PREDICTORS OF HEALTHY EATING AMONG ETHNICALLY DIVERSE UNIVERSITY FRESHMEN

By

LISA ANN FERDINAND

A THESIS PRESENTED TO THE GRADUATE SCHOOL
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Lisa Ann Ferdinand

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The present study used the Theory of Planned Behavior to examine the individual (attitudes, intentions, perceived level of behavioral control, and self-efficacy) and social factors (subjective norms) that influence ethnic-minority (primarily African American and Hispanic American) freshmen university students to engage in healthy eating behavior. Participants consisted of 69 ethnic-minority freshmen university students, all of whom were between the ages of 18 and 19 years. Students were administered an assessment battery that consisted of a Demographic Questionnaire, the Theory of Planned Behavior Questionnaire, the Food Pyramid Self-Efficacy Questionnaire, and the Marlowe-Crowne Social Desirability Scale short version. Students also used an online nutrition program, the Interactive Healthy Eating Program for 7 days and recorded healthy eating behavior scores generated by the program on a Dietary Intake Record Form.

Results provided evidence that among ethnic-minority freshmen university students, attitudes, subjective norms, and perceptions of behavioral control significantly predict intention to engage in healthy eating behavior over a 3-week period. This finding supported a stated hypothesis. Results also indicated that among ethnic-minority freshmen university students, perceptions of behavior control and intention failed to predict engagement in healthy eating behavior over a 3-week period. This finding failed to support a stated hypothesis. In addition, the results provided some support for the addition of a self-efficacy measure to the TPB model when it is used in research focused on the healthy eating behavior of ethnic-minority freshmen university students similar to those in the present study. No gender or ethnicity differences were found for any of the investigated variables.

CHAPTER 1
INTRODUCTION

Nature of the Problem

The American diet – high in fat, saturated fat, and sodium; and low in calcium and fiber-containing foods such as fruits, vegetables, and whole grains – has been implicated in the development of several chronic diseases such as coronary heart disease, certain types of cancer, obesity, stroke, diabetes, and hypertension; and in the development of other health problems such as osteoporosis (Centers for Disease Control and Prevention [CDC], 2004b; Variyam et al., 1998). As a result, nutrition professionals have set guidelines and definitions for the terms 'healthy eating' and 'unhealthy eating', and developed recommendations for healthy eating that are summarized in the *Dietary Guidelines for Americans* (United States Department of Agriculture & United States Department of Health and Human Services [USDA, USDHHS], 2000).

To educate individuals about healthy eating patterns and the relationship between diet and chronic diseases, the *Dietary Guidelines for Americans* has been widely disseminated (Croll et al., 2001). However, a recent report from the U.S. Center for Nutrition Policy and Promotion (CNPP) concluded that most people (76%) had a diet that needed improvement, and reported that the diets of Americans had not changed since 1996 (Basiotis et al., 2002). The report also indicated that non-Hispanic Blacks had lower-quality diets than their White counterparts.

Considering that the American diet has not improved in almost a decade, it is perhaps unsurprising that today, chronic diseases are among the most prevalent, costly,

and preventable of all health problems (CDC, 2004a). Chronic diseases account for about 70% of all U.S. deaths and about 75% of health care costs each year. As a result, national organizations have raised a call for increased preventive care to improve the health and quality of life of Americans and keep the health care budget under control (Marks, 2003).

It is also a fact that some ethnic-minorities may have lower-quality diets than their White counterparts (Basiotis et al., 2002). Not surprisingly racial and ethnic-minority populations (including Blacks, Hispanics, Asian Americans/Pacific Islanders, and American Islanders/Alaska Natives) are affected by chronic diseases at far greater rates than other Americans (USDHHS, 2002). In fact, while overweight and obesity have reached epidemic proportions for all Americans, they are most prevalent in ethnic-minorities. Furthermore, many obesity-related diseases, including diabetes, hypertension, cancer, and heart disease, have higher rates among various members of racial and ethnic-minority groups compared with Whites (American Public Health Association [APHA], 2003). In addition, obesity has been linked to symptoms of depression for females from ethnic-minority backgrounds (Siegel et al., 2000), suggesting that the mental health of minority adults may also be affected by unhealthy eating patterns.

The relationship between eating habits established during childhood and the risk of chronic disease development during adulthood and later life is well established in the literature (Xie et al., 2002). Poor eating habits are often established during youth and carried into adulthood, thus increasing a person's risk for chronic diseases (CDC, 2004a). Yet research indicates that youth do not find healthy eating important (Croll et al., 2001), and they continue to be at risk because of their unhealthy dietary practices (CDC, 2002). For example, nationwide 14% of students were at risk for becoming overweight, and 79%

were unlikely to have eaten the daily-recommended servings of fruit and vegetables. Moreover, these statistics were worse for ethnic-minority youth – Black and Hispanic students were significantly more likely than White students to be at risk for becoming overweight, particularly in the case of female students.

The findings regarding the unhealthy eating patterns of adolescents, and minority adolescents in particular, are disheartening and underscore the need for health-promotion efforts targeted to this group, to quell the present trend of mortality and morbidity attributed to chronic diseases. Adolescence is a critical time when individuals are beginning to take responsibility for their health and health care decisions (Croll et al., 2001) and consequently, adolescents represent a crucial target population for health-promotion efforts. However, for health-promotion efforts to be truly successful, they must be accepted by (and be relevant to) the specific cultural groups and communities for whom they are developed (Millstein et al., 1993; Weissberg, 2003), and must be grounded in research that tests theories and models in the area of positive health practices (Yarcheski et al., 1997). Moreover, health-promotion efforts should focus on healthy behaviors and development (rather than on problem-oriented behaviors) so that health-promoting interventions can be identified that are attractive to (and serve the motivational needs of) adolescents (Millstein et al., 1993).

The present prevalence of chronic diseases in the U.S., especially within minority populations, the pattern of unhealthy eating behaviors characteristic of adolescents and minority adolescents in particular, and the relationship between adolescent eating patterns and later chronic disease development, highlight the need for theoretically-based research examining the factors that influence healthy eating behaviors in adolescents, and

adolescents from ethnic-minority backgrounds in particular. It is only through such research that culturally relevant intervention programs targeted at this population can be developed and implemented successfully. Yet, relatively little research has focused on the healthy eating behaviors of adolescents, especially those from minority backgrounds.

Moreover, no studies have focused on the eating patterns of a particularly important adolescent population, university freshmen. Knowledge about the factors that predict healthy eating with this population is important, however, as attending college for the first time often represents for many students the first opportunity to make independent choices about eating habits. In addition, college life can present difficult and unique challenges to freshmen developing healthy eating patterns, as they may be dealing with peer pressure to eat in an unhealthy manner, and may be living in a campus environment that makes unhealthy food choices easily accessible. Therefore, interventions promoting healthy eating behaviors targeted at this population should be especially beneficial.

By conducting research to identify factors that promote healthy eating among ethnic-minority freshmen, counseling psychologists (and other health care professionals who often serve as key providers of services to university freshmen) can use such factors to help minority freshmen to cope with the challenges that they may encounter with regard to healthy eating in a college environment. Consequently, the present study used a well-supported theoretical framework, the Theory of Planned Behavior, to examine the individual and social factors that predict the level of engagement of ethnic-minority freshmen in healthy eating behaviors. It was hoped that the findings of this theoretically grounded study, which is culturally relevant and focused on health promotion, would allow providers such as counseling psychologists to respond to the call to improve the

health and quality of life of American minorities. For example, as a result of the study, counseling psychologists could facilitate self-care practices, health related decisions, and health-promoting behaviors in ethnic-minority freshmen that would allow them to develop sustainable healthy eating patterns and reduce the potential for chronic disease development.

Theoretical Framework

One theory that has received much attention in the literature with regard to predicting behavioral outcomes, including healthy eating, is the Theory of Planned Behavior (TPB) (Ajzen, 1991). The TPB is an extension of the Theory of Reasoned Action (TRA) (Ajzen & Fishbein, 1980), which suggests that an individual's intention to perform a particular behavior is the single most important predictor of actual behavior.

Intentions capture the motivational factors that influence a behavior, and, "are indications of how hard people are willing to try, of how much effort they are planning to exert, to perform the behavior" (Ajzen, 1991, p. 181). Intentions, in turn are thought to be influenced by attitudes toward the particular behavior, and subjective norms, or the attitudes of important others, towards the behavior.

The TRA was extended into the TPB to address the original model's limitations in dealing with behaviors over which people have incomplete volitional control. Ajzen (1991) reasoned that although it is generally true that the stronger the intention to engage in a behavior, the more likely performance of the behavior should occur, behavioral intention can only find expression if the behavior in question is under volitional control. That is, the performance of most behaviors also depends on factors such as the availability of requisite opportunities and resources.

Thus, Ajzen (1991) proposed the construct of perceived behavioral control (PBC), which represents an individual's perceptions about the existence of behavioral constraints and facilitators that might affect their ability to engage in a behavior. In situations where behaviors are under full volitional control, PBC can be considered to have motivational implications for behavioral intention in the same manner that attitude and subjective norms do because individuals are more likely to intend to engage in behaviors if they perceive they can perform them (Ajzen, 2002b; Notani, 1998). In this case PBC would not be expected to independently add significantly to the prediction of behavior beyond the level of behavior that is predicted by intention. However, in the case where behavior is not under volitional control, PBC can serve as an independent predictor of behavior to the extent that PBC is accurate and represents actual ability. Thus, the relationship between PBC and behavior strengthens as volitional control decreases.

In summary, PBC can exert a direct influence on behavior, and an indirect influence through its prediction of behavioral intention. (see Figure 1). In the revised and final model of the TPB, PBC together with behavioral intention are thought to directly predict behavioral achievement. Hence, the TPB postulates that a person is more likely to engage in a behavior when (a) his or her intention to perform the behavior and perceptions of control are strong, and (b) when the individual holds a positive attitude, favorable subjective norm, and high perceptions of control.

Rationale for Using the TPB

The TPB was chosen as a theoretical framework for the present study because of the theory's consideration of attitudes, subjective norms and PBC. The influence of attitudes and norms on behavior is well supported in the literature (Cialdini et al., 1990; Ennett & Bauman, 1994; Reno et al., 1993). In addition, there is some research that

suggests that norms are important for the healthy eating behavior of teens in particular, with engagement in healthy eating being influenced by family members, and less by friends and other social situations (Croll et al., 2001). Research also suggests that constructs such as PBC and self-efficacy may be of particular importance in predicting the behaviors of adolescents from ethnically diverse backgrounds because specific sociopolitical conditions exist for these adolescents, which may impact upon their real and perceived opportunities and resources (Tucker, 2002; Tucker & Herman, 2002).

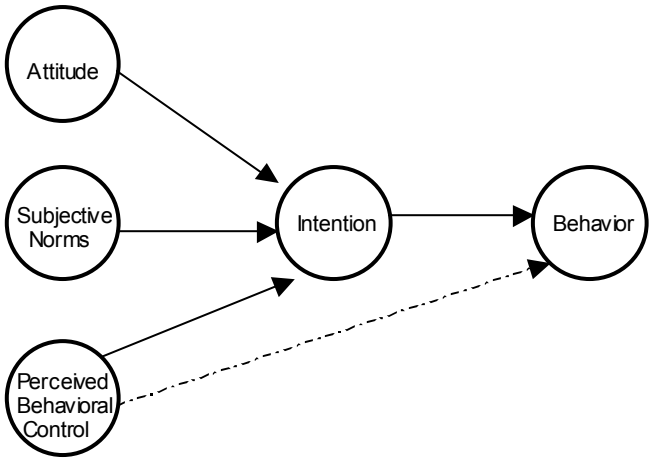

Figure 1. Conceptual model of the Theory of Planned Behavior. The solid arrows illustrate the direct associations of attitude, subjective norm, and perceived behavioral control with intention, and intention with behavior. The dashed arrow links perceived behavioral control directly to behavior. The dashed arrow is used because this association increases when volitional control decreases.

Hypotheses and Research Questions

Although the Theory of Planned Behavior (TPB) has previously been used as a framework to investigate the healthy eating behaviors of adults, adolescents and university students, the model has never been used to examine the predictors of healthy eating behaviors of university freshmen specifically even though healthy eating among this group is especially challenging. Moreover, the TPB model has rarely been used to

explore the behaviors of minority populations in any behavioral domain (Ellis Gardner & Hausenblas, 2001), and when this model has been used in studies of such populations, the focus of these studies has often been on problem-oriented risk behaviors rather than health promoting behaviors (Hanson, 1997).

The purpose of the present study will be to build upon the existing TPB literature by exploring the efficacy of the TPB model for explaining the healthy eating behaviors of ethnic-minority freshmen. For the purpose of the present study, healthy eating or eating a healthy diet was defined as using the dietary intake recommendations of the *Food Guide Pyramid* (USDA, USDHHS, 2000) for a 3-week period. Based on the TPB model, the following hypotheses were tested:

- **Hypothesis 1**: Among ethnic-minority freshmen, attitudes, subjective norms and perceived behavioral control (PBC) regarding healthy eating will predict intention to engage in healthy eating behavior over a 3-week period
- **Hypothesis 2**: Among ethnic-minority freshmen, PBC and intention to engage in healthy eating over a 3-week period will predict engagement in healthy eating over a 3-week period.

In addition, the following research questions were explored:

- **Research Question 1**: Among ethnic-minority freshmen, are there significant differences in the level of engagement in healthy eating behaviors over a 3-week period in association with gender and ethnicity?
- **Research Question 2**: Among ethnic-minority freshmen, are there significant differences in attitudes, subjective norms, PBC and intentions to engage in healthy eating over a 3-week period in association with gender and ethnicity?
- **Research Question 3**: Among ethnic-minority freshmen, will the addition of a self-efficacy measure to the TPB model improve the ability of the model to predict intention to engage, and actual engagement, in healthy eating over a 3-week period?

The above hypotheses and research questions were addressed separately for African Americans in accordance with the “difference model” research approach proposed by

Oyemade and Rosser (1980). That approach advocates recognizing cultural differences when investigating the social behavior of different ethnic groups by examining factors in the behavior of different ethnic groups in separate analyses. In so doing, the different opportunities that may be available to different ethnic groups are considered, and ethnic differences in behaviors and in the factors influencing the behaviors can be determined. The difference model approach is also consistent with recommendations made by Fisher et al. (2002) who advocate movement away from comparative and deficit approaches to research with minority adolescents.

CHAPTER 2
REVIEW OF THE LITERATURE

This chapter will present an overview of the existing literature on the efficacy of the Theory of Planned Behavior (TPB) for explaining engagement in healthy eating behavior. First, literature on the efficacy of TPB for explaining behaviors generally and health-related behaviors more specifically is reviewed. Second, literature pertaining to eating behaviors generally and healthy eating behavior more specifically is discussed. Finally, issues regarding the conceptualization and operationalization of the perceived behavioral control (PBC) construct that have been raised in the literature will be examined. As previously suggested, the PBC construct may be particularly salient to ethnic-minority freshmen because specific sociopolitical conditions exist for these adolescents – conditions that may impact upon their real and perceived opportunities and resources (Tucker, 2002; Tucker & Herman, 2002). In each instance, the relevance of the literature presented to the present study will be discussed.

Efficacy of the Theory of Planned Behavior

The usefulness of the Theory of Planned Behavior (TPB) in predicting behavioral intention and behavior generally and health-related intention and behavior more specifically has been supported by several theoretical and meta-analytic reviews. For example, in their meta-analytic review of 185 independently published studies on the TPB with regard to a variety of behaviors including food choice, Armitage and Conner (2001) found that across all behaviors the TPB accounted for 27% of the variance in behavior. Overall, the PBC construct added an average of 2% to the prediction of

behavior, over and above intention. These authors also found that attitude, subjective norm and PBC combined accounted for 39% of the variance in intention, with the PBC-intention correlation independently accounting for 6% of the variance, controlling for attitude and subjective norm. The subjective norm-intention correlation was found to be significantly weaker than the other relationships with intention.

Ajzen (1991) also reviewed the literature regarding the usefulness of the TPB for separately predicting intentions and behaviors not under volitional control. With regard to predictions of behavior, Ajzen focused on 12 studies investigating a range of behaviors such as playing video games, problem drinking, and election participation. He found that for 5 of the 12 studies, both intention and PBC made significant independent contributions to the prediction of behavior. In six of the remaining studies, intentions proved to be the more important of the two predictors. Finally, in a study focused on weight loss, PBC overshadowed the contribution of intention. The combination of intentions and PBC permitted significant prediction of behavior in each case, accounting for up to 61% of the variance in behavior in one instance.

Ajzen (1991) reviewed 16 studies to examine the prediction of intention in the TPB model. He found that a considerable amount of the variance in intention could be accounted for by the three predictors in the TPB model (attitude, subjective norm, and PBC), with 18% to 88% of the variance being accounted for by these predictors for the different behaviors examined. Ajzen further noted that whereas intentions and attitudes towards behaviors almost invariably contributed significantly to the prediction of intentions, the results for subjective norms were mixed, with no clearly discernable

pattern. Ajzen concluded that for the behaviors considered, personal considerations might have tended to overshadow the influence of perceived social pressure.

Other reviews have focused specifically on the TPB and health-related behaviors including eating behaviors. For example, Godin and Kok (1996) reviewed 58 studies that reported a total of 87 applications regarding intention. The applications were classified into seven health-related behavior categories (addictive, automobile, clinical and screening, eating, exercising, HIV/AIDS, and oral hygiene). These authors found that the overall average explained variance in intention from the three predictor variables was 41%, varying from 32% for eating behaviors to 47% for oral hygiene behaviors. For studies that reported a significant additional contribution of PBC above attitude and subjective norm, the averaged added variance was 13%, varying from 5% for eating behaviors to 24% for oral hygiene behaviors. It was further found that the average explained variance in behavior was 34%, ranging from 16% for clinical and screening behaviors to 42% for HIV/AIDS-related behaviors. Finally, PBC additionally contributed to an average of 11.5% of the variance in behavior in half of the studies.

Conner and Sparks (1996) also reviewed the utility of the TPB in explaining engagement in a variety of health-related behaviors. However, their review focused primarily on the utility of the PBC construct in the prediction of intention and behavior. Overall, these authors' review suggested that the PBC construct added significantly to the prediction of behavioral intention and actual behaviors including smoking and alcohol consumption. For other behaviors such as sexual behaviors, exercise, and breast/testicle self-examinations, PBC was found to add significantly to the prediction of intentions but

not behavior. Finally, in the domain of food choice and health screening attendance, PBC did not significantly contribute to the predictions of either intentions or behavior.

In summary, there appears to be empirical support for the efficacy of the TPB in predicting behavior in a variety of domains, including those related to health and more specifically eating. The reviews therefore justify the use of the TPB in the present study as a potentially useful model for exploring the healthy eating behaviors of the ethnic-minority university freshmen who participated in this study. Interestingly, the reviews on health-related behaviors suggested contradictory results in the domain of food choice and eating behaviors. Whereas the Godin and Kok (1996) review suggested that attitude, subjective norm and PBC predicted 32% of the variance in intention for eating with PBC adding 5% of additional variance, the Conner and Sparks (1996) review suggested that PBC did not significantly contribute to the prediction of either food choice intention or behavior. These contradictory results further suggest the need for the focus of the present study on examining (a) the efficacy of the TPB for predicting intention to engage in healthy eating and healthy eating behavior, and (b) the predictive value of PBC in this TPB prediction model.

The Theory of Planned Behavior and Healthy Eating

Sparks (1994) suggests that the Theory of Planned Behavior (TPB) model provides a useful framework for exploring eating behaviors because these behaviors are frequent activities that are often characterized by "a confrontation of competing motivations and ambivalent attitudes… indulgence and planned restraint" (p.25), and these behaviors are subject to social influences. Therefore, a model in which attitudes, perceived control and subjective norms influence intention and behavior fits well for examining predictors of healthy eating behavior.

The TPB model has been a well-used framework for investigating a range of eating behaviors including the consumption of low-fat diets (Armitage & Conner, 1999a), the use of dietary supplements (Conner et al., 2001), fruit and vegetable consumption (Lien et al., 2002; Sjoberg et al., 2003), food choice (Kassem et al., 2003), and healthy eating (e.g., Conner et al., 2002). The contradictory findings regarding the usefulness of the TPB in predicting eating behaviors that are obvious when comparing the literature reviews by Godin and Kok (1996) and Conner and Sparks (1996) may well be due to the different ways that eating behaviors have been defined and studied in the literature.

Traditionally, many studies on eating behaviors have focused on single-nutrient consumption or the consumption of individual foods. Unfortunately, however, because most foods contain many nutrients and most diets are composed of many foods, single-nutrient and single-food approaches do not account for the complexity of eating habits and do not reflect the multi-faceted nature of the human diet (Hann et al., 2001). Moreover, nutrient bioavailability and absorption often depend on food preparation and eating patterns.

In contrast, studies of healthy eating behavior usually focus on overall diet quality and eating patterns that are consistent with the dietary guidelines specified by the *Food Guide Pyramid* (USDA, USDHHS, 2000). As a result, healthy eating studies often include measures that evaluate food intake and choices related to all of the major food groups (grains, vegetables, fruits, milk, and meat), and intake of fat, cholesterol and nutrients. Such studies may give a better picture of overall eating patterns. Furthermore, because healthy overall diets are closely linked with health promotion and the reduction of risk for chronic diseases (USDA, USDHHS, 2000), studies focused on healthy eating,

versus more specific eating behaviors, may allow the most comprehensive conclusions to be drawn regarding interventions geared towards health promotion and chronic disease reduction.

Several studies have used the TPB framework to explore the predictors of healthy eating behavior with adult, university, and adolescent populations. Øygard and Rise (1996) investigated which factors in the TPB model predicted the intention to eat healthier food over a 4-week period in a sample of 527 Norwegian young adults aged 23-26 years old. Healthy food in this study was defined as 'foods containing a low quantity of fat, sugar and salt'.

The authors found that attitude and subjective norm accounted for 26% of the variance in the intention to eat healthier food during the next 4 weeks. In this study, a self-efficacy measure was used to measure PBC, and inclusion of the self-efficacy/PBC construct into the model increased the explained variance in intention to 32%. The relative contribution of attitude to the variance in intention was strongest, followed by self-efficacy/PBC. Subjective norm was insignificant in the first step, although it retained its significant effect when PBC was added to the model. These authors additionally reported that they found no gender differences in the results obtained.

Povey et al. (2000) also examined the extent to which the TPB was a useful model for predicting intentions to eat a healthy diet, and for predicting actual dietary behavior in adults. Using a sample of 235 adults in England, these authors measured engagement in healthy eating by using a 63-item food frequency questionnaire that was then used to calculate measures of daily macro-nutrient intake, percentage food energy from fat, fiber

intake, and fruit and vegetable intake. PBC was measured as a combination of self-efficacy and controllability items.

Results of the Povey et al. (2000) study showed that attitude, subjective norm, and PBC were all significant predictors of intentions, accounting for 42% of the variance. Attitudes were found to be the strongest predictors of intentions such that stronger intentions were related to more positive attitudes towards eating a healthy diet. The results of the study also showed that intentions and PBC predicted healthy eating behavior, accounting for 15% of the variance in this behavioral domain.

Bebetsos et al. (2002) explored intentions and self-efficacy towards healthy eating in a sample of 96 physically active Greek university students. 'Healthy eating' was described to participants in a two-page document with healthy eating suggestions that included consuming less salt and sugar, eating baked instead of fried foods, drinking natural juices etc. These authors assessed the predictor constructs in the TPB (attitude, subjective norm, PBC, and intention) and role identity, attitude strength and self-efficacy and found that together these variables accounted for 72% of the variance in healthy eating. However, the contribution of self-efficacy towards intention was not significant. It was further found that attitudes, intention, PBC and attitude strength predicted self-efficacy for healthy eating and that self-efficacy had a significant association with maintaining healthy eating behaviors.

More recently, Baker et al. (2003) assessed intentions about eating, and actual healthy eating behaviors over a 2-week period for 305 American adolescents between the ages of 13 and 17. Being a healthy eater in this study was defined as (a) eating in a balanced way with a lot of fruit and vegetables, (b) eating 3 meals a day, (c) not eating

too much junk food (fast food, chips, and sweets or desserts), (d) eating moderate amounts (not too much or too little) when you are hungry, and discontinuing eating when you are full, and (e) eating only a moderate amount of fat. Interestingly, these authors operationalized PBC as a bi-dimensional construct comprising two sets of beliefs about behavioral control: means-ends beliefs which reflect general ideas about causality; and agency beliefs, which refer to an individual's perception that he or she personally possesses or can use a specific means to obtain a given outcome.

Baker et al. used mean and covariance structure models (MACS) to test the TPB model with specific emphasis on the subjective norms and PBC paths in the model. For social norms they found that girls' perceived peer norms exerted a stronger indirect influence on eating intentions than their perceived parent norms, and that attitudes had a stronger influence on intentions for boys relative to girls. For PBC, between-gender analysis revealed that intraself agency beliefs, that is, a belief that one's own internal resources such as self-discipline and effort affect healthy eating, predicted stronger intentions to eat healthily for girls, although it did not have an influence for boys. Furthermore, for both boys and girls, a stronger belief that healthy eating is affected by one's external resources (extraself agency beliefs) such as family and friends, predicted weaker intentions to eat healthily. Finally, it was found that once a belief in one's own internal resources was accounted for, holding a causality belief that eating behavior is influenced by a person's internal resources had a negative influence on eating intentions.

Backman et al. (2002) extended the TPB healthy eating literature by exploring whether ethnicity and gender influenced the relationships among the theoretical constructs in the TPB model in a study investigating the psychosocial predictors of

healthful dietary behaviors in a sample of 780 White, Black and Hispanic American adolescents (ages 14-19 years). Unfortunately, Backman et al. did not provide a breakdown of their sample by ethnicity within gender or vice versa. A healthy diet was defined as eating at least 5 servings of fruits and vegetables daily; eating low-fat or fat-free dairy products daily; adding very little fat to foods; eating small servings of meat, poultry, and fish; and limiting intake of fried foods, snack foods, and fast foods. The authors did not specify how PBC was operationalized in the study.

Results of the study provided support for the use of TPB in identifying predictors of healthy dietary behavior among male and female adolescents from diverse ethnic backgrounds. Intention explained 17% of the variance in healthy dietary behaviors, and attitude, subjective norm and PBC explained 42% of the variance in intention. PBC did not contribute significantly to the prediction of a healthful diet.

Results of analyses applied to the external variables of gender and ethnicity suggested some differences with regard to both variables. Males reported greater caloric intake compared to females, and females reported significantly greater intention to eat a healthy diet, more positive attitudes toward healthy eating, and stronger subjective norms than their male counterparts. The findings regarding the positive attitudes of females toward healthy eating, and their greater intention to eat a healthy diet are particularly interesting given statistics indicating that Black and Hispanic female students are particularly at risk for becoming overweight (CDC, 2000). It may be the case that minority females were under-represented in the sample used by Backman et al. (2002). Alternatively, the findings by these researchers could suggest that although minority females may have positive attitudes and high intentions towards healthy eating, other

factors may affect engagement in healthy eating behaviors that are not considered by the TPB model. Access to healthy foods and cultural practices regarding eating and food preparation may be two such factors. The results of the Backman et al. study also indicated that Black participants reported greater caloric consumption from fat than their White or Hispanic counterparts.

Finally, Conner et al. (2002) built upon the extant literature regarding the TPB by exploring the power of the TPB to predict long-term healthy eating intentions and behavior in a sample of 144 adult health-promotion clinic attendees in England over a 6-year period. In addition to examining the variables specified by Ajzen (1991) in the TPB model, the additional variable of perceived past behavior and the moderating role of intention stability were also examined. Healthy eating was defined as being a diet low in fat, high in fiber, and high in fruit and vegetable consumption. PBC was operationalized as the perception of the extent to which performance of the behavior was within the participant's control, and was measured with a combination of self-efficacy and controllability items.

Results indicated that the TPB variables were predictive of healthy eating intentions, explaining 43% of the variance in behavioral intentions cross-sectionally and 20% of the variance prospectively (over a 6-year interval). Perceived past behavior was found to be predictive of intentions cross-sectionally but not prospectively. Finally, intentions were found to be significant prospective predictors of healthy eating behavior, explaining 9% of the variance, whereas perceived past behavior did not have a significant additional effect. As a whole, the results suggested that the TPB provided a sufficient account of the determinants of long-term healthy eating, and that intentions were more

strongly controlled by the cognitive factors described by TPB than by reflection on past behavior.

Contribution to the Literature by the Present Study

The review of the Theory of Planned Behavior (TBP) literature suggests that there is empirical support for viewing the TPB as a useful framework for understanding healthy eating behavior in adult, university and adolescent populations. However, the existing literature base also highlights several areas that may be worthy of further investigation that are addressed by the present study. First, it is remarkable that only two of the studies using the TPB model to explore healthy eating behavior in the past have used samples comprising American participants (Backman et al., 2002; Baker et al., 2003). Yet, the current prevalence of chronic diseases in the U.S., and the relationship between unhealthy diets and the development of such diseases suggest that research on the predictors of healthy eating in American samples is warranted. Moreover, the efficacy of the TPB model for predicting healthy eating behavior in both American and non-American samples suggests that it may provide a useful framework for further research in this behavioral domain.

Second, only the Bebetsos et al. (2002) study focused on the healthy eating behaviors of university students and none of the studies reviewed focused on university freshmen. However, it is often precisely when individuals first enter university as freshmen that they begin to make independent decisions about their eating behaviors. Furthermore, the college campus environment often presents major healthy eating challenges for freshmen and other university students. As such, university freshmen are a worthwhile target population for healthy eating research that will have implications for

developing counseling interventions and education programs to promote their establishment of healthy eating lifestyles that will continue into adulthood.

Third, only 1 study examined ethnic differences in the constructs of the TPB model (Backman et al., 2002), and only two studies examined gender differences in the TPB constructs (Backman et al., 2002; Baker et al., 2003). However, ethnic- and gender-related differences in both eating patterns and chronic disease prevalence have been reported in the health literature. For example, it has been reported that Black and Hispanic students are significantly more likely than White students to be at risk for becoming overweight, particularly in the case of female students (CDC, 2002). Thus, studies that seek to understand the factors that predict healthy eating behaviors for specific populations are imperative so that culturally sensitive and relevant interventions can be implemented.

Studies using the TPB that have included ethnic-minority individuals in their population samples have reported varying levels of support regarding the usefulness of the TPB in explaining the behaviors of ethnically diverse populations. For example, Davis et al. (2002) found support for the TPB in predicting completion of high school among a sample of African American high students. However, Trost et al. (2002) concluded after their study exploring the psychosocial correlates of physical activity in White and African American girls, that the TPB had limited utility for explaining the physical activity of African American girls. The results of these two studies seem to suggest that the utility of the TPB for explaining behavior may be influenced by the domain of the behavior and ethnicity.

Thus overall, the TPB literature supports the focus of the present study on an ethnic-minority sample. Furthermore, the literature supports this study's exploratory examination of ethnicity and gender-associated differences in levels of engagement in healthy eating behavior, and in levels of the constructs of the TPB.

Conceptualization and Operationalization of Perceived Behavioral Control in the Theory of Planned Behavior

The Theory of Planned Behavior (TPB) is an extension of the Theory of Reasoned Action (TRA) (Ajzen & Fishbein, 1980), which proposed that a central factor in the performance of a behavior is the individual's intention to perform that behavior. The construct of perceived behavioral control (PBC) was added to the TRA in an attempt to deal with situations in which people may lack complete behavioral control over the behavior of interest (Ajzen, 2002b). Thus, in the final model of the TPB, PBC together with behavioral intention are thought to directly predict behavior, with PBC exerting both a direct influence on behavior, an indirect influence through its influence on behavioral intention.

Notani (1998) conducted a meta-analysis of 36 articles that together provided 63 tests of the TPB to assess the robustness of the theory and to delineate under which conditions, if any, the PBC construct was most predictive of behavioral intention and behavior. Based on the meta-analysis Notani concluded that PBC served as an antecedent to both behavioral intention and behavior. Furthermore Notani's findings suggested that PBC was a stronger predictor of behavior when it was (a) conceptualized to reflect control over factors primarily internal versus external to an individual (b) operationalized as a global measure designed to directly measure a person's overall perception of control,

and (c) used with non-student versus student samples and used to predict familiar versus unfamiliar behaviors.

The conceptualization of the PBC construct has generated considerable attention in the TPB literature, with researchers alternatively conceptualizing PBC as perceived barriers (e.g., Lien et al., 2002), perceived difficulty (e.g., Sparks et al., 1997), personal agency (e.g., Baker et al., 2003), and most notably, self-efficacy (e.g., Ajzen, 1991). Ajzen suggested that the PBC could be considered most compatible with Bandura's (1982) concept of self-efficacy that suggests that people's behavior is strongly influenced by their confidence in their ability to perform it. However, several researchers have presented evidence supporting a distinction between PBC and perceived self-efficacy often by demonstrating their differences with respect to the prediction of intention and behavior.

For example, in a study exploring the consumption of a low-fat diet using the TPB, Armitage and Conner (1999a) obtained evidence for the distinction between self-efficacy and PBC from principal components analysis, and patterns in prediction of intention. These authors suggested that items concerned with the ease or difficulty of performing a behavior, or confidence in one's ability to perform it, measured perceived self-efficacy and related specifically to internal resources. In contrast, items that addressed the extent to which people perceived control over more external factors measured PBC.

Results of Armitage and Conner's (1999a) study revealed that the global control items produced separate self-efficacy and PBC factors when they were subjected to a principal components analysis. In addition, self-efficacy and PBC differed in terms of their influence on intention and their intercorrelations with other TPB variables. Other

authors using confirmatory as well as exploratory factor analyses have supported Armitage and Conner's (1999a) findings suggesting that there is a distinction between self-efficacy and controllability (e.g., Manstead and van Eekelen, 1998; Sparks et. al, 1997).

In response to the research suggesting that self-efficacy and controllability can be reliably distinguished, Ajzen (2002b) proposed a 2-level hierarchical model of PBC, in which PBC was the overarching superordinate construct comprised of two components: self-efficacy, dealing largely with the ease or difficulty of performing a behavior; and controllability, or the extent to which performance is up to the individual. Ajzen further suggested that self-efficacy and controllability might both reflect beliefs about the presence of internal and external factors. Consistent with this model of PBC, Ajzen (2002a) indicated that measures of PBC should include items that capture both self-efficacy and controllability.

To date, the PBC construct has been treated inconsistently in the TPB literature focused on healthy eating, with researchers conceptualizing PBC in different ways. Studies by Conner et al. (2002) and Povey et al. (2000) both explored the healthy eating behaviors of adults using a conceptualization of PBC that closely approximated Ajzen's 2-level hierarchical model. Both of these studies included items in their PBC measure that captured both self-efficacy and controllability. However, no studies have used a similarly conceptualized measure of PBC to examine the predictiveness of the TPB model for explaining the healthy eating behavior of adolescents. Thus, the present study will use modified items from the Conner et al. (2002) study on healthy eating in adults to determine whether the most recent conceptualization of the PBC construct in the TPB

model has predictive value for understanding the healthy eating behaviors and healthy eating intentions of ethnic-minority freshmen.

The finding of the meta-analysis conducted by Notani (1998) regarding the predictiveness of PBC has also received much attention. Notani's findings suggested that PBC was a stronger predictor of behavior when it was operationalized as a global measure designed to directly measure a person's overall perception of control. However, Ajzen (2002a; 2002b) suggested that PBC can be measured using direct or belief-based items that are relevant to the target behavior. Direct or global measures assess an individual's overall perception of control. In contrast, belief-based measures evaluate a list of individual control beliefs that a sample considers salient and which are usually obtained through pilot testing. Whereas belief-based PBC measures are based on more information, direct measures of PBC allow a person to consider all possible factors that may enhance or diminish control to arrive at an overall assessment of his or her PBC.

Perhaps because of the conclusion drawn by Notani (1998) that PBC is a stronger predictor of behaviors when it is operationalized as a more global or direct measure, direct measures of PBC have typically been used in TPB studies on healthy eating. However, Notani's meta-analysis included only 1 study that involved an ethnic-minority sample (Hispanic Americans) and it is therefore unclear whether the results of the meta-analysis generalize to an ethnic-minority sample. Moreover, because belief-based models provide the cognitive and affective foundations for perceptions of control, they also give more information regarding appropriate interventions.

As such, the present study sought to also include a measure of PBC that would have relevance to interventions by specifying conditions under which ethnic-minority

freshmen might find it difficult to engage in healthy eating behaviors. Unfortunately, the difficulties associated with recruiting minority samples made a pilot study impossible. Instead, a reliable measure of healthy eating self-efficacy that included situations in which engaging in healthy eating behaviors could be challenging was included in the present study in addition to the more global measure of PBC. The issue of whether such a measure would add to the ability of the TPB model to predict intention or behavior beyond that which is predicted by a more global measure of PBC is addressed.

Finally, considerable attention has been given to the conclusion of Notani (1998) that PBC is a better predictor of behavior when it is used with non-student versus student samples and familiar versus unfamiliar behaviors, but a better predictor of behavioral intention when used with student versus non-student populations. However, ethnic-minorities were under-represented in the studies included in Notani's meta-analysis. Furthermore, none of the studies included in the meta-analysis were focused on healthy eating. In the present study the TPB will be tested with a student population (university freshmen minority students) to identify predictors of a relatively familiar behavior (healthy eating).

CHAPTER 3
METHODS

Participants

Participants in this study were undergraduate freshmen university students who were recruited from a summer class offered by a program at the University of Florida designed to offer support and enrichment services to ensure that students succeed in the university environment. This class was chosen for participant recruitment specifically because a large number of ethnic-minority students are typically enrolled in the class, thus increasing the likelihood of ethnic-minority students being adequately represented in the participant sample. Of the 69 ethnic-minority students who were invited to participate in the study, all (100 %) students returned the first part of the assessment battery with signed informed consent forms, whereas 23 (33%) students completed the study by completing the second part of the assessment battery.

Participants ranged in age from 18 to 19 years old, with a mean age of 18.1 years. Eleven (15.9%) of the participants were male and 58 (84.1%) were female, therefore suggesting that males were under-represented in the study sample. Forty-six (66.7%) participants were African American, 16 (23.2%) were Hispanic American, and 7 (10.1%) were classified as “other”. Therefore, African Americans were over-represented in the study sample. It is noteworthy that students who classified themselves as “other”, reported their ethnicities as Asian, (4 students) African/Caucasian American (1 student), Black (1 student), and Haitian (1 student), and therefore can be considered ethnic-minorities.

In terms of reported household income, 9 (13%) of the participants reported a household income below $10,000, 17 (24.6%) between $10,001 and $20,000, 11 (15.9%) between $20,001 and $30,000, 11 (15.9%) between $30,001 and $40,000, 8 (11.6%) between $40,001 and $50,000, and 7 (16.4%) over $50,001. Six (8.7%) participants did not report an annual household income.

In addition, the average weight of the participants at the beginning of the study was 141.8 pounds. Nineteen (27.5%) students had previously attended a healthy eating workshop. Most of the sample identified their eating habits as unhealthy, with 8 (11.6%), 25 (36.2%), 27 (39.1), 3 (4.3%), and 6 (8.7%) students reporting their present eating habits as very unhealthy, slightly unhealthy, slightly healthy, very healthy, and neither unhealthy or healthy, respectively. Finally, when asked how satisfied they felt with their current weight 14 (20.3%) students reported feeling very dissatisfied, 27 (39.1%) students reported feeling slightly dissatisfied, 14 (20.3%) reported feeling slightly satisfied, 13 (18.8%) reported feeling very satisfied, and 1 student did not answer the question. Thus, the sample was fairly evenly split with regard to feeling satisfied or dissatisfied with their current weight. The demographic characteristics of the sample are presented in Table 1.

Measures

Participants in this study initially completed an assessment battery consisting of a Demographic Questionnaire (DQ), the Theory of Planned Behavior Questionnaire (TPBQ), the Food Pyramid Self-Efficacy Scale (FPSES), and the Marlowe-Crowne Social Desirability Scale short version (MCSD-S). All questionnaires in the assessment battery were counterbalanced before they were distributed to participants. 2 weeks after completing the initial assessment battery, participants completed a Dietary Intake Record

Form for a period of seven days. More detailed descriptions of these questionnaires are provided below and each questionnaire may be found in the appendices.

Table 1. Demographic Characteristics of Participants

Characteristic	N	%
Gender		
Male	11	15.9
Female	58	84.1
Age		
18	64	92.8
19	5	7.2
Ethnicity		
African American	46	66.7
Hispanic	16	23.2
Other	7	10.1
Income		
Less than $10,000	9	13.0
$10,001 - $20,000	17	24.6
$20,001 - $30,000	11	15.9
$30,001 - $40,000	11	15.9
$40,001 - $50,000	8	11.6
Over $50,000	7	10.1
Unreported	6	8.7
Healthy Eating Workshop		
Yes	19	27.5
No	50	72.5
Present Eating Habits		
Very Unhealthy	8	11.6
Slightly Unhealthy	25	36.2
Slightly Healthy	27	39.1
Very Healthy	3	4.3
Neither Unhealthy nor Healthy	6	8.7
Satisfaction with Present Weight		
Very Dissatisfied	14	20.3
Slightly Dissatisfied	27	39.1
Slightly Satisfied	14	20.3
Very Satisfied	13	18.8
Unreported	1	1.4

N = 69

Participant Demographics

Demographic questionnaire (DQ). This questionnaire(Appendix B) was developed by the primary researcher and administered to obtain information regarding the participants' age, height, weight, gender, self-reported ethnicity, socio-economic level

(annual household income), and general information regarding the participant's eating habits.

Theory of Planned Behavior Constructs

TPB questionnaire (TPBQ). Ajzen (2002a) indicated that in measuring the constructs of the TPB (i.e., intention, attitude, subjective norm, and perceived behavioral control), it is imperative that the behavior of interest is defined in terms of its target, action, context and time, and that all constructs are defined in terms of exactly the same elements. Target refers to the purpose of the behavior, action is the behavior of interest, context is the location of the performance of the behavior and time is when the behavior will be performed. For the purpose of this study, the target was defined as increasing overall levels of healthy eating, the action was defined as eating a healthy diet, the context was defined as the university campus environment, and the time was dietary intake in 24-hour periods for a total of 21 days. For the purpose of the present study "eating a healthy diet" was defined as using the dietary intake recommendations of the *Food Guide Pyramid* (United States Department of Agriculture, United States Department of Health and Human Services [USDA, USDHHS], 2000). To ensure that participants were knowledgeable about the dietary recommendations of the *Food Guide Pyramid*, a handout describing the recommendations were distributed with the TPBQ.

Intention, attitude, and PBC were measured using slightly modified items (with regard to context and time) that were developed by Connor et al. (2002) who explored the healthy eating behaviors of adults over a 6-year period using the TPB model. In the Conner et al. study, participants were asked to fill out measures of the TPB constructs when the study commenced (time 1), 6 months later (time 2) and 6 years later (time 3). Therefore, reliability data for the TPB constructs for all three times in the Conner et al.

study will be reported as each TPB construct measured in the present study is described below. In addition, Conner et al. used a single item to measure subjective norm, resulting in low test-retest reliability. Therefore, in the present study, four additional items were used to increase the reliability of this construct. In addition, consistent with recommendations made by Ajzen (2002a), in the final TBPQ the different items assessing each TPB construct (attitude, subjective norm, PBC and intention) were separated and presented in a nonsystematic order, interspersed with items measuring other TPB constructs.

Intention. The intention subscale of the TPBQ consisted of five items from the Conner et al. (2002) study that were slightly modified for use in the present study. Cronbach alpha reliability coefficients for the intention items used in the Conner et al. study ranged from .89 to .94 for times one to three (i.e., at the study commencement, 6 months later, and 6 years later). Test-retest reliability for the intention items used in the Conner et al. study was established at $r = .48$. Each item was measured on a 7-point bipolar scale. These items and the bipolar scale for each are as follows: "I intend to eat a healthy diet for the next 21 days," *definitely do not-definitely do*; "I want to eat a healthy diet for the next 21 days," *strongly disagree-strongly agree*; "I expect to eat a healthy diet for the next 21 days," *unlikely-likely*; "How likely is it that you will eat a healthy diet for the next 21 days?" *unlikely-likely*; and, "I will try to eat a healthy diet for the next 21 days," *unlikely*-likely. All of the items were rated –3 to +3. Intention was measured as the mean of the five item ratings and therefore the intention score in the present study could range from –3 to +3, with higher scores indicating higher levels of behavioral intention to eat a healthy diet for the next 21 days.

Attitude. The attitude subscale of the TPBQ consisted of six items from the Conner et al. (2002) study that were slightly modified for use in the present study. Cronbach alpha reliability coefficients for the attitude subscale used in the Conner et al. study for times one to three (i.e., at the study commencement, 6 months later, and 6 years later) ranged from .83 to .84. Test-retest reliability for the attitude subscale in the Conner et al. study was acceptable (r = .51). Each item began with the sentence, "My eating a healthy diet would be/is…" and was completed with one of the following semantic differentials: *bad-good, harmful-beneficial, unpleasant-pleasant, unenjoyable-enjoyable, foolish-wise, unnecessary-necessary*. Each item was measured on a seven-point and ratings ranged from –3 to +3. The attitude score was calculated as the mean of the ratings of the six items and could therefore range from –3 to +3, with higher scores indicating more positive attitudes toward eating a healthy diet for the next 21 days.

Subjective norm. The subjective norm construct was assessed by a single item in the Conner et al. (2002) study. However, test-retest reliability for this item was low (r = .38). As such, four additional items were added in the present study to attempt to increase the reliability of the subjective norm measure. These items were created using suggestions for constructing measures for subjective norm offered by Ajzen (2002a). Thus, subjective norm was measured as the mean of the ratings of the five items, each measured on a 7-point bipolar scale. These items and the bipolar scales for each are as follows: "It is expected of me that I eat a healthy diet for the next 21 days," *strongly agree-strongly disagree*; "With regard to eating a healthy diet for the next 21 days, the people in my life whose opinions I value would," *disapprove-approve*; " People who are important to me think that I should eat a healthy diet," *strongly disagree-strongly agree*;

"Most people who are important to me eat a healthy diet every day," *strongly disagree-strongly agree*; "The people in my life whose opinions I value eat a healthy diet every day," *unlikely-likely*. All items were rated –3 to +3. Thus, subjective norm scores could range from –3 to +3, with higher scores indicating more positive attitudes by important others towards study participants eating a healthy diet for the next 21 days.

Perceived behavioral control (PBC). The PBC subscale of the TPBQ consisted of six items from the Conner et al. (2002) study that were slightly modified for use in the present study. Consistent with the recommendations of Ajzen (2002a), the scale consisted of several self-efficacy and controllability items. Conner et al. reported Cronbach alpha reliability coefficients for the PBC scale in their study ranging from .73 to .74. Test-retest reliability for the PBC subscale in the Conner et al. study was acceptable (r = .53). Each item was measured on a 7-point unipolar scale. These items and the unipolar scale for each are as follows: "For me to eat a healthy diet in the next 20 days is…" *difficult-easy*; "I am confident that if I ate a healthy diet I could keep it up," *strongly disagree-strongly agree*; "Whether I do or do not eat a healthy diet in the next 20 days is entirely up to me," *strongly disagree-strongly agree*; "How much control do you feel you have over eating a healthy diet in the next 20 days," *no control-complete control*; "I would like to eat a healthy diet but don't really know if I can" *strongly agree-strongly disagree*; "I am confident that I could eat a healthy diet if I wanted to" *strongly disagree-strongly agree*. All items were rated +1 to +7. PBC was measured as the mean of the six item ratings and therefore the PBC score could range from +1 to +7.

Healthy Eating Behavior

Dietary intake record form. The primary researcher developed this form, which gave participants detailed instructions on how to use the Interactive Healthy Eating Index

(IHEI) Program (Center for Nutrition Policy and Prevention [CNPP], USDA, 2003), and provided a space for participants to record their Healthy Eating Index (HEI) scores that were generated by the Program each day over a 7-day period.

Healthy rating index (HEI). The HEI (Kennedy et al., 1995) was developed as a measure of overall diet quality by the USDA. The HEI is a 100-point analytic tool designed to measure the degree to which a person's diet conforms to the recommendations of the *Dietary Guidelines for Americans* and the *Food Guide Pyramid* (USDA, USDHHS, 2000) by providing an overall index of the type and quantity of the foods people eat, their compliance with specific dietary recommendations, and the variety of their diets (Basiotis et al., 2002).

The total index score is the sum of ten dietary components weighted equally, with each component having a maximum score of 10 and a minimum score of 0, giving a total maximum index score of 100. The ten components represent different aspects of a healthful diet, with components 1 to 5 measuring the degree to which a person's diet conforms to serving recommendations for the five major food groups of the Food Guide Pyramid: grains, vegetables, fruits, milk, and meat. Component six measures total fat consumption as a percentage of total food energy (calorie) intake, component seven measures saturated fat consumption as a percentage of total food energy intake, component eight measures total cholesterol intake, component nine measures total sodium intake, and component ten measures variety in a person's diet. The exact score that a person receives in any of the food-group categories is determined by the appropriate number of servings for a given energy intake level.

Validity information for the HEI was obtained by correlating HEI scores with other conventional measures of diet quality. Kennedy et al. (1995) correlated HEI scores with energy and nutrient intake levels and found that for each of the nutrients examined, there was a positive correlation between the HEI and the intake of nutrients. Correlation coefficients ranged from $r = .06$ to .42. These correlations indicated that the index clearly reflected the fulfillment of nutrient requirements although none of the components of the index were defined directly in terms of micronutrient intake. Furthermore, the correlations suggested that the index was a measure of diet quality based on conformance with the food guide pyramid rather than being directly based on nutrient intake. In addition, Kennedy et al. found that the correlation between food energy and the HEI, although positive, was modest, $r = .21$. This finding indicated that simply consuming a larger amount of energy would not, by itself, dramatically improve the HEI.

Hann et al. (2001) also obtained validity information for the HEI in a sample of women attending a breast care center. These researchers compared HEI scores to dietary intake scores calculated by a nutrition software program and blood chemistry measures. They found that higher HEI scores were associated most strongly with greater dietary variety ($r = .71$), higher intakes of fruit ($r = .57$), and lower intakes of fat and saturated fat ($r = -.58$ and $r = -.56$, respectively). Higher HEI scores were also associated with higher plasma concentrations of α-carotene ($r = .40$), β-carotene ($r = .28$), β-cryptoxanthin ($r = .41$), lutein ($r = .23$), and vitamin C ($r = .26$) after age and vitamin supplement use were controlled for. Hann et al. concluded that the HEI is a useful tool for describing overall diet quality.

The Interactive Healthy Index (IHEI) Program (CNNP, USDA, 2003) is an interactive version of the Healthy Eating Index. The IHEI Program allows individuals to input 1 day's worth of dietary information online, and the Program then calculates a daily HEI score based on the information provided. The IHEI Program further allows a HEI score to be generated for cumulative dietary information for up to 20 days, thereby allowing dietary quality to be measured over a period of time.

In the present study, participants were asked to use the IHEI Program to record their dietary intake for the last 7 days of the 21-day period over which the study continued. This 7-day record was considered representative of the participants' eating behavior over the 3-week course of the study, and is typical of (and in some cases longer than) the time period over which eating behavior is usually recorded in studies on eating behaviors (Backman et al., 2002; Hann et al., 2001). Healthy eating behavior was measured as the mean of the HEI scores for the 7-day period and scores could therefore range from a minimum of zero to a maximum of 100. Higher scores demonstrated higher levels of engagement in healthy eating over the 7-day period, and by extension, over the 3-week period over which the study continued.

Self-Efficacy

The food pyramid self-efficacy scale (FPSES). The FPSES (Mosely, 1999) is a 22-item instrument that identifies situations in which an individual rates his or her confidence in his or her ability to make a healthy food choice based on those recommended by the food pyramid. Individuals respond to each item on a 10-point response scale with phrases of "cannot do at all" above the number 1 score column, "moderately certain can do" above the middle range scores columns, and "certain can do" above the number 10 score column. The value chosen for each item is summed to obtain

a total score and then an average score for the instrument is calculated by dividing this total score by the number of items in the instrument. Therefore, average scores could range from 1 to 10, with higher scores indicating higher levels of self-efficacy. A sample item from this scale is, "Please rate your confidence that you can stick to a healthy eating plan on a regular basis when eating at a friend's house for dinner."

A study that was conducted with 30 male postoperative coronary artery bypass patients over the age of 60 was used to determine the reliability and validity of the instrument. Two-week test-retest reliability using measurements on the instrument from 10 subjects was established at .78 ($p < .01$). Cronbach's α was computed to determine the measure's internal consistency, which was reported to be .92. The original 30 items comprising the FPSES was submitted to a panel of 6 content experts to determine content validity for the instrument. Each item was judged on a 4-point scale, which was then used to calculate the content validity index (CVI). The CVI for the FPSES was calculated at .95 after the deletion of 8 items that did not reach significance. Construct validity was determined by calculating correlations between the FPSES and the Sickness Impact Profile (SIP), which is an established measure of functional health status, with lower scores indicating better functional status. The correlations between the SIP and the FPSES was negative and significant ($r = -0.37$; $p = .05$) suggesting construct validity for the FPSES.

Social Desirability

The Marlowe-Crowne social desirability scale-short form (MCSDS). The MCSDS (Strahan & Gerbasi, 1972) is a 20-item scale that was used to measure the degree to which participants responded to the other questionnaires in the assessment battery in a socially desirable manner. The Short-Form is based on the original 33-item

instrument developed by Crowne & Marlowe (1960). The Kuder-Richardson 20 (KR-20) reliability coefficients for the short version were comparable to those of the original version (KR-20 = .83 for college females and .78 for college males). Studies revealed that Pearson correlations between the original version and the short version were as high as .98, indicating adequate construct validity for the short version (Strahan & Gerbasi, 1972). Respondents are asked to mark "True" or "False" in response to ten items keyed in the true direction and then items keyed in the false direction. Scores range from 0 to 20 with higher scores indicating high need for approval.

Procedure

The procedure for this study was approved by the University of Florida Institutional Review Board before participant recruitment and data collection. Ethnic-minority freshmen students were recruited from a large university preparation class that was offered to students in a special university preparation program held during the summer preceding their first semester at the University of Florida. Prior to student recruitment, the purpose and procedures of the study were explained to the program's director and the class instructor, and permission to conduct the study was obtained from both of these persons.

The primary researcher then attended the preparation an arbitrarily selected class that was part of the preparatory program to explain the purpose and procedures of the present study toward the goal of recruiting students to participate in it. The primary researcher explained that the purpose of the study was to determine the influence of certain attitudes and social factors on the healthy eating behaviors of university freshmen, and that participation would require: (1) signing an Informed Consent Form (2) filling out an assessment battery that should take about 30 minutes to complete and that was

comprised of a Demographic Questionnaire, the Theory of Planned Behavior Questionnaire, the Marlowe-Crowne Social Desirability Scale; and, the Food Pyramid Self-Efficacy Scale; (3) spending approximately ten minutes each day for 7 days to record dietary information using an online nutritional program (the Interactive Healthy Eating Index Program [IHEI]), and beginning this 2 weeks after the administration of the assessment battery; and (4) recording their Healthy Eating Index (HEI) scores calculated by the IHEI Program for the 7-day dietary intake period on Dietary Intake Record Forms. The time-line over which the study occurred is shown in Figure 2.

The primary researcher also advised students that they must be 18 years or older to participate in the study, and that they would be given ten bonus points by the class instructor for completing the study. Students were informed that they would not be required to put their names on any of the questionnaires because they had all been pre-coded to protect their confidentiality; additionally, they were informed that the IHEI Program required them to create a code that would be unknown to the primary researcher. Students were told that they could discontinue participation in the study at any point, and they were also assured that all information provided would be used exclusively for research purposes and would be kept in a locked file at the University of Florida. Students who were not 18 years of age or older, and therefore not eligible for study participation, were also invited to use the IHEI Program to gain insight into their eating patterns as a class exercise. These students were given ten bonus points for completing the exercise as a class exercise.

Interested students, as indicated by a show of hands, who met the eligibility requirements for the study (being18 years of age or older) were then invited to read and

sign two copies of the Informed Consent Form (see Appendix A). Students were asked to return one copy to the primary researcher, and were invited to keep one copy for their records. Each student was then given a packet consisting of a handout that is used by the University of Florida Health Education Center on eating according to the guidelines of the *Food Guide Pyramid*, the assessment battery, the Dietary Intake Record Form and a large envelope. The primary researcher then described each component of the packet to the students, after which the students were invited to complete the assessment battery.

After the primary researcher collected the completed assessment batteries, participants were invited to leave with the Dietary Intake Record Form, a copy of the Informed Consent Form for their records, and the envelope for later returned the completed Dietary Intake Form. However, they were advised to keep the Dietary Intake Form in a safe place so that it could be used to record dietary intake information for 7 days beginning 2 weeks later. Students were also instructed to write down their pre-assigned codes in their class notebooks so that if they misplaced the Dietary Intake Record Form they could write the code on a replacement form.

Two weeks after the administration of the assessment battery, the primary researcher visited the class of participating students again, gave the students the website address for the IHEI Program, and gave a short tutorial on using the interactive IHEI Program. Students were asked to record their dietary intake online for a period of 7 consecutive days using the IHEI Program, and to record the HEI scores generated by the program on the Dietary Intake Record Forms that were distributed 2 weeks before. All students in the classroom were exposed to the tutorial and invited to use the IHEI Program; however, only students who were participating in the study were asked to

record their HEI scores and return them to the primary researcher via the provided envelope when she returned to collect them after the 7-day dietary intake collection period had ended. The handout on eating according to the guidelines of the Food Guide Pyramid was also re-distributed to students, so that they could accurately calculate serving sizes when using the IHEI Program.

Students were further advised of where they could access free computer facilities around the campus so that they could access the IHEI Program if they did not have a personal computer. Students who had lost their Dietary Intake Record Forms were given un-coded forms and asked to write the original codes on the new forms that were distributed by the primary researcher. In addition, students were given contact information (email and phone contact) for the primary researcher so that any further questions could be addressed by her after the tutorial session.

In the week after the 7-day dietary intake record period, the primary researcher visited the class in which participating students were enrolled for a final time, to collect the completed Dietary Intake Record Forms from the participants. Participants were asked to place the forms in the envelope that was provided and to seal the envelope before returning the packet to the primary researcher. Participants returned the packets to the primary researcher as they exited the classroom at the end of the class period.

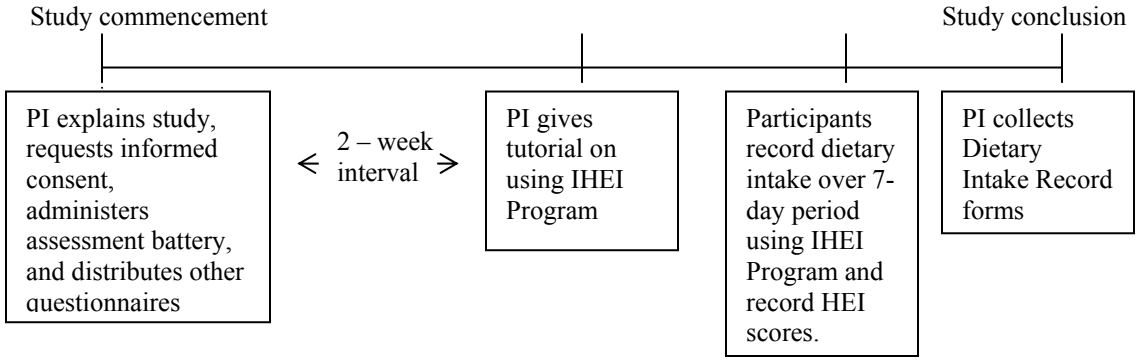

Figure 2. Time-line of data-collection points over the course of the study.

CHAPTER 4
RESULTS

This chapter presents the results of analyses conducted to address the hypotheses and research questions set forth in this study. The results are divided into five major parts. First, the descriptive data for all of the major variables in the study are reported. Second, the results of a preliminary Pearson correlational analysis that was conducted to assess the degree of association between the variables under investigation, and to determine the degree of association between the Marlowe-Crowne Social Desirability Scale and each of the other variables are presented and discussed. Third, reliability data (Cronbach's alpha reliability coefficients) for two questionnaires – the Food Pyramid Self-Efficacy Scale (FPSES) and the Theory of Planned Behavior Questionnaire (TPBQ) are presented. Fourth, the results of general linear model analyses that were executed to address the first two research questions are presented and discussed. Finally, the results of hierarchical regression analyses that were conducted to test the primary hypotheses and the third research question addressed by the present study are presented and discussed.

Descriptive Data for all Major Variables

Table 2 presents the means, standard deviations, and ranges for each variable under investigation in this study.

Results of the Preliminary Pearson Correlations

Pearson correlations were conducted to examine the degree of association among the predictor variables in this study (attitude, perceived behavioral control [PBC],

subjective norm, and self-efficacy) and the criterion variables (intention and healthy eating behavior). In addition, correlations were used to examine the relationships between social desirability (as measured by the Marlowe-Crowne short form) and each variable of interest. Pearson correlations among all of the variables are presented in Table 3.

Table 2. Means and Standard Deviations for the Variables Investigated in the Present Study for the Total Sample and by Ethnicity

Variables	*N*	*M*	*SD*	*Range*
Total Sample				
Attitude	69	1.77	.94	-.67-3.00
PBC	69	5.16	1.09	2.50-7.00
Intention	69	1.30	1.29	-2.40-3.00
Subjective Norm	69	.92	1.09	-1.60-3.00
Food Pyramid Self-Efficacy	69	5.88	1.95	1.95-10.00
Social Desirability	69	11.58	3.44	1.00 – 10.00
Healthy Eating Behavior	18	58.34	7.30	45.19-76.33
African American Students				
Attitude	46	1.68	.99	-.67-3.00
PBC	46	5.07	1.13	2.50-7.00
Intention	46	1.17	1.32	-2.40-3.00
Subjective Norm	46	.75	1.22	-1.60-3.00
Food Pyramid Self-Efficacy	46	5.63	1.77	2.32-10.00
Social Desirability	46	11.22	3.02	1.00-17.00
Healthy Eating Behavior	9	57.06	7.14	45.19-68.29
Hispanic American Students				
Attitude	16	2.06	.71	.17-3.00
PBC	16	5.43	1.03	2.50-6.83
Intention	16	1.75	1.26	-2.20-3.00
Subjective Norm	16	1.33	.68	.00-2.60
Food Pyramid Self-Efficacy	16	6.32	2.30	1.95-9.41
Social Desirability	16	12.75	3.56	6.00-19.00
Healthy Eating Behavior	8	60.43	7.75	50.03-76.33
“Other” Students				
Attitude	7	1.69	1.05	-.50-2.83
PBC	7	5.12	.94	3.50-6.33
Intention	7	1.11	1.03	-.20-2.60
Subjective Norm	7	1.11	.90	-.60-2.40
Food Pyramid Self-Efficacy	7	6.51	2.17	4.05-9.64
Social Desirability	7	11.29	5.41	4.00-19.00
Healthy Eating Behavior	1	53.17	-	53.17-53.17

Table 3. Pearson Correlations Among the Variables of Interest in the Present Study for the Total Sample and by Ethnicity

	1	2	3	4	5	6	7
Total Sample							
1. Attitude	-	.48**	.74**	.45**	.68**	.40	.23
2. Subjective Norm		-	.50**	.40**	.59**	.18	.31*
3. Perceived Behavioral Control			-	.65**	.81**	.51*	.37**
4. Self-Efficacy				-	.62**	.55*	.15
5. Intention					-	.42	.36**
6. Healthy Eating Behavior						-	.51*
7. Social Desirability							-
African American Students							
1. Attitude	-	.50**	.72**	.52**	.65**	.30	-.01
2. Subjective Norm		-	.48**	.43**	.58**	.31	.27
3. Perceived Behavioral Control			-	.69**	.77**	.43	.26
4. Self-Efficacy				-	.65**	.36	.05
5. Intention					-	.26	.24
6. Healthy Eating Behavior						-	.66
7. Social Desirability							-
Hispanic American Students							
1. Attitude	-	.46	.82**	.26	.89**	.51	.52*
2. Subjective Norm		-	.70**	.43	.66**	-.31	.17
3. Perceived Behavioral Control			-	.51*	.89**	.76*	.56*
4. Self-Efficacy				-	.53*	.69	.28
5. Intention					-	.59	.51*
6. Healthy Eating Behavior						-	.50
7. Social Desirability							-
"Other" Students							
1. Attitude	-	.18	.79*	.41	.52	.[a]	.73
2. Subjective Norm		-	.31	.08	.54	.[a]	.66
3. Perceived Behavioral Control			-	.77*	.89**	.[a]	.59
4. Self-Efficacy				-	.73	.[a]	.13
5. Intention					-	.[a]	.61
6. Healthy Eating Behavior						-	.[a]
7. Social Desirability							-

Note. * * Correlation is significant at the .01 level (2-tailed); * Correlation is significant at the .05 level (2-tailed); a. Correlation cannot be computed because N = 1.

Predictor Variable Associations

Attitude. For the total sample, results indicated that attitude towards eating a healthy diet was positively and significantly associated with subjective norm (r = .48; p <.01), PBC (r =.74; p <.01), food pyramid self-efficacy (r = .45; p <.01), and intention (r = .68; p <.01). For the African American participants, results indicated that attitude towards eating a healthy diet was positively and significantly associated with subjective

norm (r = .5; p < .01), PBC (r = .72; p < .01), intention (r = .65; p < .01), and food pyramid self-efficacy (r = .52; p < .01). For the Hispanic American participants, results indicated that attitude towards eating a healthy diet was positively and significantly associated with PBC (r = .82; p < .01), intention (r = .89; p < .01), and social desirability (r = .52; p < .05). Finally, for the "other" participants, results indicated that attitude towards eating a healthy diet was positively and significantly associated with PBC (r = .79; p < .05).

Perceived behavioral control (PBC). For the total sample, PBC was positively and significantly associated with attitude (r = .74; p < .01), subjective norm (r =.50; p <.01), food pyramid self-efficacy (r =.65; p <.01), intention (r =.81; p < .01), healthy eating behavior (r =.51; p <.05), and social desirability (r = .37; p < .01). Results for the African American participants indicated that PBC was positively and significantly associated with subjective norm (r = .48; p < .01), attitude (r = .72; p < .01), intention (r = .77; p < .01), and food pyramid self-efficacy (r = .69; p < .01). For the Hispanic American participants, results indicated that PBC was positively and significantly associated with subjective norm (r = .70; p < .01), attitude (r = .82; p < .01), intention (r = .89; p < .01), food pyramid self-efficacy (r = .51; p < .05), healthy eating behavior (r = .76; p < .05), and social desirability (r = .56; p < .05). Finally, for the "other" participants, results indicated that PBC was positively and significantly associated with attitude (r = .79; p < .05), intention (r = .89; p < .01), and food pyramid self-efficacy (r = .77; p < .05).

Subjective norm. Results of the total sample indicated that subjective norm was positively and significantly associated with attitude (r =.48; p <.001), PBC (r =.50; p

<.001), food pyramid self-efficacy (r =.40; p <.05), intention (r =.59; p <.01), and social desirability (r = .31; p < .05). For the African American participants, results indicated that subjective norm was positively and significantly associated with PBC (r = .48; p < .01), attitude (r = .50; p < .01), intention (r = .58; p < .01), and food pyramid self-efficacy (r = .43; p < .01). For the Hispanic American participants, results indicated that subjective norm was positively and significantly associated with PBC (r = .70; p < .01), and intention (r = .66; p < .01). For the "other" participants, results indicated that subjective norm was not positively and significantly associated with any of the other variables under investigation in this study.

Self-efficacy. For the total sample, results indicated that food pyramid self-efficacy was positively and significantly associated with attitude (r =.45; p <.01), subjective norm (r =.40; p =.01), PBC (r =.65; p <.01), intention (r =.62; p <.01), and healthy eating behavior (r =.55; p <.05). For the African American participants, results indicated that food pyramid self-efficacy was positively and significantly associated with subjective norm (r = .43; p < .01), PBC (r = .69; p < .01), attitude (r = 52; p < .01), and intention (r = .65; p < .01). For the Hispanic American participants, results indicated that food pyramid self-efficacy was positively and significantly associated with PBC (r = .51; p < .05), and intention (r = .53; p < .05). Finally, for the "other" participants, results indicated that food pyramid self-efficacy was positively and significantly associated with PBC (r = .77; p < .05).

In summary, for both the total sample and the African American participants, the predictor variables were all positively and significantly associated with each other. However in all cases, the degree of multicollinearity was not high enough to be

considered problematic for regression analyses ($r < .80$; Licht, 2000). In addition, for both the total sample and African American participants, all of the predictor variables were positively and significantly associated with intention. However, only PBC and self-efficacy were positively and significantly associated with engagement in healthy eating behavior for the total sample, and only PBC was positively and significantly associated with engagement in healthy eating behavior for the Hispanic American sample.

Criterion Variable Associations

Intention. For the total sample, intention to eat a healthy diet was positively and significantly associated with attitude ($r = .68$; $p <.01$), PBC ($r = .81$; $p <.01$), subjective norm ($r = .59$; $p <.01$), food pyramid self-efficacy ($r = .62$; $p <.01$), and healthy eating behavior ($r = .55$; $p < .05$). For the African American participants, intention to eat a healthy diet was positively and significantly associated with subjective norm ($r = .58$; $p < .01$), PBC ($r = .77$; $p < .01$), attitude ($r = .65$; $p < .01$), and food pyramid self-efficacy ($r = .65$; $p < .01$). For the Hispanic American participants, intention to eat a healthy diet was positively and significantly associated with subjective norm ($r = .66$; $p < .01$), PBC ($r = .89$; $p < .01$), attitude ($r = .89$; $p < .01$), food pyramid self-efficacy ($r = .53$; $p < .05$), and social desirability ($r = .51$; $p < .05$). For the "other" participants, intention to eat a healthy diet was positively and significantly associated with PBC ($r = .89$; $p < .01$).

Healthy eating behavior. For the total sample, eating a healthy diet over a 3-week period (as measured by the Healthy Eating Index [HEI]) was positively and significantly associated with PBC ($r = .51$; $p <.05$), food pyramid self-efficacy ($r =.55$; $p <.05$), and social desirability ($r = .51$; $p < .05$). For the African American participants, healthy eating behavior was not positively and significantly associated with any of the other variables under investigation in the study. For the Hispanic American participants, healthy eating

behavior was positively and significantly associated with PBC ($r = .76$; $p < .05$). Only 1 individual from the "other" participant group completed the healthy eating behavior measure and as a result correlations among healthy eating behavior and the other investigated variables could not be performed on the data from the "other" participants' group.

Social Desirability Associations

Associations between the social desirability measure and the other variables of interest were examined to determine if any of the ratings on the variables of interest were influenced by the tendency to give socially desirable response. Results indicated that for the total sample social desirability was positively and significantly associated with intention to eat a healthy diet ($r = .36$; $p < .01$), PBC ($r = .37$; $p < .01$), subjective norm ($r = .31$; $p < .05$), and engagement in healthy eating behaviors ($r = .51$; $p < .05$). For the African American and "other" participant groups, social desirability was not positively or significantly associated with any of the other variables of interest. However, for the Hispanic American participants, social desirability was positively and significantly associated with PBC ($r = .51$; $p < .05$), intention ($r = .53$; $p < .05$), and attitude ($r = .52$; $p < .05$). For this reason, the influence of social desirability was controlled for in subsequent analyses that were performed using data from the total sample or using data from the Hispanic American participants only.

Reliability of Questionnaires

Food Pyramid Self-Efficacy Scale

Reliability and validity data for the Food Pyramid Self-Efficacy Scale (FPSES) was obtained in prior research that used a sample of 30 male postoperative coronary bypass patients over the age of 60 (Moseley, 1999). No reliability data was available regarding

the instrument's reliability for use with university or minority populations. As such, a Cronbach's alpha reliability coefficient was calculated using the FPSES data from the ethnic-minority freshmen university students who participated in the present study. Results indicated that the inter-item reliability of the FPSES was high, $\alpha = .95$. These results thus give some support for the use of FPSES to assess the healthy eating self-efficacy of ethnic-minority freshmen university students similar to those in the present study.

Theory of Planned Behavior Questionnaire

The Theory of Planned Behavior Questionnaire (TPBQ) was developed using slightly modified versions of the TPBQ items used in a study conducted by Conner et al. (2002) to explore the healthy eating behavior of adults. Given these modifications, Cronbach's alpha reliability coefficients were calculated for the TPBQ and the individual subscales of the TPBQ that were used in the present study. Results indicated that the inter-item reliability of the TPBQ was high, $\alpha = .92$. The inter-item reliabilities of the individual subscales were also relatively high. Alpha coefficients were established at .91, .81, .75, and .67 for the intention, attitude, PBC, and subjective norm subscales, respectively.

Results of the Analyses to Test Research Questions 1 and 2

The first research question under investigation explored whether there were significant differences in the level of engagement in healthy eating behaviors over a 3-week period in association with gender and ethnicity. However, interestingly, only female participants completed the healthy eating behavior measure. Therefore, only significant differences in the level of engagement in healthy eating behaviors in association with ethnicity were explored.

To address this research question, a univariate analysis of covariance (ANCOVA) was conducted with level of engagement in healthy eating behavior (as measured by the HEI) as the dependent variable, ethnicity as the independent variable, and social desirability as a covariate. Results indicated that there was no main effect of ethnicity.

The second research question being examined in the present study explored whether significant differences in attitudes, subjective norms, PBC and intentions to engage in healthy eating over a 3-week period would be associated with gender and ethnicity. Given the finding from the preliminary Pearson correlations that the variables of interest were all associated with each other (see Table 3), a multivariate analysis of covariance (MANCOVA) was conducted to examine the second research question. In this MANCOVA attitude, subjective norm, PBC and intentions were the dependent variables, gender and ethnicity were the independent variables, and social desirability was a covariate. Results of the MANCOVA suggested no significant multivariate effects for either gender or ethnicity.

Thus, overall the results suggested that there were no significant differences in any of the variables of interest in association with gender or ethnicity.

Results of the Analyses to test Hypotheses 1 and 2, and Research Question 3 Predicting Intention

Hypothesis 1 under investigation in the present study asserted that intention to eat a healthy diet over a 3-week period would be predicted by attitudes, subjective norms and PBC. The first part of the third research question explored whether the addition of self-efficacy to the TPB model would improve the model's ability to predict intention. This hypothesis and research question were analyzed using a hierarchical regression model in which intention to eat a healthy diet was entered as the criterion variable. Attitude,

subjective norm and PBC scores were entered simultaneously as predictor variables into either the first or second block of the model (depending on whether social desirability scores were also included in the model), and food pyramid self-efficacy was entered into the final block of the hierarchical regression model.

Consistent with the difference model approach, the TPB model was first tested using only the data from the African American freshmen student participants. Results indicated that attitudes, subjective norms and PBC accounted for 65.6% of the variance in intention to eat a healthy diet ($F(3, 42) = 26.7$; $p < .001$). PBC made the strongest unique contribution to the variance in the intention variable ($\beta = .568$, $p < .001$). Subjective norm also contributed significantly to the variance in the intention variable ($\beta = .254$, $p < .05$); however, the unique contribution of attitude to the variance in the intention variable was not significant. Entering food pyramid self-efficacy into the second block of the regression model did not significantly improve the predictive ability of the model. Table 4 presents the results of the hierarchical multiple regression using only data from the African American freshmen student participants.

Table 4. Prediction of Intention toward Healthy Eating for the African American Students Hierarchical Regression Analysis

Predictor Variables	β	*R*	R^2	R^2 Change	Sig.
Step 1					
Attitude	.111				.413
PBC	.568				.000
Subjective Norm	.254				.022
Model		.810	.656	.656	.000
Step 2					
Attitude	.110				.412
PBC	.451				.005
Subjective Norm	.231				.035
Self-Efficacy	.185				.147
Model		.821	.673	.017	.147

The number of participating Hispanic freshmen students (n = 16) and the number of "other" participating freshmen students (n = 6) were small and thus likely would not separately provide the power needed to perform the hierarchical multiple regression used to test the hypothesis and part of the research question as done using the data from the African American participants. Thus, given the earlier finding of no ethnic differences in the TPB variables, the data of all of the participating freshmen students in the present study (regardless of their ethnicity) were combined to test the efficacy of the TPB model.

The preliminary Pearson correlations suggested that for the total sample of participating freshmen students, social desirability scores were correlated with the criterion variable (intention), and with two of the predictor variables (PBC and subjective norm). To control for the effect of socially desirable responding on both the criterion and predictor variables, social desirability scores were entered into the first block of the hierarchical regression model. Attitude, subjective norm, and PBC scores were then entered simultaneously into the second block of the model, and food pyramid self-efficacy was entered into the third block of the model.

Results of the hierarchical multiple regression using the total sample of ethnic-minority students indicated that social desirability alone accounted for 13% of the variance in intention ($F(1, 68) = 10.06$; $p < .01$). When attitudes, subjective norm, and PBC were simultaneously added to the model, an additional 57.5% of the variance in intention was accounted for, representing a significant increase in the variance accounted for by the model ($F_{change}(3, 64) = 41.66$; $p < .001$). In addition, PBC and subjective norm were found to make significant unique contributions to the model ($\beta = .46$, $p < .001$ for PBC; $\beta = .20$, $p < .05$ for subjective norm). Entering self-efficacy into the third block

of the regression model did not significantly improve the predictive ability of the model. Table 5 presents the results of the hierarchical multiple regression for the total sample.

Table 5. Prediction of Intention toward Healthy Eating for the Total Sample of Students Hierarchical Regression Analysis

Predictor Variables	β	*R*	R^2	R^2 Change	Sig.
Step 1					
Social Desirability	.361				.002
Model		.361	.130	.130	.002
Step 2					
Social Desirability	.047				.527
Attitude	.137		.		.189
PBC	.575				.000
Subjective Norm	.222				.008
Model		.840	.706	.575	.000
Step 3					
Social Desirability	.069				.358
Attitude	.156				.132
PBC	.461				.000
Subjective Norm	.200				.016
Self-Efficacy	.161				.076
Model		.849	.720	.014	.076

Predicting Healthy Eating Behavior

Hypothesis 2 under investigation in the present study stated that PBC and intention to engage in healthy eating over a 3-week period would significantly predict engagement in healthy eating behavior. The second part of the third research question explored whether the addition of food pyramid self-efficacy to the TPB model would improve the model's ability to predict level of engagement in healthy eating behavior. This hypothesis and research question were analyzed using a hierarchical regression model in which healthy eating behavior over a 3-week period (as measured by HEI scores) was entered as the criterion variable, and intention and PBC scores were entered simultaneously as predictor variables into either the first or the second block of the model (depending on whether social desirability scores were also included in the model). Food pyramid self-

efficacy was entered into the final block of the hierarchical regression model to test the third research question.

Again, the model was first tested using only the data of the participating African American students (n = 9) in accordance with the difference model approach. Results indicated that intention and PBC did not significantly account for a significant amount of the variance in healthy eating behavior. Moreover, the addition of self-efficacy in the second block of the model did not improve the model's predictive ability.

The preliminary Pearson correlations suggested that for the total sample of participating freshmen students, social desirability scores were correlated with the criterion variable (healthy eating behavior), and with two of the predictor variables (PBC and intention). To control for the effect of socially desirable responding on both the criterion and predictor variables, social desirability scores were entered into the first block of the hierarchical regression model. Intention and PBC scores were then entered simultaneously into the second block of the model, and food pyramid self-efficacy was entered into the third block of the model.

Results of the hierarchical multiple regression using the data of the total sample of participants indicated that social desirability independently predicted 26.3% of the variance in healthy eating behavior (F (1, 17) = 5.707; $p < .05$). The simultaneous addition of intention and PBC into the second block of the model did not significantly increase the variance in healthy eating behavior accounted for (F_{change} (2, 14) = .979; p = .40). However, when food pyramid self-efficacy was added to the third block of the model an additional 17.9% of the variance in healthy eating behavior was accounted for, representing a significant change (F_{change} (1, 13) = 4.98; $p < .05$). Only social desirability

and food pyramid self-efficacy made unique significant contributions to the final model (β for social desirability = .52; $p < .05$; β for food pyramid self-efficacy = .58; $p < .05$)

Table 6 presents the results of the hierarchical multiple regression for the total sample.

Table 6. Prediction of Engagement in Healthy Eating Behavior for the Total Sample Hierarchical Regression Analysis

Predictor Variables	β	*R*	R^2	R^2 Change	Sig.
Step 1					
Social Desirability	.513				.030
Model		.513	.263	.263	.030
Step 2					
Social Desirability	.348				.178
PBC	.369				.376
Intention	-.032				.936
Model		.594	.353	.090	.400
Step 3					
Social Desirability	.515				.043
PBC	.013				.974
Intention	-.130				.712
Self-Efficacy	.575				.044
Model		.849	.720	.014	.044

CHAPTER 5
DISCUSSION

The purpose of this chapter is to (1) summarize and interpret the results of this study, (2) identify some of the limitations of the research design and offer directions for future research, and (3) discuss the implications of the present study for counseling psychologists.

Summary of the Results

Hypothesis 1

The primary purpose of this study was to evaluate the efficacy of the Theory of Planned Behavior (TPB) for predicting healthy eating behavior in ethnic-minority freshmen. For the purpose of the present study, healthy eating behavior or eating a healthy diet was defined as using the dietary intake recommendations of the *Food Guide Pyramid* (USDA, USDHHS, 2000) for a 3-week period.

Consistent with the TPB model, Hypothesis 1 stated that among ethnic-minority freshmen, attitudes, subjective norms, and perceived behavioral control (PBC) regarding healthy eating would predict intention to engage in eating a healthy diet over a 3-week period. In accordance with the difference model approach (Oyemade and Rosser, 1980), the hierarchical regression analysis used to test Hypothesis 1 was first conducted using only the data of the participating African American freshmen students. Then, this same analysis was conducted with the total sample of ethnic-minority freshmen participants. Preliminary Pearson correlations suggested that for the total sample of ethnic-minority freshmen, social desirability was positively and significantly correlated with intention,

subjective norm, and PBC, and therefore the influence of social desirability on the criterion and predictor variables was controlled for in the analyses using the total sample of participants.

Results of this study lent support to Hypothesis 1 when the analysis to test this hypothesis used only the data of the participating African American students and when this analysis used the data of all of the participating ethnic-minority students. Specifically, attitudes, subjective norms and PBC were found to predict 65.6% of the variance in intention for the African American students and 57.5% of the variance in intention and for the total sample of students. Furthermore, in both cases, PBC and subjective norms made unique significant contributions to the variance accounted for in intention; however, attitude did not make a significant contribution to the variance in intention.

The above findings are consistent with the TPB model and therefore can be interpreted using the TPB framework. The TPB postulates that the greater the increased pressure from significant others to perform or not perform a behavior, the stronger should be an individual's intention to perform the behavior under consideration (Ajzen, 1991). Thus, it appears that in the present study, when ethnic-minority freshmen (African American students and all of the participating students) perceived increased pressure from significant others to eat a healthy diet over a 3-week period, they were more likely to have strong intentions to engage in eating a healthy diet.

The findings regarding subjective norm are particularly interesting given the earlier reported finding that subjective norms did not consistently contribute to the variance in intention across a range of behaviors (Ajzen, 1991). However, both the present study and

previous studies using the TPB framework to explore healthy eating, have consistently found that the variable subjective norm significantly contributes to the prediction of intention to engage in healthy eating behavior. Together these findings suggest that, contrary to the conclusions offered by Ajzen (1991), for eating behaviors personal considerations may not consistently overshadow the influence of perceived social pressure.

The TPB model also asserts that the greater the PBC, the stronger should be an individual's intention to perform the behavior (Ajzen, 1991). Accordingly, it appears that in the present study, when ethnic-minority freshmen (African Americans and the total participant sample) perceived eating a healthy diet over a 3-week period to be easy rather than difficult, and also perceived that there would be few impediments and obstacles to eating a healthy diet over a 3-week period, they had stronger intentions to engage in eating a healthy diet over a 3-week period.

However, the TPB model also states that the attitude, or the degree to which a person has a favorable or unfavorable evaluation or appraisal of the behavior in question, should predict intention to engage in a particular behavior. Thus, the finding in the present study that attitude towards eating a healthy diet was not a unique predictor of intention to engage in eating a healthy diet over a 3-week period was unexpected. The finding is even more surprising when one considers that attitude and intention were moderately correlated ($r = .68$; $p < .001$ for the total sample; $r = .65$; $p < .01$ for African American participants only).

The finding that attitude did not make a unique contribution to the variance accounted for in intention when the analyses were conducted using data from the

participating African American students alone, or using the data from the total sample of ethnic-minority freshmen students, may be explained by the high correlation between attitude and PBC ($r = .74$; $p < .01$ for the total sample; $r = .72$; $p < .01$ for African American students alone) that was found. The high correlation between these two constructs suggests that they share over 50% of their variance. Furthermore, for both the total sample of participants and the African American participants only, PBC was found to be more highly correlated with intention than was attitude. As a result, when attitude and PBC were simultaneously entered in the first block of the hierarchical multiple regression, it is likely that their shared variance obscured any unique significant contribution that attitude may have contributed to the prediction of intention.

In summary, hypothesis 1 was supported by the present study. Furthermore, the results of the present study strongly support the efficacy of the TPB as a model for predicting the intention of ethnic-minority students to eat a healthy diet over a 3-week period.

Hypothesis 2

Hypothesis 2 stated that among ethnic-minority freshmen, PBC and intention to eat a healthy diet over a 3-week period would predict engagement in eating a healthy diet over a 3-week period. To test this hypothesis a hierarchical regression analysis was conducted using only the data from the participating African American students, in accordance with the difference model approach (Oyemade and Rosser, 1980). Subsequently, a hierarchical regression analysis was also conducted using the data from the total sample of ethnic-minority freshmen participants as ethnicity was found to have a nonsignificant association with the variables of interest in this study. Preliminary Pearson correlations suggested that for the total sample of ethnic-minority freshmen, social

desirability was positively and significantly correlated with healthy eating behavior, subjective norm, and PBC, and therefore the influence of social desirability on the criterion and predictor variables was controlled for in the analyses using the total sample of participants.

Results of the present study did not support Hypothesis 2 as it was found that PBC and intention did not significantly predict eating a healthy diet for a 3-week period as indicated by the analyses using either the data from the African American participants alone or the data from the total sample of ethnic-minority participants. Thus, the results suggest that among African American freshmen university students alone and among ethnic-minority freshmen as a group, intention to eat a healthy diet for a 3-week period, and perceived level of control do not significantly predict actual engagement in eating a healthy diet.

The results of the present study do not lend support to Hypothesis 2, and thus the TPB model does not appear to be a useful model for explaining the healthy eating behavior of ethnic-minority freshmen. However, the results underlying this conclusion should be interpreted with caution given the small sample size in this study and the associated limited power for detecting significant effects in the applied analyses. In both analyses that were used to test Hypothesis 2 of the present study, the sample sizes were in fact very small ($n = 9$ for the African American students; $N = 18$ for the total sample). As such, it is likely that there was inadequate power in the analyses conducted to test Hypothesis 2.

There are at least three alternative explanations for the finding that intention and PBC did not significantly predict the healthy eating behavior of the ethnic-minority

freshmen students in this study. First, PBC as measured in the present study may not have accurately reflected the level of control participating ethnic-minority freshmen students had over the target behavior (i.e., eating a healthy diet). Indeed, the ability of PBC to predict behavior depends on the accuracy of perceptions of control such that prediction of behavior from PBC should improve to the extent that perceptions of PBC realistically reflect actual control (Notani, 1998; Ajzen, 1991). Ajzen further stated that, "PBC may not be particularly realistic when a person has relatively little information about the behavior, when requirements of resources have changed, or when new and unfamiliar elements have entered into the equation" (pp. 184-185). All of these conditions are relevant to the participants in the present study.

For example, although participants were given a handout on eating according to the dietary recommendations of the *Food Guide Pyramid* (USDA, USDHHS, 2000) just before they completed the initial assessment battery and the healthy eating behavior measure, there was no assessment of whether students actually read or understood the handout. Furthermore, only 27.5% of the sample had previously attended a healthy eating workshop. Therefore it is fair to conclude that the present sample may have had relatively little information about what eating a healthy diet for a 3-week period may have actually entailed when they completed the PBC measure.

Similarly, at the time that they completed the PBC measure, the ethnic-minority freshmen participants in this study were new to the university campus environment and may therefore have been unfamiliar with the challenges that the campus environment may have presented to healthy eating. That is, resources that may have enabled them to previously eat in a healthy manner at home may no longer have been available, and

unfamiliar elements such as campus meal plans that offer primarily unhealthy food may have influenced their eating behavior. Consequently, it is possible that in the present study, PBC may not have been an accurate or realistic measure of actual control of eating a healthy diet over a 3-week period, and may therefore have led to the inability of PBC to predict behavior as hypothesized.

It is worth mentioning that because PBC has primarily motivational implications for behavior intentions, even if perceptions of PBC were inaccurate and unrealistic in the present sample, they would still allow intention to be predicted. This means that even if ethnic-minority freshmen in the present sample falsely believed that eating a healthy diet would be easy and they had the ability to do it, such perceptions would increase their intention to eat a healthy diet, although it would not allow the accurate prediction of behavior. Therefore, inaccurate measurement of PBC because of unrealistic perceptions of PBC would explain both the confirmatory results of analyses predicting intention in Hypothesis 1, and the results found for Hypothesis 2.

The second explanation that may help to elucidate the findings of the present study concerns the stability of the intention and PBC constructs. Ajzen (1991) indicates that for accurate prediction of behavior, intention and PBC must remain stable in the interval between their assessment and observation of the behavior. However, intervening events may produce changes in intention or in PBC and thus the original measures of these variables may no longer permit accurate prediction of behavior. Support for Ajzen's assertion regarding temporal stability has been found in research in other behavioral domains. For example, Conner et al. (2000) found that intention stability moderated the impact of intentions on attendance at healthy screening appointments, and further found

that both intention stability and PBC stability moderated the impact of intention and PBC on eating a low-fat diet. Thus, it is possible that during the 3-week period over which the present study was conducted, intervening events such as the challenges of eating a healthy diet in a campus environment may have produced changes in intentions and/or PBC with regard to eating a healthy diet. Consequently, the ability of intention and PBC to predict healthy eating behavior over the 3-week period was reduced.

Finally, the finding that intention and PBC did not predict the level of engagement in healthy eating behavior by ethnic-minority university freshmen participants in the present study may also reflect the need for additional constructs to be included into the TPB model. In the past, researchers have included constructs such as past behavior (Conner et al., 2002), and self-identity (Sparks & Shepherd, 1992) into the TPB model to attempt to improve the model's ability to predict behavior in various domains. It may be the case that among ethnic-minority students, PBC and intention alone cannot sufficiently predict engagement in healthy eating behavior, as suggested by Hypothesis 2.

In summary, the present study did not lend support for Hypothesis 2. Three explanations were offered to explain the findings. However, the results obtained should nonetheless be interpreted with caution, as the sample that was used to test this hypothesis in the present study may not have been large enough to provide enough power to accurately test the TPB model.

Research Questions 1 and 2

Research Question 1 explored whether there were significant differences in the level of engagement in eating a healthy diet over a 3-week period in association with gender and ethnicity. A univariate analysis of covariance (ANCOVA) was used to address the first research question. Research Question 2 examined whether there were

significant differences in attitudes, subjective norms, PBC and intentions to eat a healthy diet over a 3-week period in association with gender and ethnicity. A multivariate analysis of covariance (MANCOVA) was conducted to address the second research question. In both the ANCOVA and MANCOVA analyses, social desirability was included as a covariate because of the high level of association found between the social desirability measure and several of the other variables in the preliminary Pearson correlations performed.

Results of the analyses to test the research questions revealed that there were no significant differences in any of the variables under investigation in association with gender or ethnicity. However, ethnic and gender-related differences have been reported in prior healthy eating behavior studies using the TPB model (e.g., Backman et al., 2002; Baker et al., 2003). As such, several key differences between the present study and those in which ethnic- and gender-related differences were found are worthy of discussion.

In the Backman et al. study, ethnic differences were found between Black participants and those of Hispanic and White descent with regard to caloric consumption from fat. However, in the present study, there were no White participants, and African Americans were over-represented in the sample (66.7%). In addition, a global measure of dietary behavior was used in the present study whereas more specific measures of dietary behavior were used in the Backman et al. (2002) study. It may be the case that although there were no ethnic differences found in the present study using a global measure of healthy eating, such differences may have been found if the individual components of the Healthy Eating Index had been analyzed.

With regard to gender, Backman et al. (2002) found gender differences in all of the variables under investigation, whereas Baker et al. (2003) found differences on measures of subjective norms. However, again several aspects of the present study may have affected the findings that are worthy of discussion. First, females were over-represented (84.1%) in the sample and this may have masked gender differences that may have been present in measures of attitude, subjective norm, PBC and intention. Second, remarkably, only females completed the healthy eating behavior measure in the present study and thus made it impossible to examine gender differences in healthy eating behavior. While it remains unclear why male participants in the present study did not complete the healthy eating behavior measure, their lack of participation may be related to the findings of Backman et al. (2002) that males may have more less positive attitudes than females toward healthy eating. Perhaps males are also less motivated to complete healthy eating behavior measures without strong incentives to do so because of less social pressure to be thin and thus to engage in food intake monitoring.

In summary, the results of the present study suggested that there were no gender or ethnicity related differences in any of the variables investigated. However, the results should be considered in light of the fact that both African Americans and females were over-represented in the present study sample, and the fact that only females completed the behavioral measure of healthy eating.

Research Question 3

Research Question 3 explored whether the addition of a self-efficacy measure to the TPB model would improve the ability of the TPB model to predict intention to engage and actual engagement in healthy eating behavior over a 3-week period. It is important to note that the self-efficacy measure was primarily included in the study because it

included situations in which engaging in healthy eating behaviors could be challenging, and could therefore be considered a less global measure of PBC. The third research question was analyzed by entering self-efficacy into the final block of the hierarchical multiple regressions that were used to test Hypotheses 1 and 2.

The results of analyses to test the first part of the third research that explored the prediction of intention to engage in healthy eating behavior using data from African American participants alone and data from the total sample of participants indicated that including self-efficacy into the final block of the hierarchical regression models did not significantly improve the ability of the model to predict intention to eat a healthy diet over a 3-week period. These results therefore suggest that the addition of a more specific measure of self-efficacy does not improve the ability of the TPB constructs to predict intention, beyond that which is predicted by a more global measure of PBC. However, it is important to note that the measure of food pyramid self-efficacy used in the present study was developed for use with an elderly male population and therefore the situations that were included may not have been the most relevant for the ethnic-minority freshmen students who participated in the present study. Therefore, it is possible that a more relevant measure of healthy eating self-efficacy may have yielded different results.

The results of analyses to test the second part of the third research question that explored the prediction of engagement in healthy eating behavior using data from the African American participants alone and data from the total sample of participants were complex. Whereas the findings for the African American participants alone suggested that the addition of food pyramid self-efficacy to the TPB model did not improve the model's ability to predict engagement in healthy eating behavior, the findings for the total

sample of participants indicated that the addition of food pyramid self-efficacy to the model significantly increased its predictive ability by 17.9%.

It may be the case that the sample size of African Americans participants who completed the healthy eating behavior measure (n = 9) did not provide the necessary power necessary to detect a significant effect with regard to the increase in the amount of variance accounted for by food pyramid self-efficacy in the final model in the hierarchical regression analysis. Consequently, when the sample size was increased through combining the groups of ethnic-minority freshmen student participants, a significant effect was obtained. Alternatively, it may be the case that for African American freshman students separately, the addition of a more specific measure of self-efficacy does not improve the ability of the TPB model to predict healthy eating behavior beyond that which is predicted by PBC. Unfortunately, the small number of African American students who participated in the study and completed the healthy eating behavior measure makes it difficult to draw definite conclusions with regard to this research question. However, the results clearly highlight the need for the present study to be replicated and extended with larger numbers of participants in each ethnic-minority group so that separate analyses of the data can be conducted in accordance with the different model approach (Oyemade and Rosser, 1980), and definitive conclusions can be drawn and used to develop and implement culturally relevant interventions for improving the healthy eating behavior of ethnic-minority freshmen students.

Limitations of the Present Study and Directions for Future Research

The present study improved upon limitations of previous research using the Theory of Planned Behavior (TPB) framework to examine healthy eating. Specifically, the present study focused on an ethnic-minority sample of American freshmen university

students and examined differences in the constructs of the TPB model in association with gender and ethnicity. However, there are limitations of this study that should also be discussed.

First the study was limited by the sample that was used in that most of the participants were African American, female students. The over-representation of African Americans made it impossible to use the difference model approach (Oyemade and Rosser, 1980) in all analyses and as such, the TPB model was only tested independently for African Americans. Furthermore, because only females completed the healthy eating behavior measure, the first research question could not be accurately tested. In addition, the total sample was relatively small ($N = 69$), and was recruited from one university campus. As discussed previously, the small sample size may have limited the power available to obtain significant effect sizes. Given these sample characteristics, the statistical reliability and generalizability of the present results are limited. These limitations underscore the importance of replicating the findings with a larger sample that is normally distributed in terms of gender and ethnicity, particularly in light of the results of analyses that were conducted to test the third research question. These analyses suggested that conducting separate analyses for different ethnic groups could yield important differences that may be masked when ethnic group sub-samples are combined. The limitations also suggest that more attractive incentives may need to be provided for ethnic-minority males participating in similar research studies.

Second, the use of self-report measures to assess the variables of interest may have also presented a limitation in the present study. The high correlations between the social desirability measure and several of the other constructs suggested that some participants

may not have responded honestly to assessments measuring such constructs. However, it is important to note that the influence of socially desirable responding was statistically controlled for in the analyses. Moreover, there is evidence to suggest that the TPB explains more variance in self-reported versus actual behavior (Armitage & Conner, 2001), and that social desirability has no moderating effect on the relationships between the TPB constructs (Armitage and Conner, 1999b). Therefore, self-reporting may not have jeopardized the results of the present study.

Several of the questionnaires that were used in the present study were not standardized for use with ethnic-minority or student samples, and this represents a third limitation of the present study. For example, the Food Pyramid Self-Efficacy Scale (FPSES) was developed for use with elderly populations and therefore may not have been relevant for, or reliable with, ethnic-minority freshmen university students. Because such culturally sensitive assessments do not currently exist, it is important for future researchers to address this limitation by attempting to develop and use measures that are valid with culturally diverse participant populations. In addition, although the results of the present study suggested very good internal consistencies for the measures used, future research should investigate the test-retest reliabilities and the validity of these measures.

Fourth, the present study was limited by the fact that pilot testing was not first conducted to identify a list of salient control beliefs that could be integrated into a belief-based model of PBC. Instead, a reliable self-efficacy measure, the FPSES, was used in the present study. However, as alluded to previously, the FPSES was not developed for use with ethnic-minority populations and this measure may not have accurately captured a list of control beliefs regarding eating a healthy diet that were relevant to the population

in the present study. Thus, the findings of the third research question may be considered, at best, preliminary. Future research should attempt to elicit control beliefs that are relevant and reliable for use with specific groups of ethnic-minority freshmen (i.e., African American vs. Hispanic American vs. other ethnic groups), as control beliefs that are salient to one group of ethnic-minority students may not be salient for another. Indeed, such research is imperative as belief-based models provide the cognitive and affective foundations for PBC (Ajzen, 1991; 2002b; Notani, 1998), and therefore have much to offer in terms of identifying specific interventions based on beliefs that are immediately relevant to the target population.

Finally, the present study was also limited by the facts that 1) a manipulation check was not administered to determine how well participants understood what eating a healthy diet would entail before filling out the initial assessment battery, and 2) throughout the study, there were no measures of intention or PBC stability administered. As discussed previously, the omission of such measures made it impossible to determine whether the inability of intention and PBC to predict engagement in healthy eating behavior resulted from inaccuracies in the measurements of the predictor variables or from the omission of additional variables in the model that may be more relevant to the prediction of healthy eating behaviors in ethnic-minority freshmen university students.

Thus, future research on the healthy eating behaviors with ethnic-minority freshmen should include manipulation checks and stability measures. Furthermore, given the relative paucity of existing research using the TPB to predict behaviors in minority populations generally, and minority freshmen in particular, there is a need for future researchers to identify other factors that may improve the ability of the TPB model to

explain the healthy eating behavior of this population. In addition, in keeping with the recommendations made by Fisher et al. 2002 for research involving ethnic-minority children and youth, such research should, "consider how minority status may add a layer of… health vulnerability imposed by social and institutional prejudices rather than by ethnic group characteristics, values, and traditions" (p. 1027).

Implications for Counseling Psychologists

The prevalence of chronic diseases in minority populations, the pattern of unhealthy eating behaviors characteristic of many minority adolescents, and the relationship between adolescent eating patterns and subsequent chronic disease development (CDC, 2002, 2004a; Croll et al., 2001; USDHHS, 2004; Xie et al., 2002) all underscore the need for effective, culturally relevant interventions that 1) are grounded in theory and research, and 2) promote healthy eating behaviors in minority adolescents. Because attending college often represents for many adolescents the first opportunity to make independent choices about eating habits, university freshmen may be a particularly critical target population for such interventions.

Counseling psychologists often serve as key mental and physical health-promotion providers for freshmen university students through their roles as these students' mentors, academic advisors, mental health counselors, crisis counselors, and career counselors. As such, counseling psychologists may be uniquely positioned to implement research-based health-promotion interventions for freshmen students at the individual and organizational level, and thus, to heed the call by national organizations for increased preventative care geared towards improving the health and quality of life of all Americans (Marks, 2003).

The present study was a theoretically grounded exploration of the individual and social factors that influence the healthy eating patterns of ethnic-minority freshmen. The

results of the present study suggest that the attitudes, subjective norms, and perceptions of behavioral control of ethnic-minority freshmen affect their intention to eat a healthy diet over a 3-week period. On an individual level, the findings therefore imply that counseling psychologists may be able to increase the intention of ethnic-minority freshmen to engage in eating a healthy diet by exploring their attitudes, subjective norms, and perceived behavioral control (PBC) regarding eating a healthy diet. For example, an ethnic-minority freshman may believe that she has little control regarding preparing 'ethnic' foods in healthy ways. A counseling psychologist could help the student explore ways to eat healthy and in this process teach the student problem solving skills and other interventions for self-empowerment. More importantly, perhaps, counseling psychologists can assist students in identifying and overcoming the barriers to engaging in behaviors (e.g., eating a healthy diet) that are consistent with their diet intentions.

At an organizational level the findings of the present study support expanding counseling psychologists' roles as advocates and educators to include direct physical health promotion. For example, counseling psychologists can act as advocates for freshmen and other university students by appealing to the university administration to include more healthy food choices on the campus meal plan. Counseling psychologists can also serve as educators to students and other counseling professionals on the campus environment regarding the mind-body connection and thus the importance of healthy eating for overall mental and physical well-being. Counseling psychologists can also help to establish support programs in the university campus environment targeted especially towards freshmen – programs such as healthy eating support groups in which members are trained to reinforce healthy eating behaviors and to identify and overcome

barriers to acting on intentions to eat healthy diets. Such programs have the potential for making students feel supported by significant others in their efforts to eat in a healthy manner.

Finally, the present study serves as an example of the kind of important research topics that need to be addressed by the growing numbers of counseling health psychologists, particularly those working in university settings such as counseling centers and student health centers. As leaders in culturally sensitive research (Heppner et al., 2000), counseling psychologists may be best equipped to build upon and extend the findings of the present study in ways elaborated upon in the preceding section.

Conclusions

In conclusion, the present study examined the efficacy of the Theory of Planned Behavior (TPB) as a framework for predicting and understanding the healthy eating behavior of ethnic-minority freshmen. Results of the study suggest that the TPB may be a useful framework for understanding the intention of ethnic-minority freshmen students to engage in healthy eating behavior. However, the model was less successful in its ability to predict level of actual engagement in healthy eating behavior by these freshmen. The present study also provided some support for the addition of self-efficacy items that specify situations in which healthy eating could prove challenging to ethnic-minority freshmen students to the more typical items that are used to measure the PBC construct in the TPB model, when it is used in research focused on the healthy eating behavior of ethnic-minority freshmen students similar to those in the present study. It is recommended that future researchers continue to test and build upon the TPB model so that effective and culturally relevant interventions that are targeted to promoting healthy

eating behaviors in specific populations of ethnic-minority university students can be identified and implemented.

APPENDIX A
STUDENT INFORMED CONSENT FORM

Dear Student:

The purpose of this informed consent form is to ask you to participate in a study on the occurrence of healthy eating among university freshmen. The influence of certain attitudes and social factors on healthy eating of university freshmen will specifically be investigated. For the purpose of this study, healthy eating is defined as "eating according to the dietary recommendations of the Food Guide Pyramid". This research is being conducted by Lisa Ferdinand, a doctoral student in the Counseling Psychology Program at the University of Florida.

If you decide to participate in this study, you will be asked to: (1) sign this informed consent form; (2) fill out five questionnaires that should take between 20 and 30 minutes to complete; (3) use an online nutrition program to record all the foods and drinks that you consume for a period of 7 days; and, (4) fill out a questionnaire that will take about 10 minutes to complete at the end of the 7-day period of recording food and drink intake.

The online nutrition program will provide you with a score that you are to record on forms that will be given to you if you agree to participate. This score is the only food and drink intake information that you will be asked to provide for this study. All the information you provide will be anonymous, as all questionnaires, and the food and drink intake forms will have pre-assigned codes that do not specifically identify you. Your name will not be requested on any questionnaires or forms you complete for this study.

There are no anticipated risks to you as a participant in this study. The study may benefit you by increasing your attention to the degree to which your eating habits are consistent with the recommendations of the Food Guide Pyramid, and providing you the opportunity to modify and improve your eating habits through receiving accurate feedback about your food intake over a 7-day period. You are free to withdraw your consent to participate, and may discontinue your participation in the study at any time without consequence. Your decision to participate in this study will not influence your status in the AIM program in any way.

If you have any questions about this research protocol, please contact Lisa Ferdinand at (352) 367-2451 (lferdi@ufl.edu) or her faculty supervisor, Dr. Carolyn M. Tucker, Distinguished Alumni Professor at (352) 392-0601 ext. 260. Questions or concerns about your rights as a research participant may be directed to the University of Florida Institutional Review Board, PO Box 112250, University of Florida, Gainesville, FL 32611, or call (352) 392-0433.

Please sign below if you fully understand the procedure for the above described study, and agree to participate.

_____ _____
Signature of Participant Date

_____ _____
Signature of Principle Investigator Date

APPENDIX B
DEMOGRAPHIC QUESTIONNAIRE

Directions

Please provide the requested information by writing your answer in the space provided, or shading in the circle at the left of the answer that most clearly applies to you. Your answers are anonymous, so please answer honestly. A correctly shaded circle should look like this: ●

1. Age: _____
2. Height: _____ *feet* _____ *inches*
3. Current weight: _____ *lbs*
4. What is your gender?
   - O Male
   - O Female
5. What is your race/ethnicity?
   - O African-American
   - O Caucasian
   - O Hispanic
   - O Other _____
6. What is your Parent/Family Income?
   - O Less than 10,000
   - O $10,000-$20,000
   - O $20,001-$30,000
   - O $30,001-$40,000
   - O $40,001-$50,000
   - O over $50,000
7. Have you ever been exposed to a Healthy Eating Workshop?
   - O Yes When? _____
   - O No

8. How would you describe your present eating habits?
   - O Very unhealthy
   - O Slightly unhealthy
   - O Slightly healthy
   - O Very healthy
   - O Neither unhealthy nor healthy

9. Are you currently being treated for a medical condition?
   - O Yes
   - O No

   Please describe it:_____

10. Are you following any special diet?
    - O Yes
    - O No

    Please describe it :_____

11. Are you a vegetarian?
    - O Yes
    - O No

    Please describe what you do *not* eat: _____

12. Are you allergic to any foods?
    - O Yes
    - O No

    Please list these foods:_____

13. Where do you live?
    - O Apartment
    - O Residence Hall
    - O Other _____

14. Do you have a campus meal-plan?
    - O Yes
    - O No

15. Estimate the percent of your meals that are eaten at each of the following places:
    Campus:
        On-campus dining: _____%
        (e.g., Fresh Food Company or Gator Dining)
        On-campus restaurants: _____%
    Home/dormitory: _____%
    Off-campus restaurant: _____%
    Other _____: _____%

16. How satisfied are you with your current weight?
    - ○ Very dissatisfied
    - ○ Slightly dissatisfied
    - ○ Slightly satisfied
    - ○ Very satisfied

17. Are you a member of the AIM Program?
    - ○ Yes
    - ○ No

APPENDIX C
THEORY OF PLANNED BEHAVIOR QUESTIONNAIRE

Directions

The following statements pertain to your participation in the Healthy Eating Study. For the purpose of these questions, "eating a healthy diet" refers to following the dietary recommendations of the Food Guide Pyramid that are the described on the handout that you received with this questionnaire.

Please read each statement carefully and choose your answer by shading the circle under the number that most clearly describes your responses to the statements. For example, in question 1, if you definitely do not intend to eat a healthy diet for the next 21 days then you would shade the circle under the number "1". However, if you definitely do intend to eat a healthy diet for the next 21 days then you would shade the circle under the number "7", and so on.

1. I intend to eat a healthy diet for the next 21 days	Definitely Do Not						Definitely Do
	1	2	3	4	5	6	7
	○	○	○	○	○	○	○
2. My eating a healthy diet would be/is:	Bad						Good
	-3	-2	-1	0	1	2	3
	○	○	○	○	○	○	○
3. For me to eat a healthy diet for the next 21 days will be:	Difficult						Easy
	1	2	3	4	5	6	7
	○	○	○	○	○	○	○

4. It is expected of me that I eat a healthy diet for the next 21 days	Strongly Disagree						Strongly Agree
	1	2	3	4	5	6	7
	O	O	O	O	O	O	O
5. I want to eat a healthy diet for the next 21 days	Strongly Disagree						Strongly Agree
	1	2	3	4	5	6	7
	O	O	O	O	O	O	O
6. My eating a healthy diet would be/is:	Harmful						Beneficial
	-3	-2	-1	0	1	2	3
	O	O	O	O	O	O	O
7. I am confident that if I ate a healthy diet I could keep it up	Strongly Disagree						Strongly Agree
	1	2	3	4	5	6	7
	O	O	O	O	O	O	O
8. With regard to eating a healthy diet for the next 21 days, the people in my life whose opinions I value would:	Disapprove						Approve
	-3	-2	-1	0	1	2	3
	O	O	O	O	O	O	O
9. I expect to eat a healthy diet for the next 21 days	Unlikely						Likely
	1	2	3	4	5	6	7
	O	O	O	O	O	O	O
10. My eating a healthy diet would be/is:	Unpleasant						Pleasant
	-3	-2	-1	0	1	2	3
	O	O	O	O	O	O	O
11. Whether I do or do not eat a healthy diet for the next 21 days is entirely up to me	Strongly Disagree						Strongly Agree
	1	2	3	4	5	6	7
	O	O	O	O	O	O	O
12. People who are important to me think that I should eat a healthy diet:	Strongly Disagree						Strongly Agree
	-3	-2	-1	0	1	2	3
	O	O	O	O	O	O	O
13. My eating a healthy diet would be/is:	Unejoyable						Enjoyable
	-3	-2	-1	0	1	2	3
	O	O	O	O	O	O	O

14. How much control do you feel you have over eating a healthy diet for the next 21 days?	No Control						Complete Control
	1	2	3	4	5	6	7
	O	O	O	O	O	O	O
15. How likely is it that you will eat a healthy diet in the future?	Unlikely						Likely
	1	2	3	4	5	6	7
	O	O	O	O	O	O	O
16. My eating a healthy diet would be/is:	Foolish						Wise
	-3	-2	-1	0	1	2	3
	O	O	O	O	O	O	O
17. I would like to eat a healthy diet but don't really know if I can	Strongly Agree						Strongly Disagree
	1	2	3	4	5	6	7
	O	O	O	O	O	O	O
18. Most people who are important to me eat a healthy diet every day	Strongly Disagree						Strongly Agree
	-3	-2	-1	0	1	2	3
	O	O	O	O	O	O	O
19. I will try to eat a healthy diet for the next 21 days	Unlikely						Likely
	1	2	3	4	5	6	7
	O	O	O	O	O	O	O
20. My eating a healthy diet would be/is:	Unnecessary						Necessary
	-3	-2	-1	0	1	2	3
	O	O	O	O	O	O	O
21. I am confident that I could eat a healthy diet if I wanted to	Strongly Disagree						Strongly Agree
	1	2	3	4	5	6	7
	O	O	O	O	O	O	O
22. The people in my life whose opinions I value eat a healthy diet every day	Unlikely						Likely
	-3	-2	-1	0	1	2	3
	O	O	O	O	O	O	O

APPENDIX D
MARLOWE-CROWNE SOCIAL DESIRABILITY SCALE – SHORT FORM

Directions

For each of the following statements, please fill in where you consider the statement to be True or False.

	True	False
1. I never hesitate to go out of my way to help someone in trouble.	O	O
2. I have never intensely disliked anyone.	O	O
3. I sometimes feel resentful when I don't get my way.	O	O
4. I like to gossip at times.	O	O
5. There have been times when I felt like rebelling against people in authority even though I knew they were right.	O	O
6. I can remember "playing sick" to get out of something.	O	O
7. There have been occasions when I took advantage of someone.	O	O
8. I'm always willing to admit it when I make a mistake.	O	O
9. I always try to practice what I preach.	O	O
10. I sometimes try to get even, rather than forgive and forget.	O	O
11. When I don't know something I don't at all mind admitting it.	O	O
12. I am always courteous, even to people who are disagreeable.	O	O
13. At times I have really insisted on having things my way.	O	O
14. There have been occasions when I felt like smashing things.	O	O

15. I would never think of letting someone else be punished for my wrong-doings.	O	O
16. I never resent being asked to return a favor.	O	O
17. I have never been irked when people expressed ideas very different from my own.	O	O
18. There have been times when I was quite jealous of the good fortune of others.	O	O
19. I am sometimes irritated by people who ask favors of me.	O	O
20. I have never deliberately said something to hurt someone's feelings.	O	O

APPENDIX E
FOOD PYRAMID SELF-EFFICACY SCALE

Directions

A number of situations are described that can make it hard to stick to a healthy eating plan. A daily healthy eating plan consists of eating: 6-11 servings from the bread, cereal, rice and pasta group; 3-5 servings from the vegetable group; 2-4 servings from the fruit group; 2-3 servings from the milk, yogurt and cheese group; 2-3 servings from the meat, poultry, fish, dried beans, eggs and nuts group; and sparingly of fats, oils and sweets.

On the items below, please rate your confidence that you can stick to a healthy eating plan on a regular basis. For each of the following responses, please shade in the circle below the answer that corresponds to your confidence of each statement right now. A correctly shaded circle should look like this: ●

	Cannot do at all			Moderately certain can do					Certain can do	
	1	2	3	4	5	6	7	8	9	10
1. While watching television	○	○	○	○	○	○	○	○	○	○
2. Feeling restless or bored	○	○	○	○	○	○	○	○	○	○
3. During holiday times	○	○	○	○	○	○	○	○	○	○
4. Feeling upset or tense over job-related matters	○	○	○	○	○	○	○	○	○	○
5. Eating at a friend's house for dinner	○	○	○	○	○	○	○	○	○	○

	Cannot do at all				Moderately certain can do				Certain can do	
6. Preparing meals for others	O	O	O	O	O	O	O	O	O	O
7. When annoyed or angry	O	O	O	O	O	O	O	O	O	O
8. When very hungry	O	O	O	O	O	O	O	O	O	O
9. When depressed	O	O	O	O	O	O	O	O	O	O
10. When you want to sit back and enjoy food	O	O	O	O	O	O	O	O	O	O
11. Lots of high fat food is available in the house	O	O	O	O	O	O	O	O	O	O
12. Feel like celebrating with others	O	O	O	O	O	O	O	O	O	O
13. Someone offers you high fat foods	O	O	O	O	O	O	O	O	O	O
14. Feel a strong urge to eat foods high in fat that you like (i.e., steaks, hamburgers, ice cream)	O	O	O	O	O	O	O	O	O	O
15. When you are entertaining visitors	O	O	O	O	O	O	O	O	O	O
16. During vacations	O	O	O	O	O	O	O	O	O	O
17. Eating out with others when they are ordering high fat meals	O	O	O	O	O	O	O	O	O	O
18. Parties where a lot of appetizing high fat food is served	O	O	O	O	O	O	O	O	O	O
19. At recreational events (e.g., ball games, concerts) where mainly high fat fast foods are served	O	O	O	O	O	O	O	O	O	O
20. When eating breakfast in a restaurant	O	O	O	O	O	O	O	O	O	O

	Cannot do at all				Moderately certain can do				Certain can do	
21. When you have to prepare your own meals	O	O	O	O	O	O	O	O	O	O
22. When faced with appealing high fat foods in the supermarket	O	O	O	O	O	O	O	O	O	O

APPENDIX F
DIETARY INTAKE RECORD FORM

Directions

The purpose of this form is to record your dietary intake information for the Healthy Eating Study in which you have agreed to participate. At the end of the instructions, there is a table that you will be required to fill in every day for the next 7 days. Prior to filling out the table each day please think carefully about all of the foods/drinks you have consumed over the past 24 hours and then follow these instructions carefully. It may be helpful for you to read all of the instructions once *before* you begin.

1. Go to the Center for Nutrition Policy and Promotion's (CNPP) Interactive Healthy Eating Index (IHEI) program at the following website: http://147.208.9.133/
2. Read the information provided and then click on the "Login: New User" link
3. Choose a word, name or code that will be easy to remember and enter this word into the "User Name" field; remember that you are the only person that will know this code, protecting your confidentiality, however you must remember this code for the 7-day period
4. Enter the appropriate information for the "Age", "Gender" and "Date" fields and click "Save"; before you save, please ensure that the correct date for the 24-hour period of dietary intake information has been entered
5. The program will indicate that your data has been saved and that your login has been successful
6. Next click on the link "Proceed to Food Intake"
7. The program will prompt you to enter food items; in the space provided type in the first food or drink that you had in the past 24 hours and then click on "search" (for example, if you had a cup of coffee as soon as you woke up, you would type "coffee" in the space provided and then click on "search")

8. The program will then provide you with a list of possible choices (for example, coffee products to choose from); select the item that is most similar to the food or drink that you consumed (for example if you drank "ground coffee" then you would scroll down the list till you found "ground coffee") and then click on the link "add"

9. Continue adding items until all the foods and drinks that you consumed in the past 24 hours are listed and then click "select quantity"

10. The program will then prompt you to select a serving size; click on the down arrow (▼) and then choose the appropriate serving size (for example, if you had a mug of coffee, you would choose the option " 1 mug")

11. The program will also prompt you to enter the number of servings you had; if you had 1 mug of coffee you would enter the number "1", but if you had 2 mugs of coffee you would enter the number "2"

12. Click "Save and Analyze"

13. The program will give you various options for analyzing your dietary intake; click "calculate your HEI (Healthy Eating Index) score", the first option provided

14. Record you "Total HEI score" (out of a possible 100) in the table provided at the bottom of these instructions

15. Click on the link "Calculate History" which you will find on the bottom right hand corner of the page

16. The program will provide you with an "average HEI score" for total period you have been recording data; Please check to ensure that data for the whole period has been saved and then record this score in the table provided below

17. In order to protect your privacy, your personal information and food selection information are stored by the IHEI program only locally on the computer you use. Therefore, is important that you use the same computer each time you enter and save your data

18. If you are entering data for another 24-hour period (different date) immediately after, click on the link for "login" found at the top of the page; the program will prompt you for your username which you should enter and then click "OK"

19. When the program indicates that your login has been successful, change the date to the new 24-hour period and then *first* click on "save today's changes" and then click on "proceed to food intake"; be sure to click on "save today's changes to ensure that your data for the correct date is saved

20. Repeat instructions from #7 to #16 on this instruction sheet.

Table 7. Dietary Intake Record Table

	Date	Total HEI Score	Average HEI Score for Period
Day 1			
Day 2			
Day 3			
Day 4			
Day 5			
Day 6			
Day 7			

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BIOGRAPHICAL SKETCH

Lisa Ferdinand was born in Kingston, Jamaica, on October 11, 1975. In 1976, she moved to Trinidad, where she lived for the next 17 years. In 1994, Lisa graduated from St. Joseph's Convent with honors, and moved to Montreal to pursue a Bachelor of Science degree in Psychology from McGill University, graduating with distinction in 1997. She immediately went on to obtain her Master of Education degree in school counseling from Boston University in 1998.

After graduating from Boston University, Lisa returned to Trinidad in 1998 where she accepted a position as a Social Welfare Officer at a Children's Home. She later worked as a Human Resource Consultant responsible for training, recruitment and psychometric testing for 3 years. While in Trinidad, Lisa also worked part-time as a counselor in a counseling agency; worked as a lecturer at a local community college; and served as a member of the Board of Directors for Childline, an outreach help-line for at-risk children.

In August 2002, Lisa returned to the United States to pursue her doctoral degree in counseling psychology at the University of Florida, as a CLAS Alumni Fellow. During her entering her second year of the program and her research interests included multicultural issues in counseling and culturally sensitive health care. Lisa serves as the Project Administrator and Director of Research on Dr. Carolyn Tucker's Behavior Medicine Research Team.