific goals), (2) consumer research (understanding the needs, values, and experiences of the target audience), (3) segmentation and targeting (selected target audience and tailored intervention), (4) exchange (incentives, rewards, cost-benefit of change), (5) competition (internal and external competing factors for behavior change), and (6) marketing mix (combination of social marketing elements; Luca & Suggs). The benchmark of "marketing mix" is further broken down into four main elements known as the four P's: product, price, place, and promotion (Thompson et al., 2003; Turning Point, 1997). First, product is defined as the desired behavior the marketer is asking of the audience, and the benefits, tangible objects, and/or services that enhance the likelihood of behavior change. Second, price is the cost (financial, emotional, psychological, and logistical) or barriers the audience must incur to perform the new behavior. Third, place is defined as where audience members are encouraged to perform the desired behavior, where they will be exposed to the campaign materials, or where they are contemplating the new behavior. Fourth, promotion is the development and implementation of the behavior change message through different materials, channels, and activities (Thompson et al.; Turning Point).

Some research has investigated the application of social marketing to nutrition interventions (Johnson, Bellows, Bechstrom, & Anderson, 2007; Shive & Neyman-Morris, 2006; Young, Anderson, Bechstrom, Bellows, & Johnson, 2004; Wechsler, Basch, Zyber, & Shea,

1998). Luca and Suggs (2010) conducted a review of the first strategy of the marketing mix: product. The authors reviewed how interventions' choice of product messaging was implemented and how this messaging affected outcomes such as awareness, engagement, behavior change, social norms, and well-being. Examples of intervention methods include particular product positioning such as "fruit as an energy booster," linking nutrition with academic performance, proposing low fat options as a "cool" alternative, and positioning new foods as "fun and tasty." In addition, studies addressed the second strategy of the market mix, price, by lowering the costs of healthy options, providing data on the cost-benefit analysis of making healthier choices, and emphasizing the "right price" for health (Johnson et al.; Shive & Neyman-Morris; Young et al.; Wechsler et al.).

The third strategy in the marketing mix is "place." Nutrition interventions reviewed by Luca and Suggs (2010) were conducted in environments such as campus dining centers and cafeterias. Some studies also utilized the Internet or e-mail messaging as a means of providing nutrition information. The fourth strategy, "promotion" was addressed with mass media print materials, direct mailings, website listservs, and social events. These promotion strategies used techniques such as calling consumers to action, using humor, and positive (rather than fear) appeals (Johnson et al., 2007; McDermot et al., 2005; Shive & Neyman-Morris, 2006; Young et al., 2004; Wechsler et al., 1998).

Overall, in studies that used a mix of social marketing strategies, participants showed increases in awareness of the target health behavior and significant behavior changes, such as improved nutrition and food selection (Johnson et al., 2007; Wechsler et al., 1998). Based on these findings and those of other studies, recommendations have been made to implement social marketing most effectively. Researchers suggest a process of planning and strategy

development, selection of channels and materials, development of materials and pretesting, implementation, assessing effectiveness, and using feedback to refine the program (Shive & Neyman-Morris, 2006). Therefore, with successful implementation of the process and marketing mix, social marketing endeavors such as POP labeling, FOP labeling, and other environmental policies focused on health promotion provide a unique and promising avenue for change.

Point of purchase nutrition information. POP marketing represents a new and emerging form of social marketing largely geared towards improving consumers' dietary habits in the moment (Maibach et al., 2002). Some believe that POP information might be the most effective and efficient way to reach a large number of consumers. POP information is separate from nutrition and menu labeling as it typically focuses on more succinct, user-friendly formatting. There are currently four shelf-tag POP campaigns in grocery stores in the U.S. that use graphics and easy to interpret symbols to guide patrons to healthy options; however, these programs are not widely implemented. These campaigns are: (1) “Hannaford Guiding Stars”, (2) “NuVal Nutritional Scoring System”, (3) “Stop&Shop Healthy Ideas”, and (4) “Nutrition iQ”.

As an example, the “Guiding Stars Program” assigns between one and three stars to food items based on their nutritional value (with more stars indicating better nutritional content; Hannaford Guiding Stars, 2013). The “Guiding Stars Program” was shown to change food purchasing immediately after implementation, and these changes remained significant one and two years later (Sutherland, Kaley, & Fisher, 2010). Researchers further compared the same eight-month period (January-August) between years; in 2006, 24.50% of items purchased earned a star rating. This was significantly increased to 24.98% and 25.89% at the one and two year follow-up periods, respectively. For a four-week period, one year after the Guiding Stars implementation, consumers purchased significantly more ready-to-eat cereals with stars (e.g.,

less added sugars, more dietary fiber) and fewer no-star, high-sugar, low-fiber cereals (Sutherland et al.). Similar favorable effects on purchasing patterns have been found with the "Nuval Nutritional Scoring System", "Stop&Shop Healthy Ideas", "Nutrtion iQ" and similar POP programs (Katz, Njike, Rhee, Reingold, & Ayoob, 2010; Levy, Shucker, Tennery, & Mathews, 1985; Narhinen, Nissinen, & Puska, 2000; Rodgers et al., 1994; Russo, Staelin, Nolan, & Russell 1986a; Schucker, Levy, Tennery, & Mathews, 1992). Results from these programs suggest a positive direction for large-scale POP campaigns, as they are relatively easy to implement, provide simple and user-friendly messaging, and have been shown to create positive behavior change.

Collegiate nutrition interventions. Despite the evidence for the importance of creating and implementing interventions to increase college students' food selection, little research has investigated best practices for reaching this population. Nutritional interventions for college students are typically implemented in one of three ways: in-person, online, or environmental. In-person interventions involve direct (individual or group) nutrition education, and teach skills such as self-monitoring and goal setting. Ha and colleagues (2009a, 2009b) found that a nutrition education course improved dietary choices as measured by a three-day food log. Similarly, Schnoll and Zimmerman (2001) found that teaching self-monitoring and goal setting improved fiber intake. However, results from other classroom-based interventions produced mixed results, and researchers noted difficulty ascertaining which components of the program were most effective (Heckler, Gardner, & Robinson, 2010; Werch et al., 2008).

Online interventions have become more popular in recent years due to their cost-effectiveness and ability to reach a large amount of people. These interventions have targeted basic nutrition, outcome expectations, self-regulation, self-efficacy, stage of change, and actual

intake. For example, Poddar and colleagues (2010) found that a web-based education course improved students' self-regulation and efficacy but not actual intake. Other studies have found a similar lack of improvement in dietary intake but did find that web-based interventions moved students forward in stages of change and improved their self-efficacy (Clifford, Anderson, Auld, & Champ, 2009; Franko et al., 2008; Richards, Kattelman, & Ren, 2006).

Environmental interventions include using POP techniques such as eye-catching, visual information to capture consumers' attention and influence their food selection. POP materials utilized in college interventions include signage with popular characters, food labels, specific program logos, and brochures placed next to target items, at various points in dining centers, and in residence halls (Buscher, Martin, & Crocker, 2001; Freedman & Connors, 2010; Peterson, Duncan, Null, Roth, & Gill, 2010). Buscher and colleagues found that "benefit-based messages" were most useful and accepted in college settings. Benefit-based messages focus on positive aspects of improved food selection that are relevant to students such as taste, body leanness, having more energy, and improved overall health (Buscher et al.).

Peterson and colleagues (2010) studied college students' intake and their perceptions of access to healthy foods. They distributed materials with a vibrant logo at the entrance of the cafeteria and above and next to ten select food items. Informational materials and signage focused on the taste, energy, health, and body leanness provided by each food option. At the end of the intervention, researchers found an increase in consumption of low-fat salad dressing and cottage cheese, and less consumption of fast food and soft drinks. Additionally, 22% of students reported increased awareness of healthy options available to them; this awareness was associated with healthy changes in food selection and eating habits (Peterson et al.). Overall, POP

interventions appear to yield small but important improvements in nutritional intake and selection of target items.

In a similar study, Freedman and Connors (2011) implemented a POP marketing program in an on-campus convenience store to study the buying habits of multi-ethnic students at a large urban university. Entitled, "Eat Smart," POP materials included shelf-display tags with the verbiage, "Fuel Your Life" placed directly beneath seven categories of targeted food items (e.g., cereal, bread, soup, crackers, canned vegetables, granola/energy bars, and salad dressing). In addition, the researchers created educational posters and brochures with the phrase, "Eat Smart, Feel Smart and Be Smart" to direct or, "navigate," consumers to the shelf tags. Baseline sales data were collected for six weeks followed by the presentation of promotional POP materials for five weeks. Although there was no significant difference in sales of any food items between baseline and the intervention period, the proportion of sales of the tagged items increased. Thus, Freedman and Connors appeared to develop a non-invasive and easy to interpret POP campaign that improved food selection in a multi-ethnic college-aged population.

In sum, repeated exposure to POP nutrition information during the college years might have a positive effect on the nutritional knowledge and eating habits of emerging adults (Buscher et al., 2001; Conklin, Lambert, & Cranage, 2005a, 2005b; Evans & Sawyer-Morse, 2002; Shive & Morris, 2006). However, more research is needed related to the message, channel, and duration of exposure needed to encourage young adults to increase their FV intake.

Current Study Aims

The current study had three primary aims. The first aim was to develop a social marketing campaign focused on fruit and vegetable intake, including recommendations and suggestions for incorporating these foods into young adults' current diets. In this "material

development" phase of the study, message concepts were developed based on prior research. Focus groups were then conducted with 24 college students to inform the development of the final version of the marketing campaign materials. Completion of the material development phase resulted in a version of the marketing campaign that was implemented in campus dining facilities.

The second aim was to implement the social marketing campaign in dining locations at Virginia Commonwealth University (VCU). In this second stage of the project, the "material implementation" phase, marketing materials were displayed at two dining locations (Bleeker Street Deli and Cary Street Market and Deli). Sales data of carrots, apples, and chips were assessed before, during, and after the material presentation (20 days off, 20 days on, 20 days off). The primary outcome for the material implementation phase was sales of fruits and vegetables during the three time-points. It was hypothesized that the materials would create an increase in sales of healthy items and a decrease in sales of unhealthy items when they were displayed. In addition, sales of healthy items would decrease and sales of unhealthy items would increase somewhat following the materials' display.

The third and final aim of this study, the "material perspectives and psychological factors" phase, was to evaluate young adults' awareness and perceptions of the developed campaign, including its feasibility, acceptability, and effectiveness. An intercept survey was conducted to assess exposure, comprehension, and impact of the materials as well as other social and psychological factors that might contribute to healthy eating. The intercept survey was conducted with a total of 303 emerging adult diners during all three study periods (before, during, and after implementation of the materials). They also completed a battery of self-report measures including Demographics, The SF-36, Block Food Screener, Nutrition Knowledge

Questionnaire, General Self-Efficacy Scale, Dimensions of Identity Development Scale, and the Treatment Self-Regulation Questionnaire-Diet. It was hypothesized that young adults who reported greater self-efficacy, generally positive perceptions of their health, higher self-regulation for their diet, and more commitment to identity development would exhibit greater nutritional knowledge, higher FV intake, and lower fat/meat/snack intake.

Methods

Part I

Material development and implementation methods. Marketing messages were developed based on prior research investigating what college students look for in nutrition information and what has been utilized in similar studies (Buscher et al., 2001; Davy et al., 2006; Freedman & Connors, 2010; Greaney et al., 2009; Horacek & Betts, 1998; Nelson et al., 2009; Peterson et al., 2010). All messages focused on FV serving recommendations (Centers for Disease Control and Prevention, 2012) and specific reasons for including these foods in young adults' diets, but differed in the factor emphasized (e.g., appearance, finances, peer influence, health). The health models reviewed above, with an emphasis on SDT, were utilized to guide the development of the messages (Bodecs, Horvath, Szilagyi, Nemeth, & Sandor, 2010, Burton, Craig, & Netemeyer, 2000, Moller, Ryan, & Deci, 2006; Rimal, 2000; Ryan & Deci, 2000, Satia, Galanko, & Neuhouser, 2005). The overarching goal was to design a campaign that would promote an internal locus of control, autonomy in decision-making, and self-efficacy with the use of a benefit-based message. Creation of the materials also included specific attention to features such as the format, color, and wording.

Focus group participants. Once several message concepts were developed based on formative research and templates found effective in prior studies, 24 young adults (ages 18-25)

attending VCU were recruited to participate in focus groups addressing perceptions of these messages and suggestions for improvement. Participant demographics can be found in Table 2.1. Participants were presented with the message concepts and asked to provide their opinions regarding their acceptability, usability, and suggestions for improvement (see Appendix A for Focus Group protocol). Participants were recruited via flyers and advertisements placed throughout campus, and were excluded if they do not meet age requirements or if they were not current VCU students. Focus groups were audio-recorded and participants were given $15 as compensation for their time.

Table 2.1

Focus Group Participant Demographics.

	Frequency	**Percentage**
Race/Ethnicity		
Black/African American	7	29%
White/Caucasian	6	25%
Asian-American	5	21%
Hispanic/Latino	2	8%
Other	4	17%
Gender		
Female	18	75%
Male	6	25%
Year in School		
Freshman	1	4%
Sophomore	5	21%
Junior	10	42%
Senior	8	33%

Material development measures. In addition to assessing perceptions of acceptability and general opinions of the marketing materials, the focus group protocol included questions regarding perceptions of nutrition policy, barriers to healthy eating on a college campus, values and opinions regarding nutrition, and ideas for improving dietary intake among young adults. This information provided a unique, in-depth, and subjective examination of young adults' views

regarding this public health issue and feasible approaches to its amelioration.

Material development analyses. Focus group data were transcribed by undergraduate research assistants and verified by myself. Thematic analysis (Braun & Clarke, 2006) was conducted to identify major themes and beliefs toward nutrition policy, and the perceived feasibility, effectiveness, and acceptability of the developed social marketing campaign. Results from the focus groups as well as continued consultation were used to finalize the materials and prepare them for implementation.

Material implementation participants. Once developed and finalized, the marketing materials were prepared for implementation. These materials were placed in two dining locations on the VCU campus that offer similar menus (Cary Street Market and Deli and Bleeker Street Deli). Students can purchase food through their dining plans or out of pocket at both of these locations. The VCU student body consists of ~24,000 undergraduate students: 57% female, 59% European American, 21% African American, 13% Asian, and 7% Latino. Each location includes a deli area where individuals can make numerous sandwich selections and choose various side options.

Material implementation measures. Data from the sales of apples, chips (both sold with a meal and sold alone), and carrots were collected for 20 weekdays (4 weeks) to establish baseline-purchasing behavior (baseline). Following this baseline assessment period, marketing materials were placed in the two dining facilities and sales data were obtained during this "implementation" phase. Materials were placed in highly accessible and visible areas (front entrance to both locations on 24 x 36 posters) and remained for 20 weekdays (implementation). Materials were implemented in the locations concurrently to control for any history effects. After 10 days, the two themed materials were switched to address any location effects. Finally,

the marketing materials were removed from both locations and sales data were obtained for another 20 weekdays (washout).

Material implementation analyses. SPSS 22.0 was used for all data entry and analyses. Data were entered by myself and verified by research assistants at VCU. Mean sales data across all three time-points for each location and item were obtained. It was hypothesized that the marketing materials would produce increases in FV sales and, further, that the sales of these products during the washout period will be similar to that of baseline, providing evidence for the effectiveness of the campaign and need for continuous implementation.

Part II

Material perspectives and psychological factors methods. A brief intercept survey was administered during each phase of the study. This approach was utilized in prior research and assessed consumers' behaviors, attitudes, and intentions as well as opinions of the materials. Participants across all time points also completed a self-report survey battery consisting of measures assessing nutrition knowledge, health-related quality of life, current diet, self-efficacy for diet improvement, and identity development.

Material perspectives and psychological factors participants. 303 students (aged 18-25, m_{age} = 19.55) were recruited and surveyed from the two dining locations (n = 152 at Cary Street Market and Deli, n = 151 at Bleeker Street Deli) to complete the survey battery. Participants were excluded if they did not meet age requirements (18-25), if they did not purchase food from the location that day, and if they had previously participated in the study. Participants were provided $5 for their time and participation.

Survey respondents represented various years in school: 41.9% were first-year students, 20.5% were sophomores, 21.5% were juniors, 14.9% were seniors, and 1% were taking

graduate-level courses. They were also diverse in terms of ethnicity: 47.2% identified as White, 18.2% identified as African-American, 16.5% identified as Asian-American, 11.2% identified as "other", and 6.9% identified as Hispanic. 53.2% of participants were female; 46.5% were male, and 0.3% did not answer.

Material perspectives and psychological factors measures. The intercept survey addressed topics such as purchasing patterns and intentions, use of the marketing material information, general opinions of the materials and suggestions for improvement. This survey was pilot-tested with a small sample (n = 6) of VCU students (aged 18-25) to ensure it was easy to understand and achieved its goal.

Intercept survey during baseline. The intercept survey administered at baseline (Appendix B) addressed topics such as purchasing patterns and intentions. All intercept surveys were also used as a screening tool to ensure that participants met study requirements.

Intercept survey additions during implementation phase. The intercept survey administered during the implementation phase addressed topics such as purchasing patterns and intentions, use of the information, general opinions of the materials and suggestions for improvement. Examples of questions include, "*Did you find the materials helpful?*" "*Did this information influence your meal purchase?*" In addition, open-ended questions that elicit suggestions for improvement were included such as, "*How can these materials be made more appealing to young adults?*"

Intercept survey additions during washout phase. One addition was made to the general surveys completed in all phases. In this phase, participants were asked if they remembered viewing the campaign implemented in the 20 days prior.

Demographics. The demographics questionnaire (Appendix C) asked participants their

age, gender, year in school, race/ethnicity, and whether they had any underlying medical conditions relating to eating behaviors, weight, and height. In addition, two questions unrelated to the study were included to test evaluate accurate responding such as "do you have any problems with your eyes?"

SF-36. The SF-36 (Ware & Sherbourne, 1992) is a 36-item self-report measure assessing health status on eight dimensions: physical functioning, social functioning, role impairments (physical problems), role impairments (emotional problems), mental health, vitality, pain, and general health perceptions. Some questions are measured on a three-point scale ("*Yes, limited a lot, "Yes, limited a little,"* and *"No, not limited at all")* and others are measured on a five-point scale (*"All of the time," "Most of the time," A good bit of the time," "Some of the time," "A little of the time,"* and *"None of the time"*).

Extensive data are available regarding the psychometric properties of the SF-36 in U.S. and the United Kingdom (Brazier et al., 1992; McHorney, Ware, & Raczek, 1993; Ware, Snow, Kosinki, & Gandek, 1993). In a review of published studies, reliability measures have exceeded recommendations in all studies; median reliability coefficients have met or exceeded an alpha of .80 (Ware et al.). In a study of 1582 primary care patients (Brazier et al., 1992), internal consistency, measured by Cronbach's alpha, exceeded the recommended .85. All subscales exceeded .75 except for social functioning (α = .73, reliability = .74). Two-week test-reliability was determined for all dimensions; 91-98% of respondents fell within a 95% confidence interval (Brazier et al.). Content validity was established by comparing the content of the SF-36 questionnaire with that of other widely used surveys and published standards (Hunt, McKenna, McEwen, Williams, & Papp, 1981; Parkerson, Broadhead, & Tse, 1990; Ware et al., 1995). Criterion validity has been demonstrated in numerous studies (Brazier et al.; McHorney, et al.;

Read, Quinn, & Hoefer, 1987). The scale used in the current study, the SF-36 general scale, evidenced adequate reliability, $\alpha = .69$.

Block food screener (BFS). The BFS (Block, Gillespie, Rosenbaum, & Jenson, 2000) was used to assess current dietary intake. The BFS has 27 items comprising three scales (7 fruit and vegetable items, 3 grain items, and 17 fat/meat/snack items) answered on a 6-point scale (0-5): *less than once a week, once a week, 2-3 times a week, 4-6 times a week, once a day, and 2 or more times a day*. This measure was based upon the full length Block Food Frequency Questionnaire (FFQ), which contains 100 items and is a reliable and valid tool for measuring dietary intake in adult populations as compared with daily food records (Block et al.).

Correlations between the shortened BFS and the longer Block FFQ were .69 for total fat (grams/day) and .71 for total fruit/vegetable (servings/day; Block et al.). In the current study, scores were calculated for fruit/vegetable and fat/meat/snack intake. All scales of the BFS used in the current study evidenced adequate reliability with fruit/vegetable intake, $\alpha = .66$ and fat/meat/snack intake, $\alpha = .75$.

Nutrition knowledge questionnaire (NKQ). Parmenter and Wardle developed the NKQ, which includes four scales covering: (a) experts' recommendations regarding increasing and decreasing intake of different food groups, (b) nutrient knowledge, (c) food choices, which asks people to choose among different options, (e.g., to pick a healthy snack which is low in fat and high in fiber), and (d) the relations between diet and disease. A total score for the measure is also calculated. The NKQ yields reliable scores: dietary recommendations ($\alpha = .76$), sources of nutrients ($\alpha = .80$), choosing everyday foods ($\alpha = .66$), and diet-disease associations ($\alpha = .79$; Parmenter & Wardle). Construct validity was measured by administering the measure to a sample of dietetic students and computer science students. Dietetic students consistently

performed better than computer science students ($p < .001$), demonstrating adequate construct validity. Lastly, two-week test-retest reliability was very high, ranging from .80-.97 for all sections; total (two-week) test-retest reliability was .98 (Parmenter & Wardle). The primary scale used in the current study, the NKQ total, evidenced adequate reliability with $\alpha = .79$.

General self-efficacy scale (GSE). The GSE (Schwarzer & Jerusalem, 1995) is a 10-item scale designed to assess optimistic self-beliefs used to cope with a variety of demands in life. Scores on each item range from 1 to 4 (*"Not at all True," "Hardly true," "Moderately True,"* and *"Exactly True").* Higher scores indicate stronger self-efficacy beliefs. The GSE yields internally consistent scores; Cronbach's alpha ranges between .75 and .91 (Leganger, Kraft, & Roysamb, 2000; Schwarzer. Mueller, & Greenglass, 1999). Stability of scores was also adequate: test-retest reliability (seven weeks) was .82. In the study by Leganger, Kraft, and Roysamb, positive associations between the GSE and measures of positive affect, satisfaction with life, internal locus of control, and sensation seeking supported construct validity. The factor structure of the scale was equivalent across 28 nations, and formed one global dimension (Leganger et al.). The reliability of the GSE in the current study was strong, $\alpha = .87$.

Treatment self-regulation questionnaire-diet (TSRQ). The TSRQ-Diet (Williams et al., 1996) is a self-report questionnaire consisting of 15 items rated on a 7-point scale from *"Strongly Disagree"* to *"Strongly Agree."* The TSRQ is a set of questionnaires addressing why people do or would start doing some healthy behavior, try to change an unhealthy behavior, follow a treatment regimen, or engage other health-promoting behaviors. The purpose of the TSRQ is to understand the degree to which a person's motivation for a particular behavior or set of behaviors is relatively autonomous or self-determined, based on self-determination theory. There are three subscales included in this measure: autonomous regulatory style; controlled

regulatory style; and a-motivation (which refers to being unmotivated).

The TSRQ was first used by Williams and colleagues (1996), and has been widely used in studies of health behavior change (Williams, Freedman, & Deci, 1998; Williams, Rodin, Ryan, Grolnick, & Deci, 1998; Williams, Cox, Kouides, & Deci, 1999). A validation of the TSRQ by Levesque, Williams, Elliot, Pickering, and Bodenhamer (2007) confirmed the factor structure of the measure and offered support for its construct validity via its associations with other diet-regulation measures. In a study by Williams, Freedman, and Deci, Cronbach alphas for the autonomy and controlled subscales ranged from .80-.87. Cronbach's alphas in the current study ranged across subscales; the autonomy subscale evidenced adequate reliability, $\alpha = .87$, as did the control subscale, $\alpha = .79$. The a-motivation subscale evidenced low reliability, $\alpha = .45$. Therefore, this scale was not used in final analyses.

Dimensions of identity development scale (DIDS). The DIDS was developed to assess general identity development in emerging adults. The DIDS consists of five, five-item subscales representing dimensions of identity development (Luyckx, 2006; Luyckx et al., 2008): (a) Commitment Making (e.g. "*I know what I want to do with my future*"), (b) Identification with Commitment (e.g. "*My future plans give me self-confidence*"), (c) Exploration in Breadth (e.g. "*I think a lot about the direction I want to take in my life*"), (d) Exploration in Depth (e.g. "*I think a lot about the future plans I have made*"), and (e) Ruminative Exploration (e.g. "*I keep wondering which direction my life has to take*"). Items are answered using a 5-point scale, ranging from 1 = *Strongly disagree* to 5 = *Strongly agree*. Subscales for exploration are combined to create a total exploration score. Luyckx and colleagues found the DIDS to be reliable; Cronbach's alphas for the subscales ranged from .79-.86. In addition, the measure evidenced internal validity and construct validity (Luyckx et al.) All subscales used in the current study yielded reliable scores

(α = .76-.93) with the exception of the depth subscale, which evidenced somewhat low reliability, α = .62. Therefore, in the material perspectives and psychological factors phase, regression analyses were conducted both with and without the inclusion of this scale to address any concerns related to the low reliability of this scale.

Material perspectives and psychological factors analyses. Quantitative items on the intercept survey were analyzed via descriptive statistics (e.g., means and standard deviations). Higher scores indicate positive perceptions of the materials.

Analyses for the psychological factors surveys included: correlations between measures to examine associations among the constructs, and standard multiple regressions to examine how perceived health status, self-efficacy, identity development, and self-regulation of diet contribute to variance in nutrition knowledge, FV and fat/meat/snack intake.

Results

Material Development

Focus group development of materials. Initial development of the marketing materials was guided by prior research investigating common barriers to healthy nutrition among college students and nutrition messages that would be most relatable to emerging adults. This was also informed by prior research analyzing marketing materials in the college environment, and on basic concepts of social marketing (Buscher, Martin, & Crocker, 2001; Freedman & Connors, 2010; Peterson, Duncan, Null, Roth, & Gill, 2010). Particular attention was given to what has been effective in similar health campaigns, such as promoting an internal health locus of control, providing simple and succinct information, and promoting self-efficacy and motivation with a benefit-based message (Bodecs, Horvath, Szilagyi, Nemeth, & Sandor, 2010; Burton, Craig & Netemeyer, 2000, Moller, Ryan, & Deci, 2006; Rimal, 2000; Ryan & Deci, 2000, Satia,

Galanko, & Neuhouser, 2005). Most importantly, drawing on SDT, the general phrase of "one small swap for…" was adopted as a slogan for the campaign, encouraging students to make one small change in their food options. This message is intended to promote autonomy and the belief that a small behavior change can impact their health in a large way. Four benefit-based messages addressing why students should make the change were then created, based on the literature. The four main messages were "One small swap for: (1) Ramkind (peer influence), (2) Appearance, (3) Wallet, and (4) Health." A graphic designer aided the author in the design of materials.

Once initial materials were developed, focus groups were conducted with 24 young adults aged 18-25. The primary investigator moderated and coded all focus groups. The mean age of participants was $m = 20.33$. Demographics are presented in Table 2.1. Focus groups were audio-recorded and transcribed by undergraduate and graduate research assistants. Following transcription, each focus group was coded for main ideas that emerged in the dialogue, guided by thematic analysis (Braun & Clarke, 2006). The study investigator summarized each statement into a "code." Codes were then reviewed across focus groups for main ideas, identified as statements most commonly endorsed. The following paragraphs detail the most common viewpoints.

When asked several questions about what it means to be healthy, many participants endorsed ideas such as eating well, exercising to balance energy in/energy out, and consuming a balance of nutrients. In addition, many participants said that getting enough sleep and being emotionally well (i.e., strong support system, stress management) were vital to health.

Participants recognized the difficulty that they, as college students, face when trying to achieve balance in all of the aforementioned areas (nutrition, physical activity, sleep, stress

management, etc.) as they experience many competing demands. Another popular idea that arose was one of "listening to your body." Many groups indicated that when you are not taking care of yourself, you feel sluggish, unmotivated, and emotionally unwell. Moreover, they described being healthy as a "mindset" of having a healthy relationship with food. This idea was reflected in the following quote:

> I think people just need to realize that like you only get one body. It's something that like… like you take care of your car, you take care of all your other stuff, you like your Macbook, you like your smartphone. You take care of that more than you take care of yourself.

The next set of questions addressed how students make their decisions about what to eat on a daily basis. Participants indicated that they try to include fruits and vegetables in their diet, and achieve balance in when and how much they are eating. One participant noted that she pays attention to the "color" of her plate and the length of the ingredient list rather than the actual nutritional content. Also, about half of the focus groups reported that consuming organic and non-GMO foods would make one feel better than consuming processed foods.

Interestingly, many participants referred to the "food pyramid" as guiding their choices when, in fact, the food pyramid was replaced with MyPlate in 2011. When asked about MyPlate, very few students knew what it was, but upon learning about it, agreed that it is a positive, easy principle for guiding food decisions. Yet, many reported that it can be difficult to achieve moderation when unhealthy foods tend to be more expensive, there is a limited variety of foods on campus, and they perceive that "only" unhealthy food options are in close proximity to campus. Students cited convenience as a major factor in their dietary decision-making process. One participant commented on the accessibility of convenience foods:

> Our soda machines are like…we have these snack machines with cheeseburgers in bags. And the one thing I don't understand is how you can like going to a vending machine and buying a cheeseburger in a bag and not think anything of it.

Another participant reflected on the change in her habits due to accessibility of sugar-sweetened beverages:

> I remember coming to college and, like, the fact that there was soda just freely available was really interesting. I was, like, I need some water. It's almost, like, they don't want to get water, cause I'll ask like "can I just have a cup for water" and they're like "okay, you know you paid for it."

Participants were then asked to reflect on how their identity as a college student has affected their eating behaviors and patterns. Many indicated that becoming a college student has had a significant impact on their eating in several ways. For example, "freedom" to make dietary choices often leads to unhealthy selections. Also, time is a factor in that they are very busy and have little energy to cook meals or seek out healthy options. Increased stress also leads to poor eating choices. In addition, living in the dorms presents barriers to healthy eating, such a lack of appliances (stove, oven, etc.), no storage space for fresh foods, and poor dining options on campus. Further, many reported that meal plans and "swipes" do not allow for healthy food options at certain times of the day, limiting them to the dining hall for food. Moreover, they elaborated that peers and social activities have a large influence on their eating patterns in that they feel pressured to eat out and to select unhealthy foods, and become teased/singled out if they wish to eat healthy.

> I think it's easy to lose focus on like what you should be eating, because you are with your friends and all the sudden someone says, "let's go to ColdStone [ice cream shop],"

you find yourself with this huge ice cream in your hand and it's like ,"oh I shouldn't be eating this" but it's fun…Or like, I should be sleeping, or studying, or eating fruits and vegetables right now but instead I'm, you know, chugging alcohol at a party, you know, it's, um, when you're in a social setting it's just easy to, you know, lose sight on that.

The following quote reflects one participant's experiences of being ostracized by her peers for eating healthily:

Yea, I mean, I know, I don't want to say people get made fun of for eating healthy but I know I've been at the dining hall with some friends and I was eating, you know, a salad or something and my friends were, you know, eating unhealthy food and they were like "what are you eating? I could never do that" and it kind of, it made me feel a little bit singled out.

One participant recalled the "backlash" she received when she decided to be a vegetarian:

That wasn't why I was doing it, I just wanted to see if I could do it but it definitely rubs people the wrong way when you're making really probably smarter decisions with something as personal as food.

An additional barrier that was mentioned, particularly by those living on–campus, was transportation. Many students living in the dormitories do not have their own vehicles and expressed frustration that the nearest grocery store was far away, prohibiting them from getting very many groceries.

Participants emphasized to the focus group moderator that nutrition education is vital and that a required nutrition class in their freshman year would help them and their peers tremendously. They reported that prior education and habits have a lot to do with what peers eat and individuals lacking education or prior experience might eat less well overall. Participants

also reflected that self-regulation/control and motivation are key factors that influence whether one eats healthy or not. This is reflected in the following quote: "Once you realize that you can eat healthier, it motivates you. But if you don't have the motivation there, if you think you can't do it, then you just kind of stay where you are."

They described that, as they grew older and moved off-campus, they were able to go to the grocery store and cook at home more often, which subsequently increased the quality of their nutrition. Many female participants described the issue of weight gain in their first year and how this affected their body image negatively, leading them to be hyper-vigilant about nutrition. Those that acknowledged this struggle advised that students need education regarding these issues so that extreme, dangerous eating habits do not develop:

> So I think that would be really interesting to have like some sort of event that teaches you what's good, what are some good alternatives, especially since we're at this college age where everything is not possible, you know you can't cook everything, I guess just like making those like slight adjustments.

The following quote provides insight into one participant's belief that eating healthy has made a significant impact on her overall well-being:

> I think like, educating people about, a lot of people here think about healthy eating and they think it's so restrictive because they think, "I can't have soda, and I can't have cake" and you know it's so restraining but, I think people need to know that if you eat healthy it actually expands you because it gives you more energy and more happiness and it makes you healthier. So I feel like it's more freeing than anything.

Students were then introduced to public policy initiatives that had been implemented or discussed in other regions of the country, and were asked to provide their opinions about

nutritional policy in general and in the campus environment. Participants acknowledged that they understood the ideas and reasons why some policies have been enacted (such as no "junk" food in vending machines of public schools) but felt that such policies would not go over well on a college campus. They reported that their freedom to choose what they want to eat was very important to them as young adults and suggested increasing healthy food options, rather than limiting unhealthy options, as reflected in the following quote: "I don't know if I agree with them like taking it out 100% because you can't force people to eat, like they still have to have their choice." They felt that providing resources to educate students about healthy eating was more beneficial than implementing potentially restrictive policies. They provided suggestions such as holding a farmer's market on campus, a freshman nutrition education course requirement, and community nights for cooking classes or teaching meal preparation skills. One participant made the argument that it would not be safe to eliminate all sugary items on campus as perhaps someone with diabetes might need an emergency supply of sugar. In sum, freedom of choice was overwhelmingly supported, as represented in the following quote:

> Taking away doesn't help me learn and change my mind. It makes me frustrated that, like, I want to eat my chips and candy bars—like I'm going to find that junk somewhere else. It's not, "Oh, since I can't have my KitKat, I'm going to eat an apple!"

Participants were then asked to view the potential marketing materials and provide feedback on the layout, wording, general concept, and any other comments. Feedback on the first version of materials overwhelmingly concluded that close-up images of food in the background were unappetizing and distracting. Participants suggested rearranging the information so that what they felt was most pertinent (how much they should be eating), was in the center. They also suggested changing font colors, sizes, and graphic images to allow for

easier reading and a simpler design. In addition, participants suggested representing serving sizes as symbols, and that a simpler design, similar to an "info-graphic" poster would be more effective.

Participants in the first three focus groups noted that the "appearance" and "wallet" messages were most salient to college students. They indicated that college students would not worry so much about their health unless immediate consequences could be seen; things that the appearance and wallet appeals provide. They reported that, although health was very important, it would not have the "reach" that wallet and appearance could provide. One participant shared that the "health" appeal would fall on deaf ears: "It's like um, almost cliché in a way cause you've heard it [health benefits of FVs] so many times, and it's useless unless you're saying like a specific thing that happens to most college students." In addition, although they liked the "Ramkind" slogan (appealing to peer influence), it is a hard concept to transfer to their everyday lives. They would not be able to see the immediate benefit that appearance and wallet could offer. In general, they felt that the "one small swap" theme was easy to understand and "flowed" nicely.

The graphic designer and myself met to review and make suggested changes to the materials (i.e., format rearrangement, "info-graphic" design, serving sizes as symbols, change color scheme and fonts, remove background images, etc.). Subsequent focus groups (4-8) were presented with the new materials followed by the old materials for comparison. This was to ensure that the edits made were beneficial. Overall, focus groups 4-8 overwhelmingly concluded that the second version of materials was superior. Specifically, they liked the placement of the wording with serving size information in the center and represented as symbols. They also enjoyed the variety of food images displayed to remind individuals that there are more options

for fruits and vegetable than what is sold on campus. They liked the simple background of the poster, but did suggest brighter colors (no VCU colors as this would blend in with all other materials on campus) and larger font sizes to catch students' attention. Students also suggested that placing the posters in high traffic areas would be most effective.

> I think they're [the posters] really great because they're really bright, they have this visual down here, they have like gender specific just so I know, I'm not wondering if I'm eating the correct amount, and um, I think that there's little wording, so it's really quick and easy to read.

Participants indicated that the posters made them not only think about including fruits and vegetables into their diet but also how much activity they are engaging in currently. Students in focus groups 4-8 echoed that the "health" and "peer influence" messages were not as relevant to students as "appearance" and "wallet." Although one student was concerned that people would be offended by the "appearance" appeal, all other students reported that it would get people's attention. Overall, they reported that the message on the poster was easy to understand and relatable. They indicated that even if students did not change their menu item that day, they would be provided with information and an opportunity to think about their eating habits when they might not otherwise:

> I think it would help. Especially, like I said, cause it doesn't seem so…when I look at the actual guidelines, it doesn't seem as bad. So maybe just doing it like, oh, I could probably eat a fruit for right now, and it I eat something fruity later on, like an orange, you know that's already like two servings in a day.

Another participant reflected this idea in the following quote:

> Yeah I think that's probably the most effective way to eat healthier, is to make small changes. You don't have to change your whole diet but maybe instead of eating a bag of Doritos, you can get a Ziploc of almonds and something else salty, that will…it's not exactly the same but it'll be one small swap.

Other thoughts that came up while presenting the materials were additional ideas to help students include more fruits and vegetables and ways to expand the campaign. Students suggested providing flyers or brochures with more specific information related to the posters. For example, they would like a side-by-side comparison of the cost of fruits and vegetables versus other snack foods, how each specific food item helps discrete health concerns, or what fruits and vegetables are in-season. Another suggestion was to develop a website that would link to the campaign to provide this information as well as resources on campus and even recipe ideas. Although helpful, these suggestions were beyond the scope of the current project.

Following completion of these focus groups, final edits to the posters were made, including using brighter colors, larger fonts, and easier to read outlines of the fonts. In addition, "appearance" and "wallet" were selected as the final two posters that would be presented in the dining centers. During implementation, appearance and wallet were presented in the locations at opposing times (i.e., "appearance" at Bleeker Street Deli for first 10 days, at Cary Street Market and Deli for second 10 days; "wallet" at Cary Street Market and Deli for first 10 days and then at Bleeker Street Deli for second 10 days) to control for any effects caused by differences between the two locations.

Material Implementation

Sales data. Data from the sales of chips (both those with a meal and alone), apples, and carrots sold at Bleeker Street Deli, and chips and apples sold at Cary Street Market and Deli were

collected. Data from sales of carrots and chips sold alone at Cary Street Market and Deli could not be obtained from VCU dining representatives due to changes in the offering of these items at this location. All sales data were recorded in units purchased for each item per day. Each time point (baseline, implementation, and washout) included 20 weekdays of sales information. Due to the small number of locations in this study (N = 2), formal statistical analyses could not be conducted to test differences in mean sales across the time-points. Mean sales of each item at each location are presented in Table 3.1 and mean sales per poster are displayed in Table 3.2. Figure 3.1 displays differences in sales of each item by poster. Figures 3.2-3.5 represent the mean sales of each item at each location across the three time-points.

Table 3.1

Mean Sales of Food Items (in units sold per day).

Location	**Apples**	**Chips with a meal**	**Carrots**	**Chips alone**
Cary				
Baseline	42.50	173.35		
Implementation	30.75	200.20		
Washout	27.90	180.70		
Bleeker				
Baseline	37.35	409.35	14.95	34.00
Implementation	31.55	234.00	26.60	40.50
Washout	33.40	219.85	22.65	38.35

Table 3.2

Mean Sales per Poster.

	Apples	**Chips with a Meal**	**Carrots**	**Chips alone**
Poster 1	31.10	191.25	14.95	21.50
Poster 2	31.20	242.95	11.65	19.00

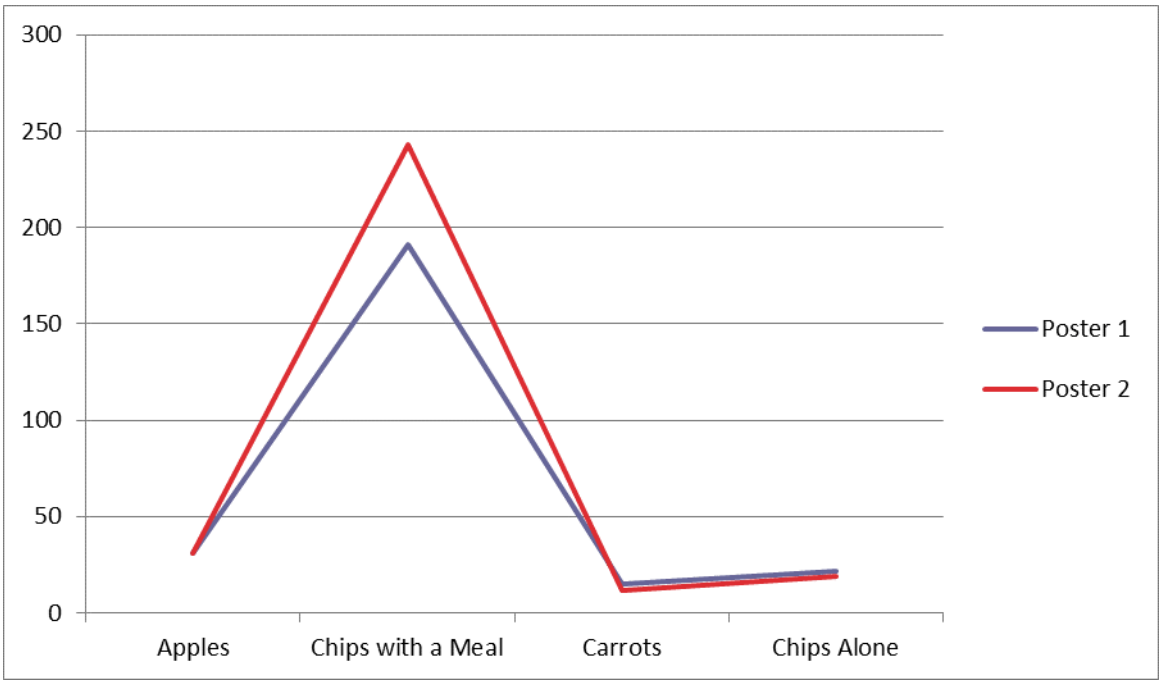

Figure 3.1 Sales of Each Item by Poster

Cary Street Market and Deli. At this location, mean apple sales were lower at implementation when compared with baseline, and lower at washout when compared with implementation. Sales of chips purchased with a meal were lower at implementation when compared with baseline but were higher at washout when compared with implementation. Yet, mean sales did not return to baseline levels.

Bleeker Street Deli. At this location, mean apples sales were lower at implementation when compared with baseline but were higher at washout when compared with implementation; sales did not return to baseline levels. Sales of chips purchased with a meal were lower both at implementation when compared with baseline and at washout when compared with implementation. Sales of carrots were higher at implementation when compared with baseline, but lower at washout when compared with implementation; mean carrot sales did not return to

baseline levels. Lastly, sales of chips purchased alone were higher at implementation when compared with baseline, yet were lower at washout when compared with implementation. Sales did not return to baseline levels.

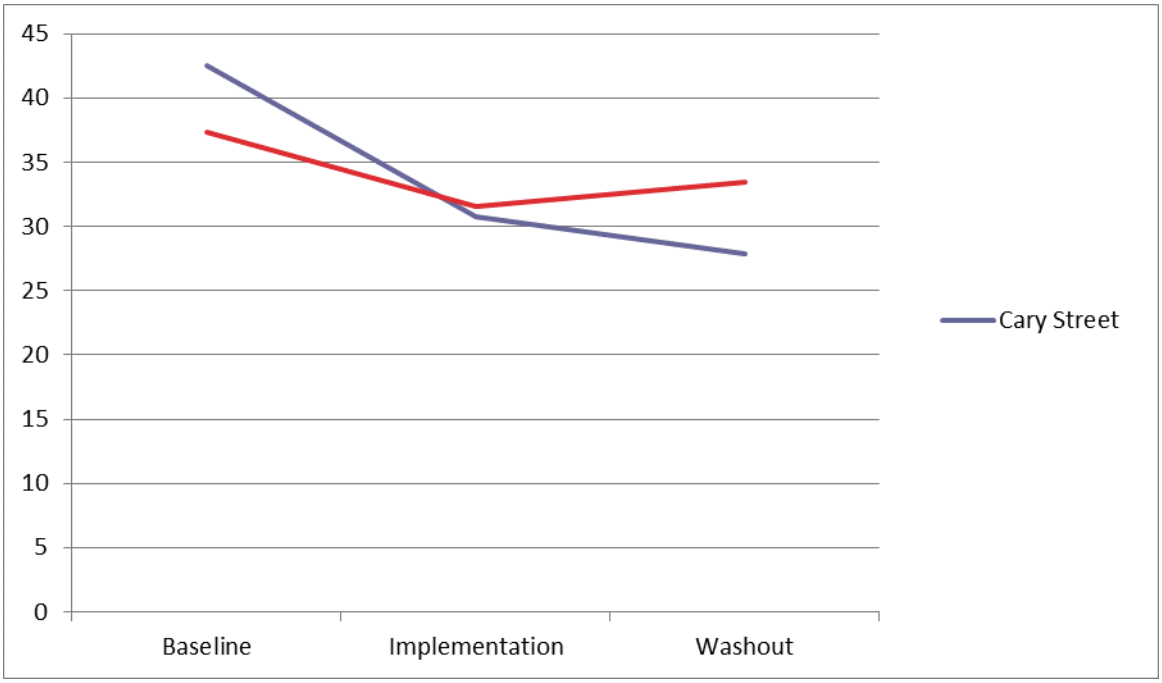

Figure 3.2 Apple Sales

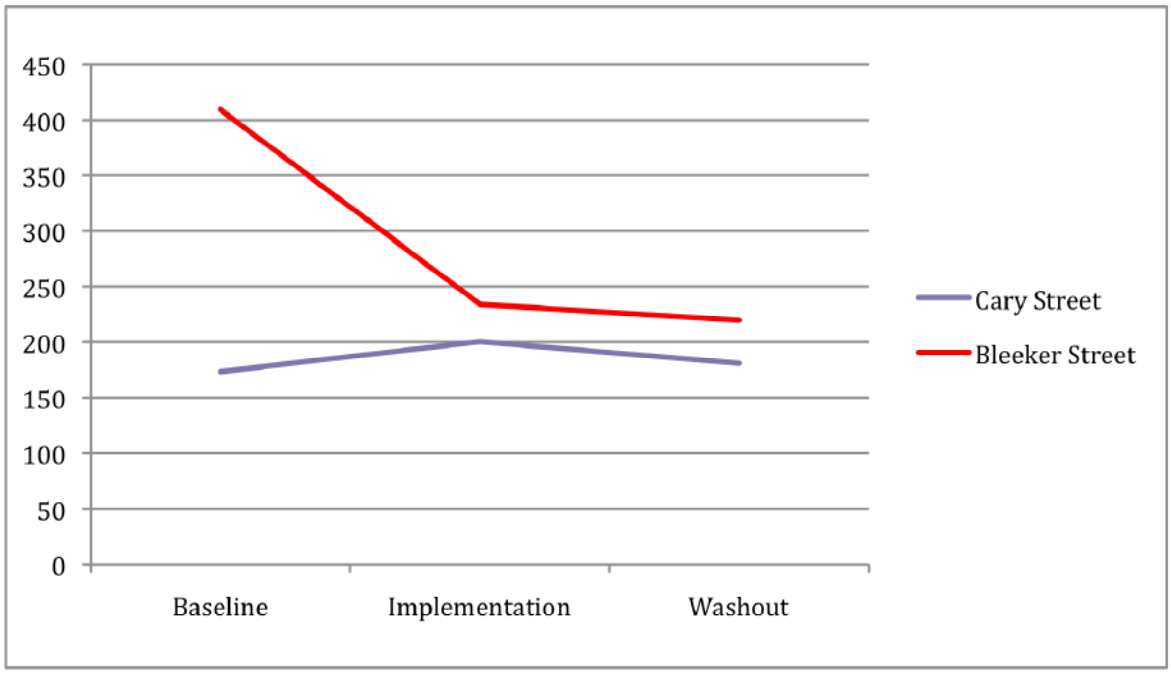

Figure 3.3 Chips with a Meal Sales

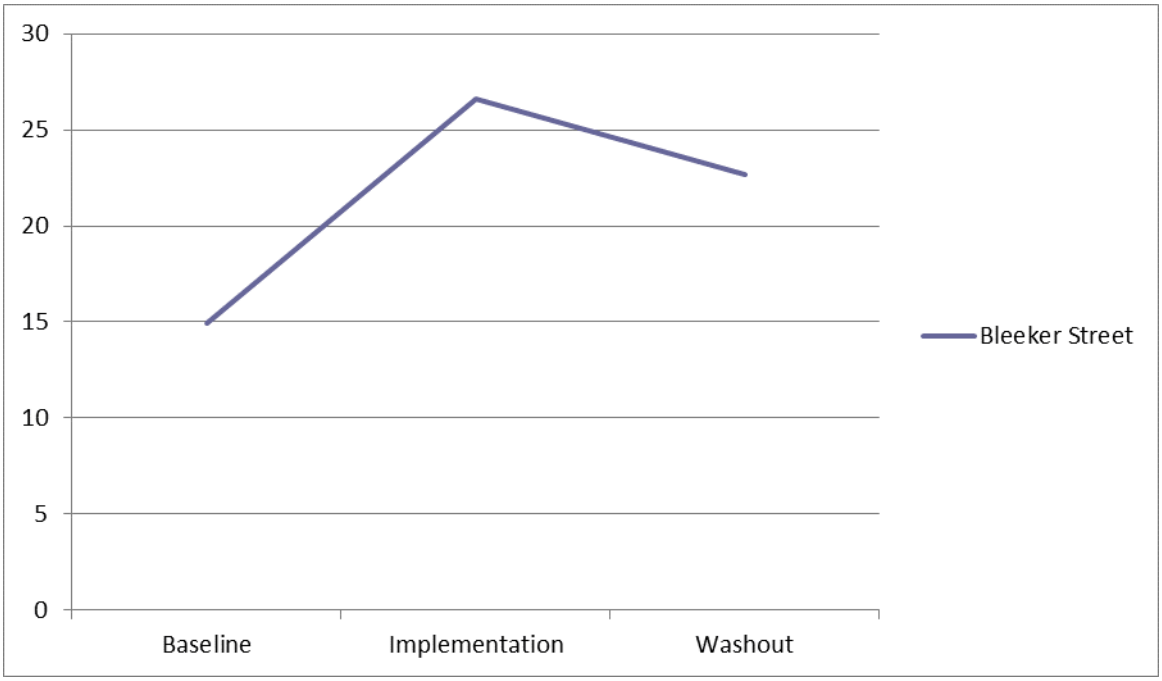

Figure 3.4 Carrot Sales

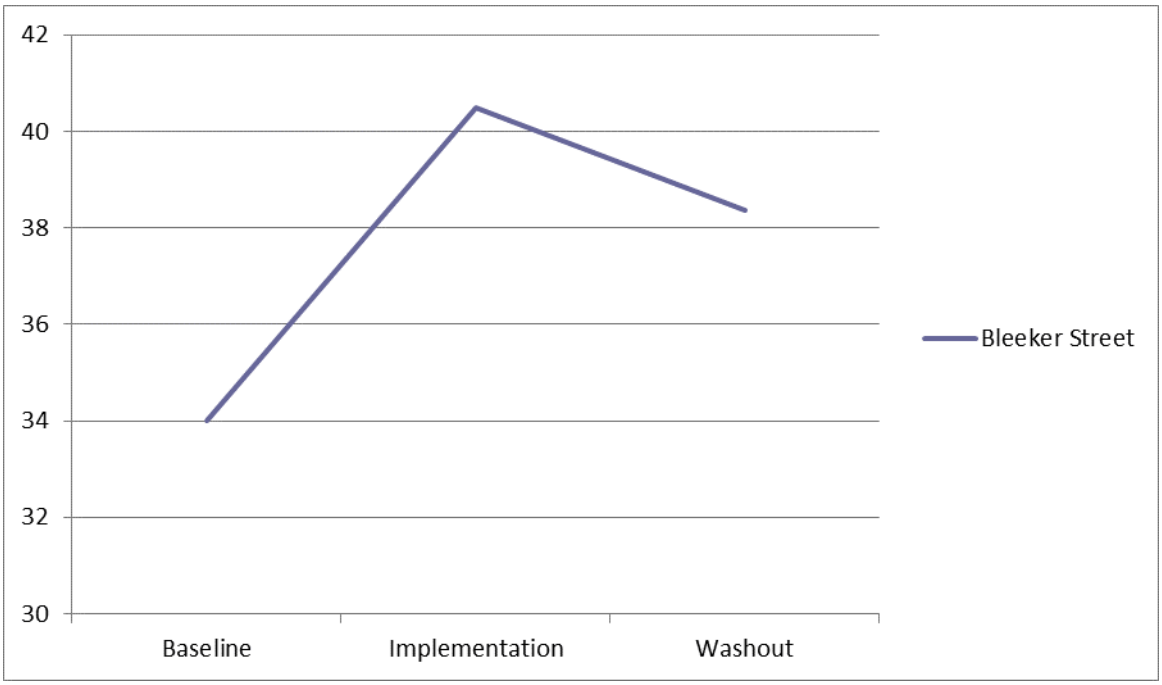

Figure 3.5 Chips Alone Sales

Material Perspectives and Psychological Factors

Material perspectives data.

Descriptive statistics. 100 participants completed the intercept survey during baseline, 102 completed the intercept survey during implementation, and 101 completed the intercept survey during the washout phase. Thirty-four participants in total saw and read the posters during the implementation phase; nine saw but did not read the materials. Descriptive statistics for attendance at the locations for all phases are presented in Table 3.3.

Table 3.3

Frequency of Location Visits.

Frequency	**Baseline**	**Implementation**	**Washout**
Five or more times per week	24%	10.8%	7%
Three-four times per week	25%	16.7%	18%
One to two times per week	43%	56.9%	50%
This was my first time attending	1%	5.9%	15%

Approximately one-third (33.3%) of participants who viewed the materials indicated that the posters motivated them to think about or change their diet that day; 20.6 % of participants indicated that the posters did, in fact, impact their meal choices that day. All (100%) of those who saw the posters did not find anything about them confusing. Participants asked to indicate how well four adjectives (attention-getting, interesting, direct/to the point, and useful) described the posters. Results are presented in Table 3.4.

As reflected in the table, the majority of participants agreed that the posters were very "attention-getting," "direct/to the point," and "useful;" approximately equal numbers of participants agreed that the posters were either very or a little "interesting". A total of 33 individuals surveyed in the washout phase indicated that they remembered seeing the materials in the weeks prior (13 in washout week one, 8 in week two, 8 in week three, and 4 in week four). Those who remembered seeing the materials described them as informative, helpful, visually attractive, "easily seen," "the information made me think," and "a good way to get across to students." Consistent with focus group and implementation intercept surveys, some described that the posters "might make people aware but they don't care," and that "there are not a lot of fruit and vegetable options on campus." This indicates that the materials did have a lasting impact on diners, yet they still face the same barriers to utilizing the information as described by previous participants.

Table 3.4

Qualitative Descriptors of Materials.

	Attention-Getting	**Interesting**	**Direct/To the Point**	**Useful**
Very much	73.5%	44.1%	97.1%	79.4%
A little	20.6%	41.4%	2.9%	17.6%
Not at all	5.9%	14.7%	0%	2.9%

Qualitative material perspectives responses. Open-ended responses from the implementation phase were analyzed for major themes and ideas. As noted, 34 participants in

total saw and read the posters during the implementation phase and, therefore, answered the open-ended responses about the materials; 9 saw the posters but did not read or attend to them. A summary of responses to the open-ended questions is presented in Table 3.5.

Table 3.5

Intercept Survey Open-Ended Responses

Question	**Responses**
What was the main message of the poster?	• Eat healthier (11 respondents) • Eat more fruits and vegetables (9 respondents) • Eating well is not difficult (4 respondents) • One small change can make a big impact/easy to swap (3 respondents) • The more fruits and vegetables you eat, the healthier you are • You can eat healthy if you are motivated/conscious of decisions • Makes you think twice about what you are putting in your body • How many servings of fruits and vegetables you should eat per day
Did the poster motivate you in any way?	• Would think about the information for next time (2 respondents) • Wanted to change to fruit but no apples were available • Realized they were not eating enough fruits and vegetables • Looked to see if there was fruit available
Did the poster impact your choices today?	• Changed their order (ex. chose soup over chips, added an apple; wrap over a burger, added spinach to sandwich, apples instead of chips) • Had already decided on what they were going to have • Purchased cheapest item
What could make the posters more appealing to college students?	• Larger letters • Helpful if portion sizes were displayed • Brighter colors
Any other general comments/thoughts?	• Not many fruit and vegetable options available/need more options (5 respondents) • Education needed around campus (2 respondents) • Liked gender-specific information (2 respondents)

The majority of respondents reported that the main messages of the posters were to "eat healthier" and to "eat more fruits and vegetables." This message is consistent with the overall purpose of the project. The next most common message students thought the posters conveyed was that of the "ease" of improving your diet, as seen in such responses as, "eating well is not difficult," and "one small change can make a big difference." Less frequent, yet interesting responses included, "you can eat healthy if you are motivated," "think twice about what you are putting in your body," and "how many servings of FV you should eat per day."

Survey respondents indicated that the posters motivated them to think about their future dietary choices and made them realize that they were not currently including enough FVs in their diet. Although the majority of participants reported that the posters did not impact their meal choice, a minority indicated that the posters did, in fact, guide their purchase such as: choosing apples instead of chips, choosing a wrap over a burger, adding an apple to their meal, and adding spinach to their sandwich. One respondent indicated that s/he wished to change their side to an apple instead of chips but that apples were unavailable in the deli at that time.

A few respondents suggested changes for future iterations of the materials such as using larger font size, brighter colors, and displaying actual portions. Finally, respondents offered other comments. Many reflected that, although the posters were useful, not many FV options are available around campus, making it difficult to actually change behavior. In addition, they reflected that many students are uneducated about nutrition and that campus-wide education initiatives would be very helpful. This is consistent with feedback expressed in the focus groups.

Psychological factors data. Data were cleaned and prepared for analyses. Validity questions were analyzed to examine any random responding; all questions were in range. Descriptive statistics revealed that several scales were out of the acceptable ranges for skewness

and kurtosis (Field, 2012). Winsorizing, a method in which individual outliers are changed to values closer to the rest of the data, was used to reduce the influence of outliers without transforming the data (Gosh & Vogt, 2012). This commonly used method involves changing outliers above the ninety-fifth percentile and any value below the fifth percentile to the highest and lowest values in the data set that were not outliers, respectively (Field; Gosh & Vogt). Winsorizing is considered to be a less extreme way of handling outliers than simply removing them from the data set; simply removing them assumes that the outliers should not have been found in the sample whereas Winsorizing asserts that the score was likely part of the sample but unusually extreme (Gosh & Vogt). Three individuals' scores from the Block Fruit and Vegetable Scale and two from the Nutrition Knowledge Questionnaire Total scale were changed using this method. All other scales and/or subscales were unchanged.

Correlations. Correlations among study variables included in the subsequent regression analyses were examined (i.e., Nutrition Knowledge Questionnaire total scale, FV and fat/meat/snack subscales of the Block Food Screener, autonomy and control subscales of the TSRQ, the GSE total, all six subscales of the DIDS, and the SF-36 general scale). Significant correlations were found between many scales (see Table 3.6 for all correlations among scales). Of note, the NKQ total scale significantly correlated with BFS fruit and vegetable (r = .119) but not the BFS fat/meat/snack scale. This indicates that those with greater nutritional knowledge reported higher fruit and vegetable intake. The NKQ also significantly correlated with GSE (r = .133), SF-36 general (r = .158), and the TSRQ autonomy scale (r = .217), indicating that those with increased nutrition knowledge display more self-efficacy, positive perceptions of their health status, and autonomy with regards to their diet.

In addition, the GSE total scale was significantly correlated with the SF-36 general (r = .203) both subscales of the TSRQ: autonomy (r = .220) and control (r = -.198), as well as the commitment making (r = .242), ruminative exploration (r = -.288), and the identity with commitment (r = .360) subscales of the DIDS. These findings suggest that those with greater self-efficacy have an increased perception of their overall health status, autonomy and individual control over their diet. In addition, those with increased self-efficacy are more advanced in their identity development. Moreover, the TSRQ autonomy scale significantly correlated with both subscales of the BFS: fruit and vegetable (r = .178) and fat/meat/snack (r = -.130), as well as two measures of the DIDS: commitment making (r = .204), exploration with depth (r =.155), and identity with commitment (r = .282). Thus, these results indicate that those with greater feelings of autonomy over their diet have increased FV intake, decreased fat/meat/snack intake, and are more advanced in their identity development. A complete listing of all correlations is found in Table 3.6.

Table 3.6

Measure Correlations

	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**
NKQ_Total (1)	1	**.119***	-.021	**.133***	***.158****	***.217****	-.040	.110	-.039	***-.155****	.040	.088	-.096
BFS_FV (2)		1	.015	.109	***.227****	***.178****	.094	.048	.062	-.046	.104	.113	.056
BFS_meat/snack (3)			1	-.013	-.002	**-.130***	-.042	-.029	.016	-.012	-.037	-.048	-.016
GSE (4)				1	***.203****	***.220****	***-.198****	***.242****	.083	***-.288****	.105	***.360****	-.090
SF-36 General (5)					1	.089	-.025	**.118***	.073	-.112	.073	***.204****	-.048
TSRQ_aut (6)						1	***.290****	***.204****	***.155****	-.034	.151**	***.282****	.117*
TSRQ_control (7)							1	-.090	***.184****	***.297****	.049	-.105	***.289****
DIDS_commit (8)								1	***.289****	***-.467****	.046	***.713****	***-.153****
DIDS_exdepth (9)									1	.072	***.217****	***.252****	***.553****
DIDS_rumex (10)										1	***.194****	***-.476****	***.745****
DIDS_exbreadth (11)											1	.079	***.673****
DIDS_idw/commit (12)												1	***-.161****

(*) and bold, $p \leq .05$; (**), bold and italicized, $p \leq .01$.

Multiple regression analyses. Standard multiple regression analyses were used to test the hypothesis that intrinsic factors such as health perceptions, self-efficacy, self-regulation for diet, and identity development would predict both nutrition knowledge and current intake. Separate regressions were completed for the three main outcome variables: the NKQ total scale, BFS fruit and vegetable scale, and the BFS fat/meat/snack scale. Individual predictors included: SF-36 general subscale, GSE total, autonomy and control subscales of the TSRQ, and five subscales of the DIDS. It should be noted that regression analyses were run with and without the inclusion of the sixth DIDS scale, Exploration with Depth, due to concern about the low reliability achieved in the current study ($\alpha = .62$). Results for all analyses did not differ with and without including this scale in the model.

NKQ total. A standard multiple regression showed that the overall model was significant, F (9, 272) = 3.56, $p < .001$, $R^2 = .109$, indicating that the IVs significantly accounted for variance (10.9%) in total nutrition knowledge. The SF-36 general scale was significantly associated with nutrition knowledge, B = .343, t (272) = 2.31, $p = .022$. Moreover, the autonomy subscale of the TSRQ was significantly associated with total nutrition knowledge, B = .311, t (272) = 3.56, $p < .001$. No other individual IVs were significant. Partial correlations indicate that the SF-36 general scale contributed 2.0% of individual variance to total nutrition knowledge and the TSRQ autonomy subscale contributed 4.6% of the variance to total nutrition knowledge.

BFS fruit and vegetable scale. A standard multiple regression showed that the overall model was significant, F (9, 261) = 3.05, $p = .002$, $R^2 = .098$, indicating that the IVs significantly accounted for variance (9.8%) in fruit and vegetable intake. Of note, the SF-36 general scale was significantly associated with fruit and vegetable intake, B = .266, t (261) = 3.2, $p = .002$. No other individual IVs were significantly associated with the BFS Fruit and Vegetable Scale.

Partial correlations indicate that the SF-36 general scale contributed 3.8% of individual variance to FV intake.

BFS fat/meat/snack scale. A standard multiple regression showed that the overall model was not significant, indicating that the IVs did not significantly account for variance in meat and snack intake, F (9, 255) = 0.78, p = .64, R^2 = .028.

Discussion

The current study evaluated the development, effectiveness, and acceptability of a social marketing campaign to improve fruit and vegetable intake in emerging adults. It was hypothesized that young adults would notice, understand, and use the marketing materials to include more FVs in their meal purchases. It was also hypothesized that young adults who reported greater self-efficacy, generally positive perceptions of their health, higher self-regulation for their diet, and more commitment to identity development would exhibit greater nutritional knowledge, higher FV intake, and lower fat/meat/snack intake. Findings from the material development and implementation phases, and the material perspectives and psychological factors data will each be described in the following paragraphs.

Material Development

Focus groups ascertained students' opinions of the pilot marketing campaign materials, as well as general perceptions of nutrition, dietary habits, and strategies for improving emerging adults' dietary intake. A major theme across the eight groups was what "healthy" means to emerging adults. These individuals viewed health as comprised of many dimensions such as eating well, exercising, getting enough sleep, maintaining social relationships, and paying attention to mental health. This perspective is likely a result of increased attention to an integrated approach to health and disease prevention and a more "Eastern" philosophy of

medicine (Chan, Ho, & Chow, 2001; Wallace & Shapiro, 2006). The popularity of this opinion might reflect a shift in the emerging adult mindset towards health and away from the "invincibility" of youth (Arnett, 2000). Nonetheless, students indicated that the "health" message provided in one of the poster options would not necessarily affect the general student population, in that their peers are less concerned with disease risk at this time in their lives, suggesting that some elements of "invincibility" might remain (Arnett).

Focus group participants were also very interested in food production issues, and expressed enthusiasm for more accessible, non-genetically modified and organic foods. They viewed foods produced this way as healthier than the standard on-campus food items. Previous studies indicate that college students, as a group, are becoming more interested and vocal about eco-friendly practices (Dahm, Samonte, & Shows, 2009). This perspective might also be a unique aspect of the urban environment of VCU's campus and the surrounding Richmond area. Richmond has several popular organic, vegetarian, and vegan food shops and restaurants (Peifer, 2013). Perhaps, consequently, the VCU student population is more attuned to these issues than the general college-age population.

With respect to discrete ways in which being a college student affects their eating patterns and choices, focus group participants identified issues previously noted in the literature (Davy, Benes, & Driskill, 2006; Greaney et al., 2009; Horacek & Betts, 1998; Nelson, Kocos, Lytle, & Perry, 2009) such as cost, convenience, meal-preparation restrictions related to dormitory living, the appeal of freedom of choice, the novelty of the responsibility for feeding themselves, limited (and perceived as poor) healthy dietary options within the campus environment, and the influence of peers. Students were very forthcoming with these barriers and noted that many influence them concurrently, making the effort to think about eating healthy a

daunting task. It might be that the numerous and, in some circumstances, unsolvable barriers (such as not being able to cook in one's dorm room) to healthy eating decrease motivation and feelings of autonomy and control over their diet. As described, these factors are very important to young adults' health decisions and outcomes (Bodecs, Horvath, Szilagyi, Nemeth, & Sandor, 2010, Burton, Craig & Netemeyer, 2000; Moller, Ryan, & Deci, 2006; Rimal, 2000; Ryan & Deci, 2000). In fact, many of those in the focus groups that considered themselves "healthy eaters" identified motivation and "self-control" as important individual factors that help them maintain a healthy lifestyle. Making positive changes in the structural and cultural environment of a college campus might make these barriers seem more surmountable, thereby increasing motivation and self-efficacy to improve dietary habits.

A related focus group theme was that many participants felt both they and their peers needed more education about healthy eating strategies and how to implement them within the stressful college environment. They emphasized the need for and interest in such initiatives and recommended unique ideas such as cooking classes sponsored in the dormitories, monthly fresh farmers' markets on campus, ride-shares to grocery stores, and a nutrition course as a requirement in the first semester of freshman year. Previous studies using similar ideas such as a weekly, campus-produced, cooking show (Clifford, Anderson, Auld, & Champ, 2009) and general nutrition class (Ha & Caine-Bush, 2009) have reported significant increases in FV intake in college students.

Students were vehemently opposed to widespread, more restrictive policies affecting food choice. They expressed understanding of the mechanisms and theory behind policies such as calorie labeling and taxes on unhealthy food items; however, they were opposed to the "control" that such policies would seemingly impose. The majority agreed with policies that

would increase healthy options and not restrict or take away unhealthy options. They noted that this approach would still allow individuals the freedom to choose what they wished, but would also facilitate easier access to healthy options. These opinions seemed to be based in their experiences on the VCU campus. Specifically, they reported that the poor food quality and general lack of healthy options was very frustrating and forced them to make less healthy decisions than they would like. Research indicates that increasing a variety of food options increases intake of all foods (Raynor & Epstein, 2001). Unfortunately, this means that not only are healthy foods consumed in greater quantities, less healthy foods are selected more often as well. Therefore, researchers have studied whether increasing the variety of FVs available to diners might increase consumption of low-energy and highly nutritious food items. Several studies with undergraduates have, indeed, shown that increasing the variety of FVs available during meals increases overall consumption of these items (Burns & Rothman, 2104; Meengs, Roe, & Rolls, 2012; Raynor & Osterholt, 2012). Placement of FVs in highly visible areas also serves to increase their overall consumption, "nudging" individuals to select these items rather than unhealthy choices (Hanks, Just, Smith, & Wansink, 2012). This line of research shows promise for simple environmental changes, such as those students suggested in this study, which might have a large impact on nutrition improvement.

Students' belief that mere "exposure" to healthy foods would improve dietary intake was helpful in understanding their perspective on the marketing materials. Many reflected that the materials might not impact their choices that day, but that the campaign would "plant a seed" and make them think more about their diet when they needed to make another food purchase. The idea that repeated exposure to ideas leads to behavior change has been studied and supported in both behavioral (Stein, Nagai, Nakagawa, & Beauchamp, 2000) and dose-response studies

(Holtrop, Wadland, Vansen, Weismantle, & Fadel, 2005) that examined health behavior change such as smoking cessation and treatment adherence, respectively.

Overall, the focus groups revealed that VCU students' opinions and experiences are very similar to those reported in prior studies (with some unique aspects that might be reflective of VCU's urban environment). Students also had very specific ideas about how this information could be disseminated across campus. They thought their peers would be passionate about and eager for change and innovative interventions. This was reflected in one participant's expressed appreciation for the opportunity to participate in the focus group, "I like this little focus group right here, like, more groups that we can come together and talk about it and get more people informed, and just learning from each other. It's really good."

Material Implementation

Mean data from sales of four food items (apples, carrots, chips sold with a meal, and chips sold alone) were collected for all three time-points (baseline, implementation, and washout) at Bleeker Street Deli. Unfortunately, carrot sales and sales of chips sold alone at Cary Street Market and Deli could not be obtained from VCU Dining representatives due to changes in the offering of these items at this location. It was hypothesized that sales of healthier options such as apples and carrots would be higher during the implementation phase, compared with baseline, and this increase would be maintained (or decreased only slightly from implementation) during the washout phase. The opposite hypothesis was made for both categories of chips sales. Specifically, it was hypothesized that mean sales would be lower during the implementation phase, compared with baseline, and this decrease would be maintained (or increased only slightly from implementation) during the washout phase.

The hypothesis for apple sales was not supported. Unfortunately, mean apple sales were lower than baseline during implementation and lower than implementation during the washout phase at both locations, indicating a decrease across all three phases. Although mean apple sales were higher than implementation during the washout phase at Bleeker Street Deli, sales did not return to baseline levels. The increase during washout compared with implementation at Bleeker Street Deli might suggest a lingering effect or "planting the seed" of the materials but this cannot be clearly determined with the data collected.

The hypothesis for chips sold with a meal was partially supported. At Cary Street Market and Deli, mean sales were higher during implementation than baseline, yet sales during the washout phase were lower than implementation, returning to near-baseline levels. This might suggest a need for constant implementation of the materials. The hypothesis for chips was largely supported at Bleeker Street Deli. At this site, mean sales of chips with a meal were lower at baseline compared to implementation, as well as between implementation and washout. Yet, the decrease in sales of chips with a meal does not indicate whether the total amount of meals sold decreased or whether the chips provided in the meal package were exchanged for another side option such as carrots.

The hypothesis for carrot sales was largely supported. Mean carrot sales at Bleeker Street Deli were higher at implementation than baseline. Although sales were slightly lower at washout compared with implementation, a general increase in sales from baseline to washout remained. Interestingly, carrots can be substituted for chips when purchasing a meal at Bleeker Street Deli. Therefore, the decrease in mean sales of chips with a meal and overall increase in carrot sales might reflect students "swapping" chips as their side with carrots when purchasing a meal package.

The hypothesis for chips sold alone was partially supported. Mean sales of chips sold alone were higher at implementation compared with baseline. Although sales were lower at washout compared with implementation, an overall increase from baseline to washout remained. This might indicate that the materials had an impact during washout, as hypothesized.

Overall, the trends in mean sales suggest the possibility that the displayed marketing materials had a small effect on increasing sales of healthier items and decreasing sales of less healthy items. It should be noted that the three time-points occurred in the spring semester of 2014 (January-April). Therefore, other factors such as students starting New Year's Resolutions (i.e., eat healthier, lose weight) could have also impacted sales. It might be that baseline levels of sales (i.e., apple sales being atypically high during baseline) were skewed due to people trying to eat healthier in January as compared to other months when resolutions tend to wane. One study (Pope, Hanks, Just, & Wansink, 2014) collected purchasing data from a local grocery store from July-March. Items sold were categorized as "less-healthy" or "healthy." Results of this study indicated that households spent approximately the same amount of money on less-healthy items in the post-holiday season (January-March) as they did during the holiday season, but increased expenditures on healthy foods by an estimated 29.4% from baseline and 18.9% from the holiday period. Therefore, the "post-holiday resolution" effect might have inflated sales at both dining locations as compared with the rest of the year. A similar effect might occur during the weeks leading up to VCU's Spring Break, as many students attempt to get "in shape" for vacations. In fact, Pope and colleagues hypothesized that, as winter ends, and people start looking ahead to summer and "bikini season," food purchasing in general decreases. Therefore, similar studies should be replicated in the fall semester and various times throughout the year to identify any potential effects of the time period or semester in which this study was completed.

Another factor that might have influenced the findings was the overall quality of the food items. In the intercept surveys, many students indicated that, although they are interested in choosing fruits and vegetables with their purchase, the freshness of these items is suspect and the items are not always in stock. This speaks to the systemic issues in the dining locations, and the demand for higher quality and variety of healthy options mentioned in the focus groups (e.g., organic fruit options).

To isolate the effects of marketing materials in greater detail, future studies should include more extensive and comprehensive sales data including a larger number and variety of items, and comparison with prior years of sales to test for any history effects. It would also be helpful for each phase of the study to be longer (e.g., three months of baseline, implementation, and washout) to increase exposure to and opportunities for patrons to see and attend to the posters. The inclusion of more than two locations would also allow for the statistical analysis of differences in sales.

Material Perspectives and Psychological Factors

Material perspectives. Intercept surveys were completed with individual diners at both locations during the implementation phase of the marketing materials. The majority of those that noticed and read the posters reported that the materials were "attention-getting," "direct/to the point," and "useful." This was echoed in the free-response portions of the survey as most participants reported that the main message of the materials was to "eat healthier" or to "eat more fruits and vegetables." This indicated that the general intended purpose of the materials was clear. Fewer students reported that the posters conveyed the message that small alternatives in your diet could improve overall nutrition. Further refinement of the materials might have helped to deliver this message more effectively.

Consistent with the focus group data, intercept survey responses indicated that the quality of food available at campus dining locations is a major barrier to healthy eating. Survey respondents reported that healthy foods are not consistently available or they are not fresh. Also consistent with the focus group results was students' perspective that the materials might not impact their choice or motivate change in their behavior that day, but that the message would stick with them and initiate an internal dialogue about their diet. Although only a few participants reported changing their purchase on the day of the survey to a healthier option, many more expressed that viewing the materials would make them think about changing their purchase the next time they were at the location. The primary cited reason for not "swapping" their purchase that day was that they had already decided what to order and were uninterested in changing their pre-planned selections.

This attitude has been documented in research surrounding calorie labeling on menus. Krukowski and colleagues (2006) found that 44% to 57% of a combined sample of college students and community members reported that they were unlikely to use restaurant caloric information. Although participants in this study (Kurkowski et al.) did not provide a reasoning for why they were unlikely to use the information, results indicated that the majority of the combined sample (56% of college students and 33% of community members) reported that they do not usually look at nutrition labels, and a full 33% of participants could not identify how many calories they should be consuming. Kurkowski and colleagues suggested that these findings highlight the need for prior education on appropriate caloric intake and food label reading for these initiatives to be effective. This was echoed in students' responses in the current study (both focus group and intercept surveys) that suggested all students should be required to take a nutrition course as most of their peers do not know or understand basics of nutrition

labeling and how to incorporate this information into their lives. Yet, the easy to understand and clear information presented in the current study holds promise as it does not require an individual to have a great deal of declarative nutritional knowledge to perform the suggested behavior, as opposed to nutrition labels. Overall, the marketing materials used in the current study were very positively received and appeared to have at least some impact on those who attended to the message.

Another possible reason the marketing materials did not have a greater impact was the length of exposure to the materials. In order to complete all three study phases within the semester timeline, materials could only be displayed for 20 business days (4 weeks). Intercept surveys suggest that keeping them visible for a longer period of time might increase the number of opportunities for individuals to see the information. In addition, repeated exposure (as mentioned above) to the materials might enhance motivation to swap a healthy side item for an unhealthy choice. Although participants in the intercept survey portion did not provide a suggestion for how long the materials should be visible, the majority interviewed in the implementation phase only visited the location 1-2 times per week. Therefore, they might have only viewed the materials approximately 4-8 times during the period in which they were displayed. This would also assume that they viewed the materials each time, which might not be realistic, as a full 58% of those interviewed during the implementation phase did not see the materials at all. Yet, those who did see and attend to the materials reported positive perceptions of them. Therefore, it would be helpful to display the materials longer (and refine as necessary) to examine the point of maximum exposure to the materials that might lead to subsequent change in behavior.

Future studies should broaden the reach of such campaigns by using many different sources of media. As suggested in the focus groups, and in line with previous interventions on college campuses (Buscher, Martin, & Crocker, 2001; Freedman & Connors, 2010; Peterson, Duncan, Null, Roth, & Gill, 2010), adding flyers, a web component, and perhaps a social media element to the campaign would generate greater exposure and reach outside of the dining location. It would be vital to focus materials at the POP to incite behavior change in the environment in which the behavior is completed, but increased exposure across multiple modalities might expedite behavior change. Finally, survey respondents echoed the focus groups regarding the need for increased education about nutrition and healthy lifestyles, and the desire for healthier, more varied (e.g., wide range of fruits and vegetables, fruits and vegetables offered at more locations) dining options on campus.

Psychological factors. Self-report measures of psychosocial constructs were used to understand the intrinsic factors associated with emerging adults' nutrition behavior. Interesting associations were found among a number of study variables. Results suggested that those with greater nutrition knowledge have increased FV intake, decreased fat/meat/snack intake, self-efficacy, positive perceptions of their health status, increased motivation, and autonomy in regulation of their diet. These associations are consistent with previous literature. It is known that self-efficacy, motivation, and autonomy are linked to positive health behaviors (Bodecs, Horvath, Szilagyi, Nemeth, & Sandor, 2010, Burton, Craig & Netemeyer, 2000; Moller, Ryan, & Deci, 2006; Rimal, 2000; Ryan & Deci, 2000; Satia, Galanko, & Neuhouser, 2005). Those who display these attributes might be more likely to seek out procedural nutrition information, as measured by the NKQ.

In addition, results indicate that young adults with greater self-efficacy have an increased awareness of their overall health status, autonomy for diet decisions, greater motivation for diet change, and feel less controlled by others with respect to their dietary choices. This makes sense in light of the positive effects that self-efficacy has on health status (Bodecs, Horvath, Szilagyi, Nemeth, & Sandor, 2010). Finally, individuals with a greater sense of autonomy regarding their diet reported greater FV intake, less fat/meat/snack consumption, and were more advanced in their identity development. As noted above, studies show that individuals with more autonomous regulation styles (versus controlled) make better decisions regarding their health. This has been shown to be true with regards to weight management (Williams, Grow, Freedman, Ryan, & Deci, 2006) and with healthy eating behaviors (Pelletier, Dion, Slovinec-D'Angelo, & Reid, 2004). Current results suggest that this relation might also translate to FV intake. Moreover, results from this study suggest that individuals who are further along in their identity development might also have a greater sense of autonomy over their diet, suggesting a connection between experiencing both the exploration phases of emerging adulthood and increased autonomy (Arnett, 2000). Developmental psychologist Erik Erikson (1968) suggested that identity development and commitment is, essentially, a decision-making process requiring a sense of agency (or self-control). Therefore, it is likely that autonomy would play a part in identity development.

The associations among self-efficacy, perceptions of health status, self-regulation of diet, and identity development with FV intake, fat/meat/snack intake, and nutrition knowledge were highlighted in analysis of the survey data. All of the above psychosocial factors were significantly associated with both nutrition knowledge and FV intake, but not fat/meat/snack intake. Specifically, autonomy for dietary decisions and a more positive perception of one's

health were most strongly linked to nutrition knowledge. Positive perceptions of one's health greatly influenced FV intake. Therefore, the current study provides evidence that overall greater self-efficacy, more positive perceptions of one's health, increased feelings of control over one's diet, and a more advanced identity development have an influence on increased nutrition knowledge and FV intake; both declarative and procedural knowledge, respectively.

More specifically, those with greater dietary autonomy and perceptions of their health status might be more motivated to seek out and be invested in nutrition information. This highlights the importance of increasing autonomy to promote health behavior change. As noted above, those who make decisions with a stronger sense of autonomy have more positive outcomes with depression, anxiety, somatization, quality of life, tobacco cessation, physical activity, weight loss, diabetes management, oral health, and medication adherence (Ryan & Deci, 2008). In addition, in SDT, autonomy is seen as the mechanism that supports the other components of this theoretical model: competence and relatedness. Therefore, a stronger sense of autonomy promotes and expands both feelings of mastery with decisions and support from others (Ryan & Deci). This is particularly important for college students who are navigating independent life within the social context of a college campus. Therefore, future studies and policy initiatives directed at emerging adults should place a large focus on the promotion of autonomy. Autonomy-supportive policies can be accomplished with messages that do not pressure individuals but, rather, help them make positive choices when they are provided information and comparable alternatives (Moller, Ryan, & Deci, 2006). Autonomy-supportive policies allow individuals to feel a sense of agency to consider what is right for them, encouraging an evaluation of their own competencies and values, and ultimately facilitating the development of intrinsic motivation (Moller et al.). The emphasis on autonomy aligns well with

social marketing concepts that are based on providing consumers with an appropriate exchange behavior (small, feasible change) that enhances the perceived benefits of the behavior and makes it more likely for these individuals to engage in the behavior (Turning Point, 1997).

In addition, these findings suggest that those with better health might be already more aware of and invested in their nutrition (creating greater perceived health) and, therefore, have more declarative and procedural nutritional knowledge. Some individuals are more receptive to nutritional labeling as evident in research indicating that the relative importance of nutrition to an individual is a positive predictor of his/her comprehension of nutrition information (Wang, Fletcher, & Carley, 1995a). In addition, an individual's perception of a specific food on his/her future health predicts more positive declarative nutrition knowledge (Feick, Hermann, & Warland, 1986). Therefore, there might be a bias in that those with greater FV intake have better health and those with greater perceived health are more likely to have high levels of nutritional knowledge and engage in adequate FV consumption.

Lessons learned. As with any community-based research design, the current study experienced several challenges. First, it was not made known to the study investigator until after the completion of the study that data of carrot sales would not be available for Cary Street Market and Deli. In working with community partners, it is important to reiterate the aims and specifics of the study often to ensure mutual understanding. Second, winter weather impeded the timeline due to numerous early closings, late openings, and full snow days during the spring semester of 2014. This forced the exclusion of any sales data from days during which the locations were not open for full business hours.

Lastly, VCU dining services printed and placed the posters, as they are in direct management of the locations. Unfortunately, on what was supposed to be the first day of

implementation, the posters were not placed in the locations until 4 p.m. Therefore, the data collection for implementation was delayed by one day. It would be ideal to have a study assistant in all locations regularly throughout each day to ensure standards of implementation, but this was not feasible for the current study, and would generally not be feasible in replications. It is important to keep these challenges in mind when interpreting the results and in similar future studies.

Implications for Public Policy

This project has implications for public policy efforts to improve dietary intake. Although students indicated they would think about the materials when making a future purchase, and that the materials would "plant the seed," research is mixed on the link between intentions to complete a given health behavior and actual engagement. Many social-cognitive theories suggest that intention to complete a behavior is the strongest predictor of actual completion, yet warn that many factors (i.e., environmental and psychological barriers) can impede an individual from acting in the way they intend (Schwarzer, 2008). Therefore, many believe that other factors, such as self-efficacy and planning, can aid individuals with acting according to their intention (Schwarzer).

The Health Action Process Approach (HAPA) describes two processes: (1) pre-intentional motivation that leads to an intention and (2) post-intentional motivation that leads to the health behavior itself (Lippke et al., 2004; Luszczynska & Schwarzer, 2003; Schüz, Sniehotta, Wiedemann, & Seemann, 2006; Sniehotta et al., 2005; Ziegelmann et al., 2006). The main factors within the first stage (pre-intentional) of the HAPA are risk perception and self-efficacy. As researchers note, risk perception is not strong enough to create a behavioral intention but it ca n allow one to begin contemplating a behavior (Schwarzer, 2008), whereas

self-efficacy is the vital factor that creates intention. It might be that students do not perceive unhealthy eating as "risky" at this point in their lives, but the message of a "simple swap" in the current study might have appealed to the ease and convenience of improving their nutrition that students desire. Perceiving a healthy change as "easy and convenient", as promoted in the positive message of the materials, might have increased students' self-efficacy for improving their nutritional habits. Therefore, future nutritional policies should focus on increasing self-efficacy rather than focusing on risk prevention, as it might be difficult for many young adults, in particular, to perceive a direct, immediate risk of unhealthy dietary choices.

In addition, the post-intentional phase of the HAPA includes more direct processes such as planning (Luszczynska & Schwarzer, 2003; Sniehotta, Scholz, & Schwarzer, 2005; Ziegelmann, Lippke, & Schwarzer, 2006). As students noted, planning meals is a major barrier to healthy eating while living and working on a college campus. Their suggestions included offering more nutrition education on campus, providing better access to healthy food options, and permanently placing (yet periodically updating) marketing materials in dining locations might foster self-efficacy and might make it easier for emerging adults to plan their nutritional behaviors. Moreover, although intention to act do not always predict actual behavior, research on large social marketing campaigns for health behaviors such as smoking and drunk driving indicate that, over time, repeated exposure to these messages does, in fact, change the overall systemic culture to promote healthier behaviors (Durkin, Brennan, & Wakefield, 2012; Elder et al. 2004). These types of campaigns tend to be encountered incidentally through mass media rather than being sought out, thereby increasing reach and repeated exposure (Hornik, 2002).

It should be noted that, at VCU, there are a number of resources available related to nutrition. For example, the Wellness Resource Center provides a free nutrition consultation to

every student as well as links to nutrition-related websites on their own website. Also, VCU Dining Services launched the "Healthy for Life" campaign in 2013 which provides educational brochures in the entrance to the main dining hall (Shafer Court) and useful links on the dining services website. The program focuses on information related to serving and portion sizes, portion control, and nutritional information on the food items offered around campus. Unfortunately, unless students regularly dine at Shafer Court, they are not exposed to this campaign. Students would need to know that information is available and visit the dining services website to benefit from this program outside of Shafer Court. As noted in the literature, similar initiatives in popular restaurants are not well received or effective. Opposition comes from those who advocate for eating disorders prevention who argue that menu labeling is too focused on weight management (Puhl & Heuer, 2010; Schwartz & Henderson, 2009) and, although nutritional information is available on the website, this process requires students to seek out the information before visiting the dining centers (Berman & Lavizzo-Mourey, 2008). Lastly, this type of campaign might promote the message that nutritional information is presented for the purpose of weight management rather than a focus on healthy lifestyle choices (Bates et al., 2011; Hawks & Gast, 2000). Therefore, the campaign developed in the current study serves to provide simple, easy to understand, and highly accessible information that can aid students in making healthy decisions at the point-of-purchase.

Researchers have suggested that social marketing campaigns such as those for smoking cessation are successful at influencing behavior in a number of ways. These campaigns provide direct influence on individual decision making or increase insight into a particular behavior and its implications (Hornik, 2002; Wakefield, Loken, & Hornik, 2010). This insight can lead to increased interpersonal discussion about the behavior (Southwell & Yzer, 2007), and influence

social network norms, creating a new social norm (Abroms & Maibach, 2008). In addition, influencing social norms might have the ability to increase positive behavior in those who join or are influenced by the network (Christakis & Fowler, 2008). Eventually, change in broader social norms occur that influence policy change regarding the behavior (Asbridge, 2004).

Durkin and colleagues (2012) completed a review of mass media campaigns for smoking cessation and concluded that these efforts are effective in promoting quitting behaviors and reducing smoking prevalence in adults. They also determined that campaign reach, intensity, duration, and message type influence the effectiveness. Therefore, they suggest it is vital to target a specific population and offer consistent exposure of the materials to create shifts in group norms and attitudes. A review of campaigns targeting alcohol-impaired driving reported similar results (Elder et al., 2004).

These findings from other areas of health behavior highlight the benefit of such campaigns in changing not only individual behavior, but also group behavior. Therefore, the current study's social marketing campaign holds promise for similar initiatives in the promotion of positive dietary behaviors and eventual change in public policy. Future studies should capitalize on the process of targeting specific populations (such as college students who expressed openness to this idea) and repeated exposure (using many different platforms such as flyers, posters, websites, etc.) for creating viable, lasting change and direct effects on policy.

Conclusion

Limitations and strengths. This study extended research in a number of innovative ways. First, it is one of the first to develop a POP social marketing campaign aimed at increasing consumption of FVs as part of current diets rather than focusing on labels, caloric content, and more drastic dietary change that some argue might induce disordered eating cognitions and

behaviors. Second, very little nutrition policy research has targeted emerging adults, a group particularly vulnerable to the development of poor eating habits that will likely carry through their adult lives and could place them at increased risk for multiple chronic illnesses. This study's focus on this critical developmental period and unique approach to delivery of nutrition information provides important suggestions for subsequent research and public policy. Moreover, this study identified important factors associated with improved nutrition knowledge and dietary intake that could be targeted in education and intervention efforts with emerging adult populations.

This study does have a number of limitations. First, the inclusion of only two locations in which the posters could be presented precluded any statistical analyses of sales data. Future studies should implement a similar campaign in many locations, and for a greater length of time, (perhaps using some locations as a control) to investigate sales differences in greater detail and with more generalizability. Secondly, gathering sales data on more (or ideally all) items sold at each location would help to determine if there are certain items that are more affected by social marketing campaigns than others. Third, it would be beneficial to continue to revise materials (even after presented) to obtain the best possible message and reach.

A fourth limitation is the correlational nature of the survey data, which precludes any determination of causality. Future studies should use a longitudinal design to test for direct effects of the intervention on behavior over time. In addition, researchers should survey a larger sample to test differences in social-psychological variables across phases of the study and between those who did and did not attend to the materials. In addition, the perspectives in the focus groups and intercept surveys might be skewed due to a self-selection bias whereby those

who are more inclined to participate might be more attuned to health and nutrition and more willing to share their viewpoints on these topics.

The current study developed, implemented, and evaluated a social marketing campaign designed to increase FV intake in emerging adults. Results indicate that this approach to public health and policy is promising. Both qualitative and quantitative data indicate that the materials developed made a small impact on FV intake and attitudes towards healthy eating. In particular, this population appears to be highly invested and engaged in the discussion of improving dietary intake. This expressed eagerness to create healthier college campuses should be capitalized upon in future studies to extend the current study and further evaluate such initiatives.

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Appendix A

Focus Group Topics

College Wellness Policy and Marketing Materials

Introduction

Good evening, my name is _____, and I'll be your moderator this evening. Welcome to our focus group discussion tonight. A focus group is a small group discussion that focuses on a particular topic in depth. Today we will be talking about various health behaviors and some potential posters to be displayed at VCU. I'm not an expert in the topics we'll be discussing today, and I'm not here to give you information. I'm here to listen to your ideas and thoughts on these issues. In a focus group, there is no right or wrong answer, only opinions, and I'd like to hear from all of you about equally. It's important that I hear what each of you thinks, because your thoughts may be similar to those of many other people who aren't here at this table tonight. Your ideas are extremely important to us, and I'm interested in your comments and opinions. Please feel free to speak up even if you disagree with someone else here. I'm also interested in any questions you may have as we go along. We're audiotaping our discussion. Everything you say is important to us, and we want to make sure we don't miss any comments. Later, we'll go through all of your comments and use them to prepare a report on our discussion. I want to assure you, however, that all of your comments are confidential and will be used only for research purposes. Nothing you say will be connected with your name. Also, if there are any questions you would prefer not to answer, please feel free not to respond to them. Any questions?

Great, I'd first like to begin by going around and having everyone introduce themselves and share why they were interested in participating in this focus group.

Topic 1: Barriers to Healthy Living

Thank you all for sharing! Now we are going to move on to discussing the basics of healthy behaviors…

Most of us have some idea in our heads about what it means to be "healthy." What does "being healthy" mean to you?

- *listen for whether participants talk about specific types of foods, activity levels*

How do you know if you're eating in a healthy way?

- *Listen for types of food, timing of meals, eating out versus cooking, etc.*

What do you think about when you are choosing what to eat?

How do you think being a college student affects your eating habits?

What types of things do you think would make someone more or less likely to develop a healthy lifestyle?

What environmental barriers do students like you face for eating in a health way?

- *Listen for ideas such as time constraints, lack of healthy food options, lack of being able to prepare own food, dining plans, cost, convenience, etc.*

What social barriers do students like you face for developing a healthy lifestyle?

- *Listen for ideas such as lack of social support for eating healthily, role constraints, lack of role model, etc.*

What psychological barriers do students like you face for developing a healthy lifestyle?

- *Listen for ideas such as lack of self-esteem, self-efficacy, skills needed, knowledge of how to begin/maintain a healthy diet, not wanting to give up certain foods, etc.*

Topic 2: Nutrition in College?

What do you know about the dietary guidelines for college students?

- *Listen for knowledge of recommended servings, MyPlate, etc.*

How do you think college students could eat healthier? What information would you need? What skills would you need to learn?

- *Listen for perceived barriers in the environment, social barriers, lack of skills, motivation, lack of short-term benefits*
- *Listen for positive influences, as well*

What could VCU do to help you in develop better eating habits?

What social resources on campus would help you to eat healthier?

What do you think about VCU adopting a wellness policy?

What types of things would you think would be included in a wellness policy?

What do you think about restaurants posting their nutrition facts/calories on menus?

What do you think about policies regarding nutrition, in general? (soda ban, calorie labeling, etc.)

Topic 3: Thoughts about and Suggestions for Program Development

The sponsors of this focus group want to develop some posters about nutrition to place in a few

VCU dining centers. We want your help in telling us what you, VCU students, think about a few options. Imagine that you are the committee charged with the task of choosing which posters would give students the most information, be eye-catching, and make students want to change their diet.

1. Present first materials.
   Please take a few minutes to look the poster over before answering.

   A. What are your general reactions?
   B. Is there anything you especially like about it?
   C. Is there anything you especially dislike?
   D. Is anything confusing?
   E. Which parts would be most useful to you?
   F. What would you do after viewing a poster with this information?

2. Present second materials.
   Please take a few minutes to look the poster over before answering.

   A. What are your general reactions?
   B. Is there anything you especially like about it?
   C. Is there anything you especially dislike?
   D. Is anything confusing?
   E. Which parts would be most useful to you?
   F. What would you do after viewing a poster with this information?

3. Present third materials.
   Please take a few minutes to look the poster over before answering.

   A. What are your general reactions?
   B. Is there anything you especially like about it?
   C. Is there anything you especially dislike?
   D. Is anything confusing?
   E. Which parts would be most useful to you?
   F. What would you do after viewing a poster with this information?

Overall, which poster was your favorite? What made it better than the others?

What types of things not seen here do you think could help someone who is thinking about improving their diet?

What types of things not shown here do you think should be included in a message to college students?

What would make you more or less likely to observe and think about these messages?

Closing

We've come to the end of our discussion. Do you have any additional comments you would like to make on tonight's topics? Anything you would regret not sharing with us?

I want to thank you for your participation. Your opinions are incredibly valuable as we create and develop materials about healthy eating to help college students make good decisions!

Appendix B

Intercept Surveys

Intercept Surveys- Baseline

Introduction

Good afternoon/evening.
My name is Allison Palmberg, and I am a graduate student doing some research here at VCU. I am conducting a study of how to help college students eat more fruits and vegetables. I would like to ask you a couple questions and some questionnaires. The surveys will take approximately 10-15 minutes, and you will receive $5.00 for your time. Would you be willing to spend a few minutes answering some questions?

1. To make sure we are representing different groups in our study, would you describe yourself as:
   - White/Caucasian .....
   - African American .....
   - Hispanic/Latino .....
   - Asian/Pacific Islander……..
   - Other…….....

2. Are you between the ages of 18-25?
   - Yes .....
   - No ..... **(Thank and end)**

3. Gender
   - Male .....
   - Female .....

4. How often do you visit this location?
   - 5 or more times per week……
   - 3-4 times per week……
   - 1-2 times per week……
   - This is my first time buying food here…..

5. What did you purchase today?

HAND PACKET OF QUESTIONNAIRES

Thank you very much for giving us your time. Your feedback has been most helpful.

Intercept Survey During Implementation

Introduction

Good afternoon/evening.

My name is Allison Palmberg, and I am a graduate student doing some research here at VCU. I am conducting a study of how to help college students eat more fruits and vegetables. I would like to ask you a couple questions about the materials you might've seen today and complete some questionnaires. The interview will take approximately 10-15 minutes, and you will receive $5.00 for your time. Would you be willing to spend a few minutes answering some questions?

1. To make sure we are representing different groups in our study, would you describe yourself as:

White/Caucasian .....
African American .....
Hispanic/Latino .....
Asian/Pacific Islander……..
Other….....

2. Are you between the ages of 18-25?

Yes .....
No ..... **(Thank and end)**

3. Gender

Male .....
Female .....

4. Have you participated in this survey before?

Yes……. **(Thank and end)**
No……..

5. How often do you visit this location?

5 or more times per week……
3-4 times per week……
1-2 times per week……
This is my first time buying food here…..

6. Which of the following would describe your general reaction to this ad?

a. Do you really like it? .....
b. Do you think it is just ok? .....
c. Do you not like it very much?.....
d. Do you not like it at all?.....
e. Don't know/refused .....

7. What is the main message of this ad? (*Do not prompt*)

8. Does this advertisement motivate you to do anything? If so, what does it motivate you to do?

9. Did you see these materials when you were purchasing your meal today?

10. What did you purchase today?

11. Did the advertisement impact your choices today? Did you find the information helpful?

12. How well does each of the following words/attributes describe what you just saw?

Is it attention-getting?	Very much	A little	Not at all
Is it interesting?	Very much	A little	Not at all
Is it direct/to the point?	Very much	A little	Not at all
Is it useful information?	Very much	A little	Not at all

13. Was there anything in the advertisement that you found confusing (*Do not prompt—check all that apply*)

a. Nothing .....
b. Confused in general.....
c. Message not clear .....
d. Words were hard to understand.....
e. Too much information presented .....
f. Message didn't relate to me.....
g. Other _____

14. How can the materials be more appealing to college students?

15. Any other general comments or thoughts about the materials?

Intercept Survey During Washout Phase

Introduction

Good afternoon/evening.

My name is Allison Palmberg, and I am a graduate student doing some research here at VCU. I am conducting a study of how to help college students eat more fruits and vegetables. I would like to ask you a couple questions and have you complete some questionnaires. It should take about will take approximately 10-15 minutes, and you will receive $5.00 for your time. Would you be willing to spend a few minutes answering some questions?

1. To make sure we are representing different groups in our study, would you describe yourself as:

   White/Caucasian .....
   African American .....
   Hispanic/Latino .....
   Asian/Pacific Islander……..
   Other….....

2. Are you between the ages of 18-25?

   Yes .....
   No ..... (**Thank and end)**

3. Gender

   Male .....
   Female .....

4. Have you participated in this survey before?

   Yes……. **(Thank and end)**
   No……..

5. How often do you visit this location?

   5 or more times per week……
   3-4 times per week……
   1-2 times per week……
   This is my first time buying food here…..

6. What did you purchase today?

7. Do you remember seeing posters, flyers here recently that talked about fruits and vegetables?

   a. If yes, what did you think about the materials? Did they influence what you chose to purchase?

8. Any other general comments or thoughts about the materials?

Appendix C

Demographics

1. Age:_____

2. Year in school (please check):
   ___Freshman (first-year)
   ___Sophomore
   ___Junior
   ___Senior
   ___Graduated

3. Race/ethnicity (Check all that apply)
   ___White/Caucasian
   ___Black/African-American/African origin
   ___Hispanic/Latino
   ___Asian/Asian-American
   ___Other

4. Do you have an underlying genetic, neurological, or endocrine condition that influences your eating behaviors (e.g., Prader-Willi, Cushing's syndrome, etc.)?
   _____ YES If yes, which one? _____
   _____ NO

5. Have you ever had a concussion?
   _____ YES If yes, when? _____ (month and year)
   _____ NO

6. Have you ever been hospitalized for a brain/head injury?
   _____ YES If yes, when were you hospitalized? _____ (month and year)
   If yes, for how long were you hospitalized? _____
   If yes, for how long were you unconscious? _____
   Did you have any memory loss? If so, please describe:_____
   _____ NO

7. Height: _____ (inches)

8. Weight:_____ (pounds)

9. Gender:

10. Do you have any problems with your eyes?

_____ YES, I wear contact lenses or glasses.

_____ YES, I have an eye condition other than lenses/ glasses that makes it difficult for me to see pictures on a computer.

If yes, which ones?

_____ NO

Vita

Allison Amelia Palmberg was born on May 4, 1988, in Milwaukee, Wisconsin, and is an American Citizen. She graduated from Lake Mary High School, Lake Mary, Florida in 2006. She received her Bachelor of Science in Psychology with minors in Education and Family, Youth, and Community Sciences from the University of Florida, Gainesville, Florida in 2010. She received her Master of Science in Counseling Psychology from Virginia Commonwealth University, Richmond, Virginia in May of 2012.