ABSTRACT

INTENTION TO USE DIETARY SUPPLEMENTS:
THE ROLE OF SELF-IDENTITY AND PAST BEHAVIOR
IN THE THEORY OF PLANNED BEHAVIOR

by David James Kiefer

The purpose of this study was to investigate individuals’ motivations to take dietary supplements using the Theory of Planned Behavior (TPB). In addition to the standard TPB constructs, self-identity and past behavior were tested as additional variables to increase the theory’s predictive power, and because of conflicting past research, the interaction between self-identity and past behavior was examined. The results of this study indicated that two TPB constructs — attitudes and subjective norms — were independent predictors of individuals’ intentions to use dietary supplements. Additionally, this study found that self-identity and past behavior independently predicted intention and captured additional variance not accounted for by the standard TPB constructs. Furthermore, this study found that self-identity was a stronger predictor of behavioral intention at lower levels of past behavior rather than at higher levels. Practical implications and suggestions for future research are discussed.
INTENTION TO USE DIETARY SUPPLEMENTS:
THE ROLE OF SELF-IDENTITY AND PAST BEHAVIOR IN THE
THEORY OF PLANNED BEHAVIOR

A Thesis

Submitted to the
Faculty of Miami University
in partial fulfillment of
the requirements for the degree of
Master of Arts
Department of Communication

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Oxford, Ohio
2008

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Acknowledgements

First, I would like to thank my thesis advisor, Dr. Judith Weiner, for her guidance and support during this process. It was an honor to be your first advisee, and you have been a great advisor, mentor, and friend.

Second, I would like to thank the members of my thesis committee, Dr. Marjorie Keeshan Nadler and Dr. James Patterson. Your feedback was invaluable and helped make this project of the highest quality.

Third, I would like to thank my girlfriend, Danielle Orbash, whose love and support was priceless throughout graduate school. It would have been impossible to finish my master’s degree on time without your assistance.

Lastly, I would like to thank my parents, Mark and JoAnn Kiefer, and my brother Scott Kiefer. They have always encouraged my endeavors inside and outside of the classroom, and I am forever grateful for their love and support.
Introduction

Since Congress passed the Dietary Supplement Health Education Act (DSHEA) in 1994, the dietary supplement business has been one of the fastest growing segments of the United States’ health industry. Revenues from dietary supplements have increased significantly over the past decade, growing from $12 billion in 1997 (Newberry et al., 2001) to more than $20 billion in 2005 (Fraunfelder, 2005). In addition, the prevalence of supplement use has risen, and it is estimated that over 50% of American adults currently use dietary supplements on a regular basis (National Institute of Health, 2006). Individuals use supplements for a wide variety of health reasons, and certain supplements claim to offer benefits that include losing weight, gaining muscle mass, improving sexual performance, and preventing health problems.

Much of the past dietary supplement research has focused on supplements’ ability to enhance athletic performance, specifically with professional and college athletes (Erdman et al., 2007; Lavallee, 2007; Talbott, Talbott, & Wood, 2007), and supplements’ effectiveness among at-risk demographics, including multiple sclerosis sufferers (Shirazi et al., 2007) and women susceptible to breast and ovarian cancers (Alamain et al., 2007). The limitation of past dietary supplement research is that it focused solely on the outcomes associated with supplement use and neglected to study individuals’ motivations to engage in supplement use. The goal of this research project was to examine the cognitive processes that influence supplement use within the framework of the theory of planned behavior (TPB; Ajzen, 1985, 1991), which has been found to consistently predict individuals’ intentions to engage in a wide-range of health behaviors over the past two decades (Godin & Kok, 1996). Dietary supplement use was a beneficial health behavior to examine using this theoretical model, as supplement use can lead to negative health outcomes. Recent studies have found that nearly 20% of sampled supplements were contaminated with ingredients not found on the products’ labels (International Olympic Committee Medical Commission, 2003), and researchers have also determined that using dietary supplements without first consulting a physician can cause harmful interactions with certain prescription drugs (Fraunfelder, 2005).

Although TPB has been found to accurately predict intention across a range of health behaviors, Ajzen (1991) suggested the theory is open to the inclusion of additional constructs if they can increase the predictive power of the model. Attitudes, subjective norms, and perceived behavioral control (PBC) have been linked to predicting behavioral intention for numerous
health behaviors including smoking, drinking alcohol, participating in cancer screenings, dieting, exercising, and using condoms (Godin & Kok, 1996), but research has suggested that self-identity and past behavior also are strong predictors of health behaviors (Conner & Armitage, 1998; Smith et al., 2007; Walsh & White, 2007). Using the TPB model, self-identity has been shown to significantly and independently predict individuals’ intentions to consume organically grown vegetables (Sparks & Shepherd, 1992) and reduce dietary fat intake (Sparks & Guthrie, 1998). In addition, past behavior was found to be the best predictor for future behavior with the theory of reasoned action (TRA), which is an earlier version of TPB, when consuming sweet and fried foods, smoking, and exercising across an eight-month time interval (Mullen, Hersey & Iversen, 1987). Building on this past TRA and TPB research, this study examined whether TPB was an effective model for predicting individuals’ intentions to use dietary supplements. In addition, it was necessary to study the self-identity and past behavior constructs to determine their influence on individuals’ intentions to use supplements and their relevance to TPB.

**Purpose of Study**

The purpose of this research was to examine dietary supplement use within the TPB framework and determine the applicability of self-identity and past behavior as additional constructs to increase TPB’s predictive power. As a health behavior, dietary supplement use has been the subject of research determining product effectiveness and the rate of use among certain demographics, but little research has been done to determine individuals’ motivations to engage in supplement use. Thus, this study attempted to fill in the research gaps with individuals’ motivations to use supplements and to determine TPB’s effectiveness in predicting individuals’ intentions to use supplements. In addition, both self-identity and past behavior were examined to determine their role in influencing behavioral intention within the TPB model and the relationship between the two variables.
Chapter 1: Review of Literature

Dietary Supplements

Dietary supplements cover a broad range of products that consumers can use to positively impact their wellness and overall health. As defined by Congress in the DSHEA, a dietary supplement is any product other than tobacco that meets the following four requirements:

(a) It is designed to complement or supplement the diet; (b) It is made up of one of more dietary ingredients, which includes vitamins, minerals, herbs, amino acids, and botanicals; (c) It is designed for oral consumption through pill, capsule, tablet, powder, or liquid; and (d) It is labeled as a dietary supplement (National Institute of Health, 2006).

Individuals use dietary supplements to achieve a broad range of health outcomes, ranging from ensuring proper vitamin and mineral intake to promoting optimal health and bodily performance. In addition to being available at health food stores and vitamin stores, dietary supplements are widely available at grocery stores, in mail-order catalogs, through television programs, and over the internet (National Center for Complementary and Alternative Medicine, 2007).

Despite dietary supplements’ usefulness as a corrective and preventative health measure, they have many drawbacks, including how they are regulated in the United States. Under the DSHEA, dietary supplement manufacturers, not the Food and Drug Administration (FDA), are held accountable for making sure products are safe prior to their marketing and sale. Manufacturers are required to correctly label their products, but dietary supplement manufacturers are not required to register their products with the FDA or receive FDA approval before marketing and selling their products (U.S. Food and Drug Administration, 2007). Thus, the FDA can take action against unsafe dietary supplements only after they have been released to consumers. The only requirement for dietary supplement manufacturers is that, if they make a claim about a supplement addressing specific a health issue, they must qualify it with a statement that reads, “This statement has not been evaluated by the Food and Drug Administration. This product is not intended to diagnose, treat, cure, or prevent any disease” (National Institute of Health, 2006). This lack of governmental regulation has caused confusion among health consumers as to the actual effectiveness and necessity of taking dietary supplements.

Lack of FDA regulation has led to the improper use of dietary supplements by health consumers. Supplements are often taken after self-diagnosing health issues, and of the estimated 150 million Americans that use dietary supplements, only half report use to their physician
Because of this self-diagnosis and self-medication, dietary supplements can interact with other prescription medications and potentially lead to health complications. According to Halsted (2003), although numerous dietary supplements have clinically proven benefits, many dietary supplements contain potentially toxic substances, particularly in relation to their interaction with prescribed drugs. Numerous studies also have shown that, despite laws requiring that manufacturers disclose all of a product’s ingredients on the product label, dietary supplements often contain substances not listed by the manufacturer. A three-year study undertaken by the International Olympic Committee Medical Commission (2003) found that 18.8% of the supplements they analyzed contained an ingredient not listed on the product label. Thus, even if taken properly, dietary supplements can lead to unanticipated consequences for even the savviest health consumers if they are contaminated with substances not listed on the product’s label.

Because of the deregulation of supplements by DSHEA, product manufacturers often fail to engage in stringent testing of their products, and this can have detrimental health effects for consumers. Over the past five years, supplements including ephedra and androstendione have been removed from the market after their harmful effects were revealed, but the FDA has often been slow to react when concerns arise. Ephedra, which raises blood pressure and shrinks blood vessels, was associated with possible health risks including hypertension, heart attacks, and strokes for eight years before being taken off the market (Associated Press, 2003). In addition, a 1995 Consumer Reports magazine listed five dietary supplements — ephedra, chapparal, comfrey, lobelia, and yohimbe — that had the potential to cause serious harm to consumers, but each supplement was available to consumers until 2003 (Bell, 2003). Although the FDA serves as a safety net when supplement manufacturers fail to properly test supplements, further testing is required to substantiate any claims against supplements, which can lead to dangerous supplements remaining on the market for prolonged periods of time.

Further complicating consumer use of dietary supplements is the fact that doctors and other health professionals often recommend and take supplements. A Healthcare Professionals (2007) study found that more than 79% of U.S. physicians and 82% of U.S. nurses recommend dietary supplements to patients, and 72% of physicians and 89% of nurses regularly use vitamins, minerals, herbals, and other supplements. The same study (Healthcare Professionals, 2007) discovered that almost half of all physicians and nurses recommend supplements to
patients for general and overall health benefits. Because doctors and nurses use and recommend dietary supplements, this implies that all supplements are safe and beneficial. However, even under physician supervision, some dietary supplements have the potential to interact with prescription drugs, as they often contain ingredients not listed on the product label. Considering the lack of regulation and possible negative health outcomes associated with supplement use, it was necessary to investigate what motivates individuals to use supplements. The theory of planned behavior (TPB) has proven to be an effective predictor of health behaviors and was used in this study to examine the factors that influence individuals’ intentions to use dietary supplements.

**The Theories of Reasoned Action and Planned Behavior**

The theory of planned behavior (TPB; Ajzen, 1985) is an extension of the theory of reasoned action (TRA; Fishbein & Ajzen, 1975), and as a theoretical framework, it has proven effective at predicting human behaviors. Within the TRA and TPB models, it is understood that most human behaviors are goal-oriented and result from defined cognitive processes that occur when individuals evaluate relevant information surrounding their behaviors (Fishbein & Ajzen, 1975). In both theories, behavioral intention is understood to influence and serve as the best predictor of future behavior. Intentions are defined as the motivational factors that underlie behaviors, and these motivational factors include individuals’ willingness to attempt a behavior and individuals’ amount of effort put toward completing a behavior (Azjen, 1988). Thus, TRA and TPB’s two main assumptions are that (a) individuals behave rationally and that (b) intention is the best determinant of behavior (Ajzen, 1985). Meta-analyses of TRA (Sheppard, Hartwick, & Warshaw, 1988) and TPB (Godin & Kok, 1996) have shown that both models are effective at predicting behavioral intention and that intention is a strong predictor of actual behaviors.

The TRA model is concerned with predicting and understanding volitional behaviors (i.e., those that are intentional and explicitly under human control), and with willful health behaviors such as donating blood, exercising, and dieting, the first construct that significantly impacts behavioral intention is attitudes toward behaviors (Ajzen, 1985). It is recognized that both belief strength, which reflects individuals’ disposition toward performing a specific behavior, and belief evaluation, which is the positive or negative feelings associated with engaging in a behavior, influence individuals’ attitudes toward behaviors (Azjen, 1988). TRA emphasizes the impact of specific attitudes on behavioral intention, and communication
messages intended to alter behaviors must target specific attitudes, rather than general attitudes, toward health behaviors (Frymier & Nadler, 2006). Relating the attitude construct to dietary supplement use, individuals may have positive attitudes toward overall supplement use, but they may have negative attitudes toward using specific vitamin supplements. Therefore, in order to influence behavioral intention, a persuasive message must focus on changing attitudes toward using the specific vitamin supplements rather than overall supplement use (Hale, Householder & Greene, 2002).

In addition to attitudes, social influences termed subjective norms are the second construct that influence individuals’ behavioral intentions in the TRA model. Subjective norms are the perceived social pressures from important others to engage in behaviors, and in general, people are motivated to engage in behaviors when they feel positively about a behavior and they believe important others think they should engage in the behavior (Azjen, 1985). Both normative beliefs and motivation to comply are assumed to influence individuals’ subjective norms and their perceptions of social influence (Fishbein & Ajzen, 1980). Normative beliefs are the perception of important others’ expectations about the consequences of behaviors, and motivation to comply is the probability that people will be influenced by their referent groups (Hale, Householder & Greene, 2002). Therefore, with subjective norms and dietary supplements, if individuals perceive that supplement use is expected or looked highly upon within their social networks and they are highly motivated to act in accordance with their social groups, they will be influenced to use supplements. The converse also is true, as if individuals perceive that their referent group looks down upon supplement use, they will be motivated to not use supplements. Research has found subjective norms to be the weaker of the two TRA constructs when predicting intention, as it reaches significance less frequently than attitudes (Godin & Kok, 1996), but Ajzen (1988) posited that the relative importance of attitudes and social influences and the weight individuals place on each construct varies depending on the type of behaviors in question.

Although TRA initially dealt with volitional behaviors and was successful when predicting these behaviors, Ajzen (1985) proposed the addition of perceived behavioral control (PBC) to expand the theoretical model into what is now known as TPB. Because TRA was unable to predict behaviors such as quitting smoking that fell outside of complete volitional control, the PBC construct was added to increase the model’s predictive power over a wider
range of behaviors. Ajzen (1988) recognized that even if intention to engage in a behavior is high, individuals could still be constrained by factors unrelated to motivation, including their ability to carry out a behavior and the types of resources available to them. Therefore, with the addition of the PBC construct to the traditional TRA model, TPB expanded the theory into considering behaviors that require additional skills, resources, and opportunities.

Conceptualizing behavior as falling on a continuum which ranged from little or no volitional control (i.e., yawning) to complete volitional control (i.e., donating blood), Ajzen (1988) found that PBC, which is individuals’ perceptions of a behavior as simple or difficult, fluctuated depending on four internal and external factors: (a) information, skills, and abilities, (b) emotions and compulsions, (c) opportunity, and (d) dependence on others. Related to supplement use, individuals may have strong intentions to use vitamin and mineral supplements, but if they lack the knowledge about the proper supplements to take (i.e., information, skills, and abilities) or if they have a mental block against taking pills (i.e., emotions and compulsions), they may be unable, because of internal factors, to carry out this behavior. In addition, individuals can be constrained by external factors if they live in a rural area where access to supplements is not available (i.e., opportunity), or if they are elderly, lack transportation, or need another family member to purchase dietary supplements (i.e., dependence on others). Thus, when moving beyond volitional behaviors with health behaviors such as dietary supplement use, both internal and external factors can significantly impact individuals’ intentions and subsequent behaviors.

Simplifying the PBC construct, it can be broken into two components: control belief and perceived power. Control belief is defined as individuals’ beliefs about the probability of locating the resources needed to perform a behavior, while perceived power is the extent to which individuals believe a behavior is within or beyond their control (Ajzen, 1985). The relationship between PBC and behavioral prediction is that it is more probable individuals engage in behaviors that they have more control over and less probable they perform behaviors which they have little or no control over (Armitage & Conner, 2001; Conner & Armitage, 1998). Thus, if individuals perceive that they have the requisite skills (i.e., control belief) to use supplements and have the monetary resources (i.e., perceived power) to purchase and locate supplements, they would be more likely to use supplements because of their high level of PBC.
The applicability of TPB to dietary supplement use is evident, as previous research has shown TPB’s ability to predict both health and consumer behaviors. Past studies have found TPB effective in predicting health behaviors including the consumption of organically grown vegetables (Sparks & Shepherd, 1992), physical activity (Jackson, Smith, & Conner, 2003), and safe-sex behaviors (Terry, Galligan, & Conway, 1993). Meanwhile, in the consumer realm, TPB has been shown to effectively predict intention to purchase preferred beer products (Smith et al., 2007) and purchase environmentally-friendly products (Kalafatis, Pollard, East & Togas, 1999). Therefore, since dietary supplement use can be considered both a health behavior and a consumer behavior, this research examined the ability of TPB to predict individuals’ intentions to use dietary supplements.

Self-Identity

Although the standard TPB model is parsimonious and has proven effective at predicting health behaviors, the theory could still be improved. Ajzen (1991) stated that TPB was open to the addition of constructs if they could capture a considerable amount of variance once the theory’s other variables have been controlled for, and acting on this suggestion, this research proposed the addition of self-identity as a salient construct with the potential to increase TPB’s ability to predict health behaviors, specifically with individuals’ intentions to use dietary supplements.

The concept of self-identity, which has been identified by researchers as a possible addition to TPB (Conner & Armitage, 1998; Walsh & White, 2007), is defined as the “extent to which performing the behavior is an important component of the person’s self-concept” (Smith et al., 2007, p. 2728). The term self-identity originally derived from Stryker’s identity theory (1968), and when considering identity theory in relation to Ajzen’s model, it is compatible with TPB because both theories believe that intention is the best predictor of behavior (Terry, Hogg, & White, 1999) and recognize that behaviors are the result of a deliberate and logical thought process (Armitage & Conner, 2001). At its most basic level, self-identity is viewed not as a psychological variable but as a social construct. According to Fekadu and Kraft (2001), self-identity is “a set of expectations derived from a person’s social position and may represent the different roles a person occupies in a social structure” (p. 672). Not only is self-identity based on individuals’ internalized expectations about their behaviors, there is a wider social context in play with self-identity. Because individuals have a hierarchy of self-identities for a range of
actions, their behaviors depend on where a specific self-identity fits within that hierarchy (Jackson, Smith & Conner, 2003). Supplement use is often equated with living a healthy lifestyle, as the main purpose of supplements is to improve individuals’ overall health. Thus, if individuals strongly view themselves as healthy individuals, they would be more likely than non-users to self-identify as supplement users and engage in supplement use.

As a predictor of intention, self-identity develops from the interplay between an individual and social component, as its impact on behavior reflects the extent to which individuals see themselves fulfilling a defined role and how that role fits within their social network (Armitage & Conner, 2001). Thus, not only is self-identity reliant on individuals’ beliefs about the impact of their behavior, but it is based in part on role beliefs, which vary for individuals depending on their age, role, and status in a social structure (Godin & Kok, 1996). Walsh and White (2007) further simplified the definition of self-identity, referring to the variable as the interconnectedness of internal values and external roles. The inclusion of self-identity when examining dietary supplement use is supported by past research with TPB and exercise, as Theodorakis (1994) found that self-identity was a significant predictor of intention to visit a gym three times a week over a two-month period. Supplement use, like exercise, focuses on maintaining a healthy lifestyle, and similar to exercise, supplement use requires repetition of the behavior before health benefits are received. Thus, making these connections between exercise and supplement use, it was logical to test self-identity as an additional construct with TPB in this study.

Research has found support for self-identity as an independent predictor of both health and consumer behaviors. In separate studies concerning TPB and health behaviors, self-identity independently predicted intention to eat organically grown vegetables (Sparks & Shepherd, 1992) and intention to make dietary changes to reduce fat intake (Sparks & Guthrie, 1998). After hypothesizing that no independent effects of self-identity would be present with consuming organic vegetables, Sparks and Shepherd (1992) found that, out of 261 randomly sampled participants, there was significant support for self-identity as an independent predictor of intention and that self-identity was not mediated by attitudes. In a later study, Sparks and Guthrie (1998) found the same support for self-identity across three studies concerning individuals’ intentions to reduce fat intake. Replicating their study with a questionnaire that was distributed in the United Kingdom, Denmark, and Finland, the researchers found that, across all three studies,
self-identity independently predicted intention, and they recommended that self-identity be included as a predictor variable when using TRA and TPB to predict intentions with health behaviors. Other health-related behaviors that self-identity helped predict within the TPB framework include intention to engage in exercise (Theodorakis, 1994) and intention to donate blood (Charng, Piliavin, & Callero, 1988). Self-identity has additionally shown to be applicable with the prediction of non-health behaviors, most notably with recycling (Terry, Hogg, & White, 1999), and consumer behaviors including mobile phone usage (Walsh & White, 2007) and purchasing individuals’ preferred brand of beer (Smith et al., 2007). Because self-identity has been shown to positively impact the predictive power of TPB across a wide-range of health and consumer behaviors, it was included in this study and examined with predicting individuals’ intention to engage in dietary supplement use.

However, there is conflicting research about the role of self-identity within the TPB model. Although studies have shown self-identity to have an independent influence on intention once all other TPB variables were controlled for, there is some research which suggests that self-identity may play a different role. For example, Theodorakis, Bagaitis, and Goudas (1995) found that self-identity, rather than predict intention, mediated the effects of subjective norms with teaching individuals with disabilities. However, most of the debate over self-identity as a TPB construct centers on its possible overlap with past behavior, as some researchers have suggested that self-identity and past behavior are measures of the same construct (Fekadu & Kraft, 2001). In addition, there is debate over whether self-identity is beneficial as an independent predictor of intention, or “whether in line with identity theory, the effects of self-identity vary as a function of repeated behavior” (Smith et al., 2007, p. 2729). It is with this debate in mind that this study examined the possible independent effect of self-identity on intention to use supplements, as well as the role of past behavior in predicting intention.

**Past Behavior**

Although it is true that past behavior does not necessarily cause future behavior, one of the strongest links to predicting behavior with TPB has been past behavior. Past behavior is often considered synonymous with habit, but regardless of the terminology, support for past behavior as an effective predictor of intention has been shown with both TRA and blood donation (Charng, Piliavin, & Callero, 1988) and TPB and intention to purchase one’s preferred brand of beer (Smith et al., 2007). However, there has been disagreement over the defined role of
past behavior within TPB, as Ajzen (1991) believed it to interact with PBC rather than independently predict intention. Because it was regarded that individuals have more control over a behavior the more times a behavior was repeated, it was thought that past behavior was originally mediated by PBC. However, in Conner and Armitage’s (1998) meta-analysis of 16 different TRA and TPB studies, they discovered that, on average, past behavior accounted for 7.2% variance in intentions. Thus, after controlling for all the accepted TPB variables, past behavior was still an effective variable at predicting intention, at least for frequently repeated behaviors. Because dietary supplement use requires repeated consumption in order for health benefits to occur, it was logical to test past behavior as a variable within TPB to examine this health behavior.

Nevertheless, there remains some uncertainty about the relationship between the self-identity and past behavior constructs, which this study examined. Although Conner and Armitage (1998) agreed that the amount of variance in their meta-analysis with past behavior was significant, they also posited that it either spoke to the usefulness of past behavior as a construct, or it was the result of another variable, such as self-identity, that was not measured. Therefore, it was necessary to examine self-identity and past behavior together with dietary supplement use to determine whether they were measures of the same variable or if both could be considered distinct constructs that independently predict behavioral intention. Fekadu and Kraft (2001) fall into the former mode of thinking, as they argued that self-identity and past behavior are actually measuring the same concept. However, Smith et al. (2007) found the contrary with consumer intention to purchase preferred brands of beer, as both self-identity and past behavior independently contributed to individuals’ intentions to purchase.

**The Interplay of Self-Identity and Past Behavior**

For this study, a consideration concerning the relationship between self-identity and past behavior was whether or not self-identity varied as a function of repeated behavior. The main area of research on this topic concerned the following question: does the repetition of a behavior cause it to become a more salient part of individuals’ self-identities and lead to higher levels of intention? Or does the repetition of a behavior cause it to become more of a habit than a relevant part of individuals’ self-identities, thus weakening the predictive power of self-identity at high levels of past behavior? Considering identity theory (Stryker, 1968), it assumes that as a behavior is repeated, it will become a larger part of individuals’ self-identity. Therefore, if one were to
examine supplement use based on the principles of identity theory, individuals who have previously engaged in supplement use will have high levels of self-identity as supplement users, which will in turn predict higher levels of intention to use supplements in the future. Charng, Piliavin, and Callero’s (1988) findings with TPB and blood donation were consistent with identity theory. The researchers found that self-identity predicted intention at higher levels of past behavior with blood donation, and self-identity was a better predictor of intention to donate blood when individuals had already donated blood in the past.

However, there has been conflicting research on the relationship between self-identity and past behavior. More recent studies have disputed the assumptions of identity theory, as Smith et al. (2007) and Terry, Hogg, and White (1999) found that self-identity was a weaker predictor of intention at higher levels of past behavior. Smith et al. (2007) found that past behavior was a strong predictor of purchasing beer in the future, but that the effects of self-identity as a predictor of behavior were stronger at lower levels of past beer purchasing. This finding is consistent with Terry, Hogg, and White’s (1999) research with recycling, which found that past behavior helped predict intention to recycle, but it did not moderate self-identity. As with beer purchasing, the recycling study found that self-identity was a stronger predictor of intention at lower levels of past behavior than at high levels. Both Smith et al. (2007) and Terry, Hogg, and White (1999) believe that this relationship is present because as a behavior is repeated, it becomes more of a habit and less a salient part of individuals’ self-identity. In contrast to blood donation (Charng, Piliavin, & Callero, 1988), which is an invasive behavior that cannot be repeated on a daily or even weekly basis, supplement use requires more frequent repetition, which is more in line with behaviors such as purchasing beer and recycling. Therefore, this research proposed that with dietary supplement use, the results will more likely be similar to the beer purchasing and recycling studies such that self-identity will more strongly predict intention at lower levels of past behavior.

Health Orientation

Separate from the standard TPB constructs and the proposed additional variables, social science research has demonstrated that health behaviors can be positively and negatively influenced by individuals’ psychological tendencies (Snell, Johnson, Lloyd & Hoover, 1990; 1991). Taking this finding into consideration, it is plausible that health orientation can impact individuals’ intentions to use dietary supplements. Whereas the TPB constructs focus on
measuring intention with specific volitional health behaviors such as dietary supplement use, health orientation is a more global concept that gauges individuals’ tendencies to maintain an overall healthy lifestyle. Because supplement use is a health behavior that promotes healthiness (such that the prolonged use of supplements will have positive health effects and help maintain healthiness), it was necessary to account for individuals’ health orientation as a possible variable that impacted behavioral intention.

According to Snell, Johnson, Lloyd, and Hoover (1991), health orientation is as a construct that examines “people’s physical and/or mental health tendencies” because “the psychology of individual tendencies is an important aspect of understanding health-related behavior” (p. 181). The one important finding with health orientation research relevant to supplement use is that individuals who believe they are the primary factor in determining their health status tend to avoid risky health behaviors and partake in beneficial health behaviors (Snell, Johnson, Lloyd, & Hoover, 1991). Thus, individuals who feel they play a prominent role in determining their healthiness might take supplements if they feel it would benefit their health or avoid them if they perceive negative health consequences associated with supplement use.

Research has demonstrated that individuals’ health orientation influences alcohol and drug use (Snell, Johnson, Lloyd, & Hoover, 1990) and sexual health behaviors (Weiner, 2004), and considering that these behaviors fall under volitional control, this research posited that, separate from the TPB constructs, health orientation would impact individual’s intentions to consume dietary supplements. The proposed relationship in this study was that individuals who have high health orientations (i.e., they are strongly oriented toward maintaining their health and avoiding unhealthy behaviors) would be more likely to consume supplements than individuals with low health orientations (i.e., they are indifferent toward maintaining healthiness and avoiding unhealthiness).

Rationale for Hypotheses

As a behavioral theory, the TPB model has proven effective at predicting intention to engage in both health and consumer behaviors. With regards to health behaviors, TPB has predicted intention to consume organically grown vegetables (Sparks & Shepherd, 1992), participate in physical activity (Jackson, Smith, & Conner, 2003), and engage in safe-sex behaviors (Terry, Galligan, & Conway, 1993). In the consumer realm, TPB has predicted intention to purchase preferred beer brands (Smith et al., 2007) and environmentally-friendly
products (Kalafatis, Pollard, East & Togas, 1999). With TPB and health behaviors, two of the constructs — attitudes and PBC — have been the most powerful variables in predicting intention. The third variable, subjective norms, influences intention to an extent but is generally regarded as the least influential because it reaches significance less often (Godin & Kok, 1996). Dietary supplement use can be considered both a health and consumer behavior, and with TPB having been shown as an effective framework to examine health and consumer behaviors, the following hypotheses were tested:

H1: The three constructs outlined in the standard TPB model (attitudes, subjective norms, and perceived behavioral control) will be positively related to individuals’ intentions to use dietary supplements.

H2: Attitudes, subjective norms, and perceived behavioral control will predict individuals’ intentions to engage in dietary supplement use.

Despite the effectiveness of TPB in predicting behavioral intention with health and consumer behaviors, recent research has proposed adding variables to the theoretical model to improve its predictive power. In particular, self-identity and past behavior have been suggested as effective predictors of behavioral intention. Independent of TPB’s three original constructs (attitudes, subjective norms, and PBC), self-identity has effectively predicted intention to eat organically grown vegetables (Sparks & Shepherd, 1992), reduce dietary fat intake (Sparks & Guthrie, 1998), engage in exercise (Theodorakis, 1994) and donate blood (Chang, Piliavin, & Callero, 1988). With regards to past behavior, it has been shown to predict behavioral intention independent of TPB’s three constructs with consumer behaviors such as preferred brand beer purchasing (Smith et al., 2007) and household recycling (Terry, Hogg, & White, 1999). Additionally, meta-analyses of TPB have determined that both self-identity and past behavior have improved the model’s ability to predict intention and helped explain additional variance not captured by TPB’s three standard constructs (Conner & Armitage, 1998; Godin & Kok, 1996). Considering these findings, the following hypotheses were tested:

H3: Self-identity and past behavior will be positively related to individuals’ intentions to engage in dietary supplement use.

H4: Self-identity and past behavior will serve as independent predictors of individuals’ intentions to engage in dietary supplement use.
Although both self-identity and past behavior have been shown to independently influence intention, there has been disagreement among researchers about the relationship between the two variables. Charng, Piliavin, and Callero (1988) found that self-identity, as consistent with identity theory (Stryker, 1968), more strongly predicted intention at higher levels of past blood donation than with lower levels. However, recent research with preferred brand beer purchasing (Smith et al., 2007) and household recycling (Terry, Hogg, & White, 1999) found the exact opposite relationship such that self-identity was a stronger predictor of behavioral intention at lower levels of past behavior, rather than at higher levels. Considering that dietary supplement use is a repetitive behavior more in line with beer purchasing and household recycling, the following hypothesis was put forward:

H5: Self-identity and past behavior will interact to influence individuals’ intentions to use dietary supplements such that self-identity will have a stronger influence on behavioral intention at lower levels of past behavior than at higher levels.

Separate from the three TPB constructs and the proposed additional constructs, research has demonstrated that individuals’ health orientation can influence their intention to engage in volitional health behaviors, including recreational drug use (Snell, Johnson, Lloyd, & Hoover, 1990) and sexual health behaviors (Weiner, 2004). Health orientation is a construct that measures more global health tendencies such as individual’s motivations to maintain healthiness and avoid unhealthiness (as opposed to TPB, which is narrow and focused on specific behaviors such as supplement use), and because it was important to examine individuals’ psychological tendencies that influence health behaviors (Snell, Johnson, Lloyd & Hoover, 1990; 1991), the following hypothesis was put forward:

H6: Health orientation will predict individuals’ intentions to use dietary supplements and capture additional variance beyond the three standard TPB constructs.
Chapter 2: Methodology

Participants

Participants were 220 undergraduate students \((N = 220)\) enrolled in entry-level communication courses at a medium-sized Midwestern university. The participants received academic credit in their communication course for taking the online survey. The participants represented various academic disciplines, including communication pre-majors, business majors, and education majors. Participants completed a survey about dietary supplement use that included measures for attitudes, subjective norms, perceived behavioral control, self-identity, past behavior, and behavioral intention. A measure for health orientation, which was separate from the TPB constructs, also was included. The survey was announced via e-mail to instructors of the entry-level communication courses, and the instructors forwarded the online survey link onto their students. Participants were asked to think about their intentions to use dietary supplements over the next month, as supplement use is a health behavior that requires repetition before any potential benefits can occur.

Measurements

Health Orientation. Because dietary supplement use is first and foremost a health behavior, participants began the survey by responding to a 13-item measure for health orientation, which was adapted from Snell, Johnson, Lloyd, and Hoover (1990; 1991) and designed to measure individuals’ motivations to maintain a healthy lifestyle. The scale, which was a 7-point Likert-type scale \((1 = \text{strongly disagree}, 7 = \text{strongly agree})\), consisted of three dimensions: (a) value own health, (b) motivated to avoid unhealthiness, and (c) motivated to maintain healthiness. The value own health dimension of the health orientation scale included three items: (a) I work very hard to take care of my own health; (b) Protecting my own health is one of my most important goals; and (c) I really don’t worry much about my own health (reverse-coded). The alpha reliability for the value own health dimension was .79 \((M = 15.59, SD = 3.60)\).

The motivated to avoid unhealthiness dimension of the health orientation scale included five items: (a) I do things that keep me from becoming physically healthy (reverse-coded); (b) I am motivated to keep myself from becoming physically unhealthy; (c) I try to avoid engaging in behaviors that undermine my physical health; (d) I really want to prevent myself from getting out of shape; and (e) I am not motivated to avoid being in terrible physical shape (reverse-coded).
The alpha reliability for the motivated to avoid unhealthiness dimension was low at .61 ($M = 24.87, SD = 4.93$).

The motivated to maintain healthiness dimension of the health orientation scale included five items: (a) I’m motivated to be physically healthy; (b) I’m strongly motivated to devote time and effort to my physical health; (c) I lack the desire to keep myself physically healthy (reverse-coded); (d) It’s not really that important to me that I keep myself in top physical shape (reverse-coded); and (e) I strive to keep myself in top physical shape. The alpha reliability of the motivated to maintain healthiness dimension was .86 ($M = 25.50, SD = 6.04$) [see Appendix C].

**Open-Ended Questions.** After completing the health orientation scale, participants responded to six open-ended questions about supplements. These open-ended questions were designed to stimulate participants’ thoughts about their personal dietary supplement use, and the principal researcher did not intend to fully analyze the responses. First, participants answered two general questions about what participants consider to be dietary supplements: (a) “In your own words, please define/describe dietary supplements;” and (b) “Please give examples of what you consider to be dietary supplements.” Subjects then answered the following three questions examining their salient beliefs surrounding dietary supplements use: (a) “Please write down what you think are the main advantages of consuming/taking dietary supplements;” (b) “Please write down what you think are the main disadvantages of consuming/taking dietary supplements;” and (c) “Please list anything else you associate with dietary supplements use.” In an effort to understand what types of barriers people encounter when taking dietary supplements, participants responded to the sixth question: (a) “Please write down any difficulties, obstacles, or problems you encounter which affect your ability to consume/take dietary supplements.”

Following the six open-ended questions, participants were provided with a standard definition of dietary supplements and were instructed to keep this definition in mind while taking the rest of the survey: “Dietary supplements, as defined by the Dietary Supplement Health Education Act of 1994, are (a) Designed to complement or supplement the diet; (b) Made up of one of more dietary ingredients, which includes vitamins, minerals, herbs, amino acids, and botanicals; (c) Designed for oral consumption through pill, capsule, tablet, powder, or liquid; and (d) Labeled as a dietary supplement” (National Institute of Health, 2006). In addition to the DSHEA’s definition of dietary supplements, examples of dietary supplements from the four major dietary supplement categories were included to give participants further clarity about what
commonly used products are considered dietary supplements. The four examples given in the
survey were as follows: (a) Examples of vitamin supplements include, but are not limited to
vitamin A, vitamin B, and vitamin E; (b) Examples of mineral supplements include, but are not
limited to, calcium, iron, and zinc; (c) Examples of herbal and botanical supplements include, but
are not limited to, ginseng, flax seed oil, green tea, Echinacea, St. John’s Wort, and garlic; and
(d) Examples of amino acid supplements include, but are not limited to, creatine, glutamine, and
protein (see Appendix D).

**Attitudes.** The attitudes construct was examined using 11 semantic differential items
adapted from Jackson, Smith and Conner (2003) and Smith et al. (2007). The first three attitude
questions were adapted from Jackson, Smith, and Conner (2003) and asked participants to
respond on a semantic differential scale to the statement: *My consumption of dietary supplements
would be ______:* (a) extremely bad—extremely good; (b) extremely beneficial—extremely
harmful (reverse-coded); (c) extremely enjoyable—extremely unenjoyable (reverse-coded). The
final eight attitude items were adapted from Smith et al. (2007) and asked participants to respond
on a semantic differential scale to the statement: *For me, taking dietary supplements in the next
month would be ______:* (a) unpleasant—pleasant; (b) good—bad (reverse-coded); (c)
negative—positive; (d) favorable—unfavorable (reverse-coded); (e) wise—foolish (reverse-
coded); (f) beneficial—harmful (reverse-coded); (g) unenjoyable—enjoyable; (f) satisfying—
unsatisfying (reverse-coded). A high score on the semantic differential scale indicated
individuals’ positive attitudes toward taking dietary supplements, and a low score indicated
individuals’ negative attitudes toward taking dietary supplements. The alpha reliability for the
attitudes scale was .95 (M = 50.63, SD = 13.78) [see Appendix E].

**Subjective Norms.** The subjective norms variable was measured using six semantic
differential items adapted from Ajzen (2002), Terry, Hogg, and White (1999), and Smith et al.
(2007). The six items intended to measure both injunctive and descriptive norms and were as
follows: (a) How many people who are important to you would take/consume dietary
supplements in the next month? (none—all); (b) How likely is it that people who are important to
you take/consume dietary supplements in the next month? (very likely—very unlikely) [reverse-
coded]; (c) Do the people who are important to you approve/disapprove of you taking/consuming
dietary supplements in the next month? (approve—disapprove) [reverse-coded]; (d) How many
people who are important to you would support you taking/consuming dietary supplements in the
next month? (none—all); (e) Among the people who are important to you, how much agreement would there be that taking/consuming dietary supplements in the next month is a good thing to do? (a great deal—none at all) [reverse-coded]; and (f) Most people who are important to me think I __________ take/consume dietary supplements in the next month. (should—shouldn’t) [reverse-coded]. A high score on the semantic differential scale indicated participants’ high subjective norms (participants were more heavily influenced by their referent groups with regards to supplement use), and a low score indicated participants’ low subjective norms (participants were less influenced by their referent groups with regards to supplement use). The alpha reliability for the subjective norms scale was .85 (M = 25.29, SD = 7.58) [see Appendix F].

Perceived Behavioral Control. The perceived behavioral control variable was measured using five semantic differential items adapted from Ajzen (2002), Jackson, Smith, and Conner (2003), and Smith et al. (2007). Participants responded to the following five questions using a semantic differential scale: (a) If I wanted to, it would be easy for me to take/consume dietary supplements in the next month (strongly disagree—strongly agree); (b) How much control do you have over whether you take/consume dietary supplements in the next month (absolutely no control—complete control); (c) The number of events outside my control that could prevent me from taking/consuming dietary supplements in the next month is (very few—numerous) [reverse-coded]; (d) I feel in complete control of whether I consume dietary supplements in the next month (completely true—completely false) [reverse-coded]; and (e) For me to consume dietary supplements in the next month would be (very easy—very difficult) [reverse-coded]. A high score on the semantic differential scale indicated participants’ high perceived behavioral control (individuals had more control over their ability to consume dietary supplements) and a low score indicated participants’ low perceived behavioral control (individuals felt little or no control over their ability to consume dietary supplements). The alpha reliability for the perceived behavioral control scale was .71 (M = 29.41, SD = 5.04) [see Appendix G].

Self-Identity. The self-identity construct was measured by 11 semantic differential items adapted from Fekadu and Kraft (2001), Jackson, Smith, and Conner (2003), Smith et al. (2007), Sparks and Guthrie (1998), and Terry, Hogg, and White (1999). The 11 self-identity questions were as follows: (a) I think of myself as someone who is very concerned with dietary supplement use (disagree strongly—agree strongly); (b) I think of myself as the sort of person who is concerned about the long-term effects of supplement use (agree strongly—disagree strongly)
Supplement use is something I rarely even think about (disagree strongly—agree strongly) [reverse-coded]; (e) I really do not have any clear feelings about dietary supplement use (disagree strongly—agree strongly) [reverse-coded]; (f) I would feel a loss if I were forced to give up my dietary supplement use (completely false—completely true); (g) To engage in dietary supplement use is an important part of who I am (no, definitely not—yes, definitely); (h) I am not the type of person to engage in dietary supplement use (strongly disagree—strongly agree) [reverse-coded]; (i) I am not the type of person oriented to use dietary supplements (strongly agree—strongly disagree); (j) I consider myself a typical user of dietary supplements (definitely not—definitely do); (k) I see myself as a typical user of dietary supplements (definitely do—definitely do not) [reverse-coded]. A high score on the semantic differential scale indicated participants’ high self-identity as dietary supplement users, and a low score indicated participants’ low self-identity as supplement users. The alpha reliability for the self-identity scale was .83 ($M = 38.21$, $SD = 11.94$) [see Appendix H].

Past Behavior. The past behavior variable was examined using five items which were both quantitative and qualitative in nature. The past behavior section included three items suggested by Ajzen (2002). The first measure was an open-ended question: “On how many days in the course of the past month have you taken/consumed dietary supplements?” The second measure was a self-report in which participants responded on a 7-point Likert-type scale to the question: “In the course of the past month, how often have you consumed/taken dietary supplements?” Participants chose from seven responses numbered 1-7 (1 = everyday, 2 = almost everyday, 3 = most days, 4 = on about half the days, 5 = a number of times, but less than half, 6 = a few times, 7 = never). In the third measure, participants estimated their dietary supplement use with a semantic differential scale in response to the question: “Please estimate how often you have consumed dietary supplements in the past month (never—every day).” The fourth item asked participants to record their current supplement use with a 7-point Likert-type scale and asked: “How many supplements are you currently taking?” The responses were numbered 1-7, with each number corresponding to the number of supplements participants were currently taking. The seventh response was listed as “7+” to allow participants a choice if they were currently taking a large number of supplements not captured with the 7-point scale. The fifth
item asked participants to respond to the open-ended question: “What types of dietary supplements have you taken within the past year?” (see Appendix I).

The second and third items were combined to create a quantitative measure of past behavior to use in the statistical analysis (with item No. 2 reverse-coded), and the alpha reliability of the past behavior measure was .98 ($M = 5.36$, $SD = 4.18$). A high score on the scale indicated individuals’ high levels of past supplement use, while a low score indicated individuals’ low levels of past dietary supplement use.

**Behavioral Intention.** The behavioral intention variable was measured using five semantic differential items adapted from Jackson, Smith, and Conner (2003) and Ajzen (2002). Participants responded to the following five questions about their anticipated dietary supplement use over the next month: (a) I intend to take/consume dietary supplements during the next month (definitely do not—definitely do); (b) I will try to take/consume dietary supplements during the next month (strongly agree—strongly disagree) [reverse-coded]; (c) I intend to increase the frequency of my dietary supplement use during the next month (unlikely—likely); (d) I intend to increase the number (i.e., different types) of dietary supplements I take/consume during the next month (unlikely—likely); and (e) I expect to take/consume dietary supplements during the next month (unlikely—likely). A high score on the semantic differential scale indicated individuals’ strong intentions to consume dietary supplements, and a low score indicated individuals’ weak intentions to consume dietary supplements. The alpha reliability estimate for the behavioral intention scale was .87 ($M = 16.76$, $SD = 8.37$) [see Appendix J].
Chapter 3: Results

Data Analysis Overview

The first set of analyses tested the standard TPB model — attitudes, subjective norms, and perceived behavioral control (PBC) — in relation to intention to take dietary supplements. First, correlations between the TPB constructs and behavioral intention were measured. The three TPB constructs were then examined with regards to predicting individuals’ intentions to use dietary supplements over the next month. The second set of analyses examined the role of self-identity and past behavior within the TPB model. First, correlations between the three TPB constructs, self-identity, past behavior, and behavioral intention were measured. Then, the self-identity and past behavior variables were examined within the TPB model to determine the constructs’ ability to predict individuals’ behavioral intentions and capture additional variance above and beyond the standard TPB constructs. Means, standard deviations, correlations, and alpha coefficients of the TPB predictor variables, self-identity, past behavior and the criterion variable are presented in Table 1.

<table>
<thead>
<tr>
<th>Variable</th>
<th>M</th>
<th>SD</th>
<th>1(AT)</th>
<th>2(SN)</th>
<th>3(PBC)</th>
<th>4(SI)</th>
<th>5(PB)</th>
<th>6(BI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.) Attitudes</td>
<td>4.60</td>
<td>1.25</td>
<td>(.95)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.) Subjective Norms</td>
<td>4.22</td>
<td>1.26</td>
<td>.75***</td>
<td>(.85)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.) PBC</td>
<td>5.88</td>
<td>1.01</td>
<td>.28***</td>
<td>.28***</td>
<td>(.71)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.) Self-Identity</td>
<td>3.47</td>
<td>1.09</td>
<td>.52***</td>
<td>.41***</td>
<td>.02</td>
<td>(.83)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.) Past Behavior</td>
<td>2.68</td>
<td>2.09</td>
<td>.60***</td>
<td>.52***</td>
<td>.28***</td>
<td>.68***</td>
<td>(.98)</td>
<td></td>
</tr>
<tr>
<td>6.) Behavioral Intention</td>
<td>3.35</td>
<td>1.67</td>
<td>.68***</td>
<td>.63***</td>
<td>.17</td>
<td>.61***</td>
<td>.63***</td>
<td>(.87)</td>
</tr>
</tbody>
</table>

Note: Reliabilities are in boldface on the diagonal
AT = Attitudes; SN = Subjective Norms; PBC = Perceived Behavioral Control; SI = Self-Identity; PB = Past Behavior; BI = Behavioral Intention; *** p < .001, * p < .05
Correlations Among TPB Variables

Pearson correlations were run to analyze the relationship among the three TPB predictor variables, which were attitudes, subjective norms, and PBC. As shown in Table 1, positive and statistically significant correlations were found between the three standard TPB constructs. A strong correlation was found between attitudes and subjective norms ($r = .75, p < .001$), a weak correlation was found between attitudes and PBC ($r = .28, p < .001$), and a weak correlation was found between subjective norms and PBC ($r = .28, p < .001$).

When examining the Pearson correlations between the three TPB predictor variables and the criterion variable (behavioral intention), low to moderately strong positive and statistically significant correlations were found for each of the three predictor variables. Moderately strong correlations were found between attitudes and behavioral intention ($r = .68, p < .001$) and subjective norms and behavioral intention ($r = .63, p < .001$), and a weak correlation was found between PBC and behavioral intention ($r = .17, p < .05$). Thus, H1 was supported.

Test of the Theory of Planned Behavior

A multiple linear regression was conducted to determine the effectiveness of the standard TPB constructs (attitudes, subjective norms, PBC) in predicting individuals’ intentions to use dietary supplements over the next month. Attitudes, subjective norms, and PBC were entered into the model as predictor variables, and individuals’ intentions to use dietary supplements over the next month was entered as the dependent variable. Both attitudes ($p < .001$) and subjective norms ($p < .001$) emerged as significant predictors of behavioral intention, but PBC ($p > .05$) did not emerge as a statistically significant predictor. Thus, the multiple linear regression was rerun with attitudes and subjective norms entered as independent variables and individuals’ intentions to use dietary supplements over the next month entered as the dependent variable. The PBC construct was excluded from the second regression model because of the previously mentioned non-significant results.

The attitudes and subjective norms constructs accounted for 51% of the variance in individuals’ behavioral intentions, $F(2, 195) = 104.06, p < .001$. Examining the beta weights for the two predictor variables revealed significant independent effects for both attitudes and subjective norms. In line with TPB, respondents with more positive attitudes toward supplement use had stronger intentions to use dietary supplements over the next month, ($\beta = .47, t(195) = 6.83, p < .001$). Similarly, respondents who were more strongly influenced by important others
and had higher subjective norms demonstrated stronger intentions to use dietary supplements over the next month, \((\beta = .30), t(195) = 3.90, p < .001\). Therefore, because attitudes and subjective norms independently predicted individuals’ intentions to use dietary supplements over the next month and PBC was not a significant predictor of behavioral intention, H2 was partially supported (see Table 2).

<table>
<thead>
<tr>
<th>Prediction of Intention</th>
<th>R</th>
<th>(R^2)</th>
<th>(R^2)Δ</th>
<th>(F_{\text{change}})</th>
<th>(\beta)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attitudes</td>
<td>.71</td>
<td>.52</td>
<td>.51</td>
<td>104.10***</td>
<td>.47***</td>
</tr>
<tr>
<td>Subjective Norms</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.30***</td>
</tr>
</tbody>
</table>

Note: *** \(p < .001\)

**Correlations Among Self-Identity and Past Behavior**

A Pearson correlation was run between self-identity and past behavior to examine the relationship between the two variables. As shown in Table 1, a moderately strong positive correlation was found between self-identity and past behavior \((r = .68, p < .001)\). When examining the Pearson correlations between self-identity, past behavior, and the criterion variable (behavioral intention), moderately strong positive and statistically significant correlations were found. Moderately strong correlations were found between self-identity and behavioral intention \((r = .61, p < .001)\) and past behavior and behavioral intention \((r = .63, p < .001)\). Thus, H3 was supported.

**Test of the Revised Theory of Planned Behavior**

In order to determine the independent predictive power of self-identity and past behavior within the TPB model, a hierarchical multiple regression was run. This regression helped determine if self-identity and past behavior captured additional variance in behavioral intention not accounted for by TPB’s standard constructs. The three standard TPB constructs were entered as independent variables at Step 1 of the regression (attitudes, subjective norms, and PBC), and self-identity and past behavior were entered as predictor variables at Step 2 and Step 3, respectively. The interaction term between self-identity and past behavior was the final independent variable entered at Step 4. Behavioral intention was entered into the model as the dependent variable. The regression yielded statistically significant results for all constructs.
except for PBC \((p > .05)\). Thus, the hierarchical multiple regression was rerun with attitudes and subjective norms entered as independent variables at Step 1, self-identity entered at Step 2, past behavior entered at Step 3, and the interaction term entered at Step 4. Individuals’ intentions to use dietary supplements over the next month remained as the dependent variable. The PBC construct was excluded from the regression model because of the previously mentioned non-significant results.

The inclusion of attitudes and subjective norms at Step 1 accounted for 53% of the variance in intention, \(F(2, 180) = 104.18, p < .001\). Inspection of the beta weights revealed significant independent effects for both attitudes, \((\beta = .52), t(180) = 6.76, p < .001\), and subjective norms, \((\beta = .26), t(180) = 3.41, p < .001\). Similar to the results found with the multiple linear regression, individuals who had more positive attitudes toward taking supplements were more likely to use supplements over the next month, and individuals who were more strongly influenced by their referent groups with supplement use were more likely to use supplements over the next month (see Table 3).

<table>
<thead>
<tr>
<th>Step 1</th>
<th>Attitudes</th>
<th>Subjective Norms</th>
<th>.73</th>
<th>.54</th>
<th>.53</th>
<th>104.18***</th>
<th>.34***</th>
<th>.21**</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 2</td>
<td>Self-Identity</td>
<td></td>
<td>.77</td>
<td>.60</td>
<td>.06</td>
<td>27.00***</td>
<td>.42***</td>
<td></td>
</tr>
<tr>
<td>Step 3</td>
<td>Past Behavior</td>
<td></td>
<td>.78</td>
<td>.61</td>
<td>.01</td>
<td>5.13***</td>
<td>.78***</td>
<td></td>
</tr>
<tr>
<td>Step 4</td>
<td>Past Behavior x Self-Identity</td>
<td></td>
<td>.80</td>
<td>.62</td>
<td>.03</td>
<td>11.87***</td>
<td>-.79**</td>
<td></td>
</tr>
</tbody>
</table>

Weights provided are those found in the final step of the analysis

*** \(p < .001\), ** \(p < .01\)

The addition of self-identity at Step 2 was associated with a statistically significant increase in the variance explained, \((R^2 \Delta = .06), F(1, 179) = 27.00, p < .001\). The inclusion of self-identity explained 6% additional variance in behavioral intention. Examining the construct’s beta weight, self-identity served as a significant and independent predictor of supplement use.
such that individuals who thought of themselves as typical dietary supplement users had stronger intentions to use dietary supplements over the next month, ($\beta = .29$), $t(179) = 5.20, p < .001$.

The addition of past behavior at Step 3 was associated with a very small but statistically significant increase in the variance explained, ($R^2 \Delta = .01$), $F(1, 178) = 5.13, p < .001$. The inclusion of past behavior explained 1% additional variance in behavioral intention. Examining the construct’s beta weight, past behavior served as a significant and independent predictor of supplement use such that individuals who had taken supplements in the past exhibited stronger intentions to take dietary supplements over the next month, ($\beta = .16$), $t(178) = 2.27, p < .05$.

The interaction term between self-identity and past behavior was entered into the regression model at Step 4. The addition of the interaction term at Step 4 was associated with a statistically significant increase in the variance explained ($R^2 \Delta = .03$), $F(1, 177) = 11.87, p < .01$. The inclusion of the interaction term explained 3% additional variance in behavioral intention.

At the final step, attitudes, ($\beta = .34$), $t(177) = 4.52, p < .001$, subjective norms, ($\beta = .21$), $t(177) = 3.04, p < .01$, self-identity, ($\beta = .42$), $t(177) = 4.75, p < .001$ and past behavior, ($\beta = .78$), $t(177) = 4.05, p < .001$ remained as statistically significant independent predictors of intention. The final model accounted for 62% of the variance in behavioral intention, $F(5, 177) = 61.10, p < .001$. Considering that both self-identity and past behavior served as statistically significant and independent predictors of intention to use dietary supplements and that an additional 7% of the variance was captured with the addition of the two constructs, H4 was supported.

**The Interplay of Self-Identity and Past Behavior**

In order to examine the interaction between past behavior and self-identity, a median split technique was first used to create two dichotomous groups for low past behavior ($M < 2.0$) and high past behavior ($M \geq 2.0$). After splitting the sample in separate groups, two regression analyses were performed to compare individuals with low and high past behavior. Attitudes and subjective norms were entered as the independent variables at Step 1 (PBC was excluded because of the non-significant results in previous regressions), and self-identity was entered into the model at Step 2. Behavioral intention was entered as the dependent variable.

At low levels of past behavior, the standard TPB model accounted for 33% of the variance in intention, $F(2, 82) = 19.74, p < .001$, with attitudes ($\beta = .34$), $t(82) = 2.68, p < .01$ and subjective norms ($\beta = .28$), $t(82) = 2.26, p < .05$ emerging as significant predictors of intention. The inclusion of self-identity at Step 2 accounted for 9% additional variance with
intention, \( F(1, 81) = 12.55, p < .001 \). At Step 2, attitudes (\( \beta = .29 \), \( t(81) = 2.42, p < .05 \))
subjective norms (\( \beta = .32 \), \( t(81) = 2.70, p < .01 \)) and self-identity (\( \beta = .30 \), \( t(81) = 3.54, p < .01 \))
all emerged as significant predictors of intention (see Table 4).

<table>
<thead>
<tr>
<th>Predictor</th>
<th>R</th>
<th>( R^2 )</th>
<th>( R^2 \Delta )</th>
<th>( F_{\text{change}} )</th>
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<tbody>
<tr>
<td>Step 1</td>
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<tr>
<td>Attitudes</td>
<td>.57</td>
<td>.33</td>
<td>.33</td>
<td>19.37***</td>
<td>.29*</td>
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<tr>
<td>Subjective Norms</td>
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<td></td>
<td>.32**</td>
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<td>Step 2</td>
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<td></td>
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<tr>
<td>Self-Identity</td>
<td>.65</td>
<td>.42</td>
<td>.09</td>
<td>27.00***</td>
<td>.30**</td>
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</tbody>
</table>

Weights provided are those found in the final step of the analysis
*** p < .001, ** p < .01, * p < .05

At high levels of past behavior, the standard TPB model accounted for 24% of the
variance in intention, \( F(2, 95) = 15.36, p < .001 \), with attitudes (\( \beta = .37 \), \( t(95) = 3.53, p < .01 \))
emerging as the only significant predictor of intention. The inclusion of self-identity at Step 2
accounted for 2% additional variance with intention, \( F(1, 94) = 2.73, p < .001 \). At Step 2,
attitudes (\( \beta = .31 \), \( t(94) = 2.81, p < .01 \)) emerged as the only significant predictor of intention.
Subjective norms (\( p > .05 \)) and self-identity (\( p > .05 \)) failed to emerge as significant predictors
(see Table 5). Thus, because the TPB model accounted for 33% of the variance in intention at
lower levels of past behavior and 24% of the variance in intention at higher levels of past
behavior, H5 was supported.

<table>
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<tr>
<th>Predictor</th>
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<th>( R^2 \Delta )</th>
<th>( F_{\text{change}} )</th>
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<td>Attitudes</td>
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<td>.24</td>
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<tr>
<td>Self-Identity</td>
<td>.52</td>
<td>.27</td>
<td>.02</td>
<td>2.73***</td>
<td>.16</td>
</tr>
</tbody>
</table>

Weights provided are those found in the final step of the analysis
*** p < .001, ** p < .01, * p < .05
The Influence of Health Orientation

A multiple linear regression analysis was conducted to determine the influence of health orientation on individuals’ intentions to use supplements beyond the standard TPB constructs (attitudes, subjective norms, PBC). The three standard TPB variables and the three dimensions of the health orientation scale were entered into the model as predictor variables, and individuals’ intentions to use dietary supplements over the next month was entered as the dependent variable. The regression produced statistically significant results for attitudes ($p < .001$) and subjective norms ($p < .001$), but PBC ($p > .05$) was not a significant predictor. In addition, none of the three health orientation dimensions — value own health ($p > .05$), motivation to avoid unhealthiness ($p > .05$), and motivation to maintain healthiness ($p > .05$) — emerged as significant predictors. Considering the non-significant results for all three dimensions of health orientation, H6 was not supported.
Chapter 4: Discussion

Research Findings

This present research had three main goals. First, this study examined the validity of TPB as a theoretical model for understanding and predicting individuals’ intentions to use dietary supplements. This study’s results strongly support TRA’s effectiveness in predicting individuals’ intentions to use supplements over the next month, as attitudes and subjective norms both emerged as significant predictors of behavioral intention. PBC did not emerge as a statistically significant predictor of behavioral intention, thus demonstrating that TRA, rather than TPB, was a better theoretical fit with this sample (college students at a Midwestern University) and this particular health behavior (dietary supplement use).

Second, this research examined the addition of two variables to the TPB model — self-identity and past behavior — and their ability to predict intentions to use supplement and capture additional variance not accounted for by the standard TPB constructs. This research found that both self-identity and past behavior emerged as significant and independent predictors of behavioral intention and accounted for a total of 7% additional variance in behavioral intention. Beyond TPB’s standard constructs, self-identity accounted for 6% of the additional variance in behavioral intention and past behavior captured 1% additional variance. Although the additional variance captured by the two constructs was not overwhelming, the results demonstrated the ability of self-identity and past behavior to improve TPB’s predictive power.

Third, this study examined the interplay between self-identity and past behavior, as previous research demonstrated disparate relationships between the two constructs and their influence on behavioral intention. Although TPB research with blood donation (Chang, Piliavin, & Callero, 1988) found that self-identity more strongly predicted behavioral intention at higher levels of past behavior, this study’s results showed that with dietary supplement use, the opposite relationship was present. Consistent with TPB research concerning preferred brand beer purchasing (Smith et al., 2007) and household recycling (Terry, Hogg, & White, 1999), this study found that self-identity was a stronger predictor of behavioral intention at lower levels of past behavior, rather than at higher levels. These results suggest that when a behavior such as supplement use is constantly repeated, it likely becomes habitual and less a salient part of individuals’ self-identity.
The findings of this present study provide support for the effectiveness of TRA, rather than TPB, in predicting college students’ intentions to use dietary supplements. In support of Hypothesis 1, the results of the Pearson correlations demonstrated statistically significant relationships between attitudes, subjective norms, PBC, and behavioral intention but in partial support of Hypothesis 2, only attitudes and subjective norms emerged as independent predictors of behavioral intention. These results indicate that individuals’ attitudes and perceived social pressures combined to influence intention, but individuals’ perceived levels of control over taking supplements did not significantly impact intentions. Even with PBC failing to reach statistical significance, attitudes and subjective norms accounted for 51% of the variance in behavioral intention, which is larger than the 37% average amount of variance found in Armitage and Conner’s (2001) meta-analysis of 185 studies using the TPB framework. Although TPB has effectively predicted behavioral intention across a wide-range of health behaviors (Godin & Kok, 1996), the findings from this study indicated that TRA was a more effective theoretical model when predicting college students’ intentions to use dietary supplements.

In line with past research (Armitage & Conner, 2001; Godin & Kok, 1996), the subjective norms variable emerged as a weaker predictor of intention than attitudes. This finding highlights the fact that attitudes toward supplement use, rather than referent group influence, has a stronger impact on college students’ intentions to consume supplements. From a communication perspective, this implies that health communicators wanting to persuade college students to use dietary supplements should craft persuasive messages aimed at modifying individuals’ belief strengths and belief evaluations toward consuming specific supplements. For example, when considering individuals’ belief strengths, health communicators wanting to persuade college students to take a daily multivitamin should craft persuasive messages that increase college students’ certainty that taking a daily multivitamin would improve their overall health. In addition, if health communicators want to appeal to college students’ belief evaluations toward taking a daily multivitamin, they should craft persuasive messages that portray multivitamin consumption as a positive health behavior. Although this study indicated that health communicators might find limited success in creating persuasive messages that appeal to individuals’ normative beliefs and their motivation to comply with salient others, persuasive messages would likely be more effective if aimed at modifying college students’ attitudes, and more specifically their belief strengths and belief evaluations toward supplement use.
Although this study demonstrated that TRA serves as an effective theoretical model for predicting individuals’ intentions to use supplements, it was necessary to examine why PBC did not reach statistical significance and failed to independently predict intention, which is in direct contrast to TPB research on consumer behaviors (Smith et al., 2007; Walsh & White, 2007) and health behaviors (Godin & Kok, 1996; Sparks & Shepherd, 1992). It is possible that this result occurred because the sample did not perceive many barriers to their supplement use. Participants’ mean score for PBC was nearly 6.0 ($M = 5.89$), and considering the small amount of variance with this sample, it is possible that the majority of the participants had high levels of PBC and did not perceive many barriers (i.e., lack of money or lack of access to supplements) to their supplement use. With regards to students’ lack of money, the demographic of the sampled school is predominantly upper-middle class, and it is plausible that the participants did not lack the funds necessary to purchase supplements. It is possible that if this study were replicated with participants from a lower-income bracket, PBC might have been a statistically significant predictor of intention. In addition, the sampled students reside in a town with numerous retail outlets that sell supplements, including a General Nutrition Center (GNC) specifically geared toward supplement sales. Thus, similar to the cost issue, it is plausible that this sample had sufficient access to supplements and that lack of access was a nonexistent barrier to participants’ supplement consumption.

It also is likely that PBC did not reach statistical significance because the questions used in the TPB survey examined only participants’ external control factors and neglected to measure their internal control factors. According to Ajzen (1991), individuals’ perceived levels of PBC depend on external factors such as money or access and internal factors such as information, emotions, or compulsions. However, it is possible that the TPB questionnaire tapped only the external factors. Reviewing the five PBC questions used in the survey, they could be interpreted by participants as asking only about their perceived external barriers. The five items used to measure PBC were: (a) If I wanted to, it would be easy for me to take/consume dietary supplements in the next month; (b) How much control do you have over whether you take/consume dietary supplements in the next month; (c) The number of events outside my control that could prevent me from taking/consuming dietary supplements in the next month is; (d) I feel in complete control of whether I consume dietary supplements in the next month; and (e) For me to consume dietary supplements in the next month would be _____. The items contain
only vague references to internal factors (i.e., “I feel in complete control …”) but overt references to external factors (i.e., “The number of events outside of my control …”). In order to measure the internal factors that contribute to individuals’ perceived levels of PBC, future TPB research should consider including items that tap into respondents’ knowledge and emotions about health behaviors (i.e., “Do you feel you have enough information to make an informed decision about engaging in …”). It is likely that including items intended to measure internal factors, such as knowledge, emotions, or compulsions, would impact respondents’ scores for PBC.

A small body of TPB research supports the contention that the standard PBC measurement only accounts for external control factors and fails to tap into internal factors that might prevent individuals from engaging in behaviors. Some researchers have argued that instead of PBC, a measure of self-efficacy should be included in the TPB model to account for internal factors that might impact intention. Self-efficacy is defined as individuals’ perceptions about the ease or difficulty of performing a behavior (Povey et al., 2001), and Armitage and Conner (2001) believe that a measure of self-efficacy should be included because “self-efficacy is more concerned with the cognitive perceptions of control based on internal factors, whereas perceived behavioral control reflects more general, external factors” (p. 476). Additional support for this viewpoint includes research by de Vries, Dijkstra, and Kuhlman (1988), who advocated for measuring self-efficacy instead of PBC with the TPB model, and Dzewaltowski, Noble, and Shaw (1990), who found that self-efficacy, rather than PBC, directly impacted individuals’ behaviors in the TPB framework. The results of these studies provide some support for the theoretical distinction between self-efficacy and PBC.

However, Ajzen (1991) posited that self-efficacy and PBC were interchangeable and not theoretically distinct constructs, and his research implies that PBC can be separated into two distinct components of self-efficacy beliefs and perceived control over the behavior (Povey et al., 2000). Based on Ajzen’s (1991) conception of PBC, it could be argued that the two components of PBC are self-efficacy, which is individuals’ perceptions of the ease or difficulty of performing a behavior, and perceived control, which is the extent to which individuals believe a behavior is within or beyond their control. However, more recent research from Povey et al. (2000) and Armitage and Conner (2001) disputes the belief that self-efficacy and PBC are simply two parts of the same construct. When using TPB to examine dietary change, Povey et al. (2000) examined
self-efficacy and perceived control and found that the “perceived control component was consistently less predictive of behavior than was self-efficacy, from which it may be proposed that the predictive ability of the theory (TPB) may be improved by replacing the PBC component with that of self-efficacy” (p. 134-5). Armitage and Conner (2001) discovered that although self-efficacy and PBC were both effective predictors of intention and behavior, self-efficacy explained more variance in intention than PBC. Nonetheless, Povey et al. (2000) also noted that PBC’s lack of predictive ability may result from low construct validity and be impacted by how the questions about ease and control are interpreted by participants. It may be useful for future researchers to include measures of self-efficacy and PBC to test the two constructs’ predictive abilities, and future researchers should continue to examine how PBC is operationalized to address the variable’s issues with construct validity.

Although participants’ open-ended responses were not fully analyzed, a cursory reading of their responses supports the notion that the PBC items were unable to tap into individuals’ internal control factors. In this study, there were numerous respondents that reported high levels of PBC but stated that they did not consume supplements because of their lack of knowledge about supplements and their fear of supplements’ possible negative health effects. When responding to the open-ended question “Please write down any difficulties, obstacles, or problems you encounter which impact your ability to consume/take dietary supplements,” a number of participants cited external barriers such as cost (N = 36), but a greater number of respondents indicated that their main barriers were internal factors (N = 48), including lack of knowledge about supplements (N = 12) and the potential for supplements’ negative health effects (N = 36). One participant who refrained from supplement use because of a lack of proper knowledge stated, “I think the main issue is that I am not well-informed about the different diet supplements.” Another echoed this sentiment and said, “It is too much work to find out what is the most effective and what goes together best.” When examining the impact of supplements’ negative side effects on intention, one participant stated, “I know they are unhealthy and have bad side effects,” while another wrote, “It is impossible to know any interactions because you do not know if what it says on the label is really what it is.” In helping to explain the non-significant data, it is possible that a large portion of the participants felt they had control over external factors that could potentially impact supplement use (and thus reported their perceptions of high
PBC), when in reality they had lower levels of PBC because the measurement failed to account for their internal barriers to supplement use.

Participants’ open-ended responses about barriers to their supplement consumption have important implications for health communicators. Considering that nearly one quarter of the surveyed participants expressed hesitation to take supplements because of lack of knowledge or possible negative side effects, health campaigns directed at persuading individuals to consume supplements should consider educating consumers about the positive and negative aspects of supplements. It is true that supplements may contain ingredients not listed on the label (International Olympic Committee Medical Commission, 2003) and can interact with prescription drugs (Halsted, 2003), but there also are many positive health outcomes associated with supplement use. Educating targeted demographics about specific supplements, their uses, and their outcomes might prove beneficial to health communicators and help decrease the possibility of internal barriers preventing individuals from taking supplements.

The second aim of this study was to investigate the roles of self-identity and past behavior in predicting dietary supplement use by incorporating measures for both constructs into the TPB model. By including measurements for these constructs in addition to the three standard TPB variables, support for Hypotheses 3 and 4 was found. Correlations between self-identity and past behavior demonstrated that the two variables were strongly and positively related, and the addition of the two variables to the TPB model accounted for an extra 7% of the variance in intention above and beyond the standard TPB constructs. With regards to the independent predictive power of self-identity, the inclusion of self-identity in the TPB model accounted for 6% additional variance in behavioral intention. This result is consistent with previous studies that found the inclusion of a self-identity measure improved TPB’s ability to predict intention with health and consumer behaviors (Sparks and Shepherd, 1992; Terry, Hogg, & White, 1999; Walsh & White, 2007). This present study also found that self-identity, when predicting dietary supplement use, had a stronger predictive power than what has been reported in past TPB research. According to Conner and Armitage (1998), their examination of past studies with TPB and self-identity revealed, “On average, self-identity accounts for 1% of additional variance in intention over and above TPB variables” (p. 1446). In this study, 5% more than the average variance found in Conner and Armitage’s (1998) meta-analysis was captured by the addition of the self-identity construct.
Self-identity’s position as a significant determinant of intention is consistent with past TPB research predicting consumer and health behaviors. As Conner and Armitage (1998) stated, “It is reasonable to assume that there are certain behaviors for which self-identity will be an important determinant of intentions” (p. 1446), and the 6% additional variance accounted for in this study is similar to the results found with mobile phone use (Walsh and White, 2007) and purchasing preferred beer brands (Smith et al., 2007). In the aforementioned studies, self-identity captured an additional 5% additional variance with mobile phone use (Walsh & White, 2007) and 12% additional variance with beer purchasing (Smith et al. 2007). In previous studies concerning health behaviors, self-identity captured 4% additional variance when predicting intention to consume organically grown vegetables (Sparks & Shepherd, 1992) and 2% additional variance when predicting intention to exercise (Jackson, Smith, & Conner, 2003). Therefore, based on the findings of this study, which are consistent with past TPB research, self-identity may be a worthwhile variable to include in the TPB model when examining consumer and health behaviors.

Researchers have debated the benefits of including self-identity in the TPB model and questioned whether it overlaps with other TPB constructs such as attitudes or past behavior (Fekadu & Kraft, 2001). However, this research demonstrated that when controlling for the standard TPB constructs and past behavior, self-identity still made an independent contribution to predicting behavioral intention. It is necessary to mention that self-identity and past behavior were strongly correlated, which suggests that self-identity and past behavior have similar effects on behavioral intention. Self-identity and attitudes also were moderately correlated, but the correlation was not as strong as relationship between self-identity and past behavior.

This study’s results, which found that self-identity was an independent predictor of dietary supplement use, also speak to the utility of the 11-item self-identity scale used in this study. By combining the self-identity measures from five past TPB studies (Fekadu & Kraft, 2001; Jackson, Smith, & Conner, 2003; Smith et al., 2007; Sparks & Guthrie, 1998; Terry, Hogg, & White, 1999), this research created a valid and reliable scale that adds to the body of self-identity literature. The reliability of the 11-item scale used in this study (alpha reliability was .83) was a drastic improvement over past TPB studies that examined the addition of self-identity, including Smith et al. (2007), which found an alpha reliability of .69 for a 2-item measure and Fekadu and Kraft (2001), which found an alpha reliability of .43 for a 2-item measure.
Combining the self-identity measurements into one scale provides researchers with an effective tool to help assess the influence of self-identity in future TPB research.

With regards to the past behavior construct, this research found that past behavior was a statistically significant and independent predictor of intention that captured 1% additional variance in behavioral intention. This finding is consistent with past TPB research (Smith et al., 2007), and although the amount of variance captured was relatively small, the results still indicated past behavior’s ability to capture additional variance above and beyond self-identity and the standard TPB constructs. The 1% additional variance was much lower than the average of 7.2% Conner and Armitage (1998) found in their meta-analysis of 11 TPB studies that examined past behavior, but it was in line with Ajzen (1991), which reported that, across three studies, past behavior accounted for 2% additional variance and could be attributed to the effects of common method variance. Although this study’s data suggests that Ajzen’s findings are consistent with TPB and supplement use, Conner and Armitage (1998) believe that “there do appear to be good empirical and theoretical reasons to incorporate habit measures (frequency of past behavior) as predictors of behavior in the TPB” (p. 1439).

Examining participants’ responses to the open-ended question “How many days in the past month have you consumed dietary supplements,” a simple frequency count determined that the rate of consumption among this sample of college students was congruent to the national estimate for adult supplement use. The National Institute of Health (2006) reported that over 50% of American adults use dietary supplements on a regular basis, and of the 223 participants in this study, 110 reported that they had not used supplements at all in the past month, and the remaining 113 participants reported sporadic to regular consumption of dietary supplements. Twenty-one respondents indicated that they had taken dietary supplements everyday during the past month, and an additional 41 respondents indicated that they had consumed supplements 10 or more times during the past month. Thus, although past behavior accounted for only a small portion of additional variance in intention, measuring individuals’ past behavior did provide insight into the total number of participants who had previously engaged in dietary supplement use.

In addition to testing the independent predictive power of self-identity and past behavior, this research tested the interaction between the two constructs. Past TPB research has found conflicting results concerning the two variables’ interaction, but this study presented evidence
that self-identity varied depending on individuals’ levels of past behavior such that self-identity was a stronger predictor of behavioral intention at lower levels of past behavior. This result is in opposition to studies that use identity theory as a theoretical backing (Charng, Piliavin, & Callero, 1988) and is similar to more recent TPB research (Conner & McMillan, 1999; Fekadu & Kraft, 2001; Smith et al., 2007). Conner and McMillan (1999) believe this finding reflects the influence of initial experiences and their ability to strengthen individuals’ self-identity, which subsequently influences behavioral intention. Conversely, the fact that self-identity was a weaker predictor of supplement use at higher levels of past behavior suggests that, at higher levels of past behavior, intention to use supplements is more influenced by habitual reasons (i.e., dietary supplement use is a part of individuals’ daily routine) rather than cognitive processes such as self-identity.

Two additional conclusions can be drawn from the finding that the predictive power of self-identity varies depending on past behavior. First, this result suggests that self-identity and past behavior are distinct constructs. Some researchers have suggested that self-identity and past behavior are measures of the same construct (Fekadu & Kraft, 2001), but because the predictive power of self-identity was stronger at lower levels of past behavior and weaker at higher levels of past behavior, this study demonstrated that the two variables are not interchangeable and are more than likely not measures of the same construct. Second, this result suggests the formation of theoretical distinctions in the types of behaviors for which self-identity is a strong predictor of intention at low and high levels of past behavior. Considering that this study’s results were in line with preferred beer purchasing (Smith et al., 2007) and household recycling (Terry, Hogg, and White, 1999) and dissimilar from blood donation (Charng, Piliavin, & Callero, 1988), it is plausible that self-identity is a strong predictor at high levels of past behavior with behaviors that are invasive, induce some level of fear, or require more personal investment. Blood donation requires that individuals voluntarily inject a needle into their arm, and it is possible that those who donate blood feel more invested because of the behavioral requirements and self-identify accordingly. This contrasts with behaviors such as supplement use, beer purchasing, and recycling, which are non-invasive and require a minimal level of personal investment from individuals. Thus, future researchers examining the relationship between self-identity and past behavior should consider the level of invasiveness, the role of fear, and the type of personal involvement required for a behavior when hypothesizing about self-identity’s predictive power.
To better understand the interaction between self-identity and past behavior, separate regression analyses were conducted to examine the differences in intention for individuals with low and high levels of past behavior. The results from the regression analyses suggest that the importance of the TPB constructs (i.e., the influence of the constructs on behavioral intention) varies depending on individuals’ levels of past behavior. When examining individuals with low levels of past behavior, attitudes, subjective norms, and self-identity emerged as significant predictors of behavioral intention. However, when examining individuals with high levels of past behavior, only the attitudes variable was a significant predictor of behavioral intention. These findings indicate that attitudes are a consistent predictor of intention regardless of individuals’ levels of past behavior and that the influence of self-identity diminishes with the constant repetition of supplement use. Future research should continue to investigate the relationship between self-identity and past behavior to gain a more complete understanding of the two variables’ interaction and their ability to predict behaviors.

Separate from the TPB constructs and the proposed additions to the theoretical framework, this study examined health orientation and its influence on behavioral intention. Although health orientation was a global construct distinct from the narrowly focused TPB variables, a regression analysis determined that health orientation did not predict individuals’ intentions to use dietary supplements. This finding was contrary to the proposed hypothesis, which predicted that individuals’ with high health orientations would be more likely to use supplements. It is likely that this result occurred because the health orientation construct was too broad and could not account for individual preferences with supplement use. For example, the first item in the value own health dimension stated, “I work very hard to take care of my own health.” However, individuals could intend to take supplements as a perceived shortcut to maintaining their health (i.e., weight loss pills as a quick fix) and not actually work hard to take care of their own health. The same relationship holds true for the motivated to avoid unhealthiness dimension. One item in this dimension stated, “I try to avoid engaging in behaviors that undermine my physical health,” but it is plausible that even though supplements are intended to help maintain their health, individuals could avoid supplements because they do not believe supplements are healthy alternatives to diet and exercise. Lastly, in the motivated maintain healthiness dimension, individuals could be “motivated to be physically healthy” but avoid supplement use because they recognize the potential health drawbacks. Thus, the non-significant
data indicated that health orientation does not play a significant role in predicting individuals’ intentions to use supplements and that individuals with strong health orientations are not more likely to be supplement users.

Limitations

This study was not without its limitations. First, the study was conducted with a convenient sample — in this case college students in introductory communication courses — and it is reasonable to question the applicability of the results to the general population. Although the study demonstrated that the number of college students in this sample who use supplements (around 50%) was nearly the same as the number of adult supplement users nationwide, the sample was taken from a Midwestern University with less than 9% minority students and was most likely not representative of the population as a whole. Future research should strive to replicate this study with more diverse populations, which can lead to more generalizable findings. Second, this study used self-report measures to test for behavioral intention. Although steps were taken to limit the effects of response consistency effects (i.e., multi-item measures and negatively-worded items), the limitations of survey-based self-reports should still be considered. Lastly, this study measured behavioral intention rather than actual behavior. Although research has demonstrated that intention is an effective predictor of actual behavior (Fishbein & Ajzen, 1975), a longitudinal study that measures participants actual supplement use over the next month, rather than their intentions to use supplements, might prove beneficial. Future research examining supplement use should consider a longitudinal design to measure individuals’ intentions and their actual levels of behavior to gain a more accurate assessment of the influence of the TPB constructs.

Open-Ended Questions

Separate from the statistical analyses, the open-ended questions — which were not analyzed but instead reviewed in a cursory reading — generated interesting and noteworthy responses. First, the open-ended responses to the question “Give examples of what you consider to be dietary supplements,” which was answered prior to filling out the TPB survey, illustrated the impact of mass media and advertising on the dietary supplement industry. One sixth of participants responded to this question by naming specific dietary supplements (N = 32), including popular weight-loss supplements such as Alli, Trim Spa, Hydroxycut, and Slim Fast and popular weight-gain supplements including NO Explode, EAS Myoplex, and Orange Krush.
One participant stated, “I don’t know the names specifically, but they have advertisement with celebrities like Anna Nicole Smith or Carmen Electra. Advertisements like this make it seem healthy and approved by the appropriate departments.” Another respondent also touched on the influence of mass media and advertising and said, “The dietary supplements you see in the ads in magazines and on TV where people have lost weight by taking them.” Clearly the advertising campaigns of the major supplement companies are making an impression on consumers.

In addition to the open-ended questions asking participants to give examples of supplements, participants generated interesting responses to open-ended question that stated, “Please list anything else you associate with dietary supplement use.” The most surprising thing about participants’ responses to this question was their negative responses. Based on the qualitative data, it appears that numerous participants hold negative views toward dietary supplements and supplement users. Fourteen participants associated supplement use with “eating disorders,” “unhealthy eating habits,” or “low self-esteem,” while another eight participants associated supplements with “laziness” and “cheating.” Additionally, 16 participants associated dietary supplements with illegal performance-enhancing drugs and listed “steroids” or “Human Growth Hormone abuse” as their response to this question. One respondent associated supplement use with “someone who is mentally unhealthy,” and another felt that supplement use indicated a “social stigma. I always think of people who have eating behavior problems or are obsessed with their weight.” Despite the benefits that individuals can gain from appropriately taking supplements, there was a noticeable trend of individuals’ negative associations with supplement use.

**Conclusion**

The results of this study have implications for communication researchers. First, this study demonstrated the ability of TRA and its two constructs — attitudes and subjective norms — to predict dietary supplement use. This study lends support for TRA, rather than TPB, as an effective predictor of dietary supplement use with college students. However, because PBC failed to reach significance and the measure did not reflect internal barriers to supplement use, researchers should explore modifying the PBC measure to reflect internal barriers and consider the benefits of using a measure of self-efficacy in the TPB model. Second, this study found that self-identity and past behavior were significant and independent predictors of supplement use, and even though the standard TPB model is effective and parsimonious, researchers should
continue to explore the ability of additional constructs, including self-identity and past behavior, to improve the model’s predictive power. The interaction between the two constructs, where self-identity is a stronger predictor of intention at low levels of past behavior rather than at higher levels, also suggests that the two are in fact distinct constructs. Lastly, this study created an 11-item measure for self-identity that was both reliable and valid, and future researchers wishing to examine the influence of self-identity in the TPB model should consider using this self-identity scale.

Although there are many factors that influence individuals’ intentions to use dietary supplements, this study has shown that the TRA framework, as well as the self-identity and past behavior constructs, can help explain why individuals choose to consume supplements or refrain from supplement use. Because of the potential positive and negative health outcomes associated with dietary supplement use, social scientists should continue to examine this health behavior through established theoretical frameworks and explore the cognitive and situational factors that influence individuals’ health behaviors.
REFERENCES


Appendix A

Survey Introduction

This survey is concerned with your intention to use dietary supplements. For each question, please indicate the response that most clearly matches your opinion. There are no right or wrong answers, as I am interested only in your opinions. It may seem like the same question is being asked several times but using different words. I do this on purpose because no single question will perfectly measure your opinions. This survey will take 15-20 minutes to complete.

There is no place for you to type your name or student number on the questionnaire. Your responses will be completely anonymous. No one will be able to tell which questionnaire is yours. After completing the survey, you will be taken to a separate sign-in page that asks for your name, course section, and instructor name in order for you to receive class credit. This page is sent separately from your questionnaire. If you have any questions, please feel free to ask. Your participation in this research project will partially fulfill the research requirement in your communication course.

The responses you provide today are being collected with online survey software that is designed to secure your data and provide you with confidentiality. Nevertheless, despite these safeguards, there is always a remote possibility of hacking or other security breaches that could compromise the confidentiality of the information you provide. Thus, you should remember that you are free to decline to answer any question that makes you uncomfortable for any reason.

If you have questions about your rights as a participant, please contact the Office for the Advancement of Scholarship and Teaching at 513-529-3600 or via email at humansubjects@muohio.edu.

If you have any questions regarding this research project, please contact the experimenter David Kiefer at 513-529-7171 or via email at kieferdj@muohio.edu.
Appendix B

_Informed Consent_

Please read the following before consenting to participate in this survey:

1.) This research project is designed to investigate college students’ use of dietary supplements. You will be asked to answer each question while thinking about your intention to use dietary supplements over the next month.

2.) I understand that my participation is voluntary and that I have the right to withdraw from this study at any time without penalty.

3.) I understand that I can leave an answer blank and still complete the survey.

4.) The purpose of this research has been explained to me, and I understand the explanation.

5.) I understand that I have the right to have this study explained to my satisfaction upon completion of the questionnaire.

6.) I understand that the information I give in this study is anonymous. The experimenter will have no way of determining which responses are mine.

7.) I understand that the data I provide in this study may be used for secondary analysis. Again, these data will be treated in the strictest confidence. The primary researcher will not be able to identify individual responses.

8.) I understand that a copy of the research report for this study will be made available to me upon request.

9.) I understand that the responses I provide are being collected with online survey software that is designed to secure my data and provide me with confidentiality. Nevertheless, despite these safeguards, there is always a remote possibility of hacking or other security breaches that could compromise the confidentiality of the information I provide. Thus, I am free to decline to answer any question that makes me uncomfortable for any reason.

10.) I am over 18 years of age.

*Given these statements, I freely consent to participate in this research project within the Department of Communication that will partially fulfill the research requirement for COM 134/COM 135/COM 136:

   Yes  _____
   No   _____
Appendix C

Health Orientation Scale (13 items)

(1 = strongly disagree, 7 = strongly agree)

Value own health
1. I work very hard to take care of my own health.
2. Protecting my own health is one of my most important goals.
3. I really don’t worry much about my own health. R

Motivation to avoid unhealthiness
1. I do things that keep me from becoming physically healthy. R
2. I am motivated to keep myself from becoming physically unhealthy.
3. I try to avoid engaging in behaviors that undermine my physical health.
4. I really want to prevent myself from getting out of shape.
5. I am not motivated to avoid being in terrible physical shape. R

Motivation for healthiness
1. I’m motivated to be physically healthy.
2. I’m strongly motivated to devote time and effort to my physical health.
3. I lack the desire to keep myself physically healthy. R
4. It’s not really that important to me that I keep myself in top physical shape. R
5. I strive to keep myself in tip-top physical shape.

Note: R = reverse scored item
Appendix D

Open-Ended Questions (6 items)

1. In your own words, please define/describe dietary supplements.
2. Please give examples of what you consider to be dietary supplements.
3. Please write down what you think are the main advantages of consuming/taking dietary supplements.
4. Please write down what you think are the main disadvantages of consuming/taking dietary supplements.
5. Please write down any difficulties, obstacles, or problems you encounter which impact your ability to consume/take dietary supplements.
6. Please list anything else you associate with dietary supplement use.

The following is the definition of dietary supplements as outlined in the Dietary Supplement Health Education Act (DSHEA) of 1994.

Please use this definition when answering the remaining questions about dietary supplement use.

Dietary supplements, as defined by the Dietary Supplement Health Education Act of 1994, are (a) Designed to complement or supplement the diet; (b) Made up of one of more dietary ingredients, which includes vitamins, minerals, herbs, amino acids, and botanicals; (c) Designed for oral consumption through pill, capsule, tablet, powder, or liquid; and (d) Labeled as a dietary supplement.

- Examples of vitamin supplements include, but are not limited to, vitamin A, vitamin B, and vitamin E.

- Examples of mineral supplements include, but are not limited to, calcium, iron, and zinc.

- Examples of herbal and botanical supplements include, but are not limited to, ginseng, flax seed oil, green tea, echinacea, St. John’s Wort, and garlic.

- Examples of amino acid supplements include, but are not limited to, creatine, glutamine, and protein.
Appendix E

Attitudes Scale (11 items)

My consumption of dietary supplements during the next month would be ________________.

extremely bad—extremely good, extremely beneficial—extremely harmful (R), extremely enjoyable—extremely unenjoyable (rated on a 7-point scale ranging from 1 to 7)

For me, taking/consuming dietary supplements during the next month would be ________.

unpleasant—pleasant, good—bad (R), negative—positive, favorable—unfavorable (R), wise—foolish (R), beneficial—harmful (R), unenjoyable—enjoyable, satisfying—unsatisfying (R) (rated on a 7-point scale ranging from 1 to 7)

Note: R = reverse scored item
Appendix F

Subjective Norms Scale (6 items)

1. How many people who are important to you would take/consume dietary supplements in the next month? (1 = none, 7 = all)

2. How likely is it that people who are important to you take/consume dietary supplements in the next month? (1 = very likely, 7 = very unlikely) (R)

3. Do the people who are important to you approve of disapprove of taking/consuming dietary supplements in the next month? (1 = approve, 7 = disapprove) (R)

4. How many people who are important to you would support you taking/consuming dietary supplements in the next month? (1 = none, 7 = all)

5. Among the people who are important to you, how much agreement would there be that taking/consuming dietary supplements in the next month is a good thing to do? (1 = a great deal, 7 = none at all) (R)

6. Most people who are important to me think I ______________ take/consume dietary supplements in the next month. (1 = should, 7 = shouldn’t) (R)

Note: R = reverse scored item
Appendix G

Perceived Behavioral Control Scale (5 items)

1. If I wanted to, it would be easy for me to take/consume dietary supplements in the next month. (1 = strongly disagree, 7 = strongly agree)

2. How much control do you have over whether you take/consume dietary supplements in the next month? (1 = absolutely no control, 7 = complete control)

3. The number of events outside my control that could prevent me from taking/consuming dietary supplements in the next month is: (1 = very few, 7 = numerous) (R)

4. I feel in complete control of whether I take/consume dietary supplements in the next month. (1 = completely true, 7 = completely false) (R)

5. For me, to take/consume dietary supplements in the next month would be: (1 = very easy, 7 = very difficult) (R)

Note: R = reverse scored item
Appendix H

Self-Identity Scale (11 items)

1. I think of myself as someone who is very concerned with dietary supplement use. (1 = disagree strongly, 7 = agree strongly)

2. I think of myself as the sort of person who is concerned about the long-term effects of supplement use. (1 = agree strongly, 7 = disagree strongly) (R)

3. I think of myself as someone who generally thinks carefully about the health consequences of dietary supplement use. (1 = agree strongly, 7 = disagree strongly) (R)

4. Supplement use is something I rarely even think about. (1 = disagree strongly, 7 = agree strongly) (R)

5. I really do not have any clear feelings about dietary supplement use. (1 = disagree strongly, 7 = agree strongly) (R)

6. I would feel a loss if I were forced to give up my dietary supplement use. (1 = completely false, 7 = completely true)

7. To engage in dietary supplement use is an important part of who I am. (1 = no, definitely not, 7 = yes, definitely)

8. I am not the type of person to engage in dietary supplement use. (1 = disagree strongly, 7 = agree strongly) (R)

9. I am not the type of person oriented to use dietary supplements. . (1 = agree strongly, 7 = disagree strongly)

10. I consider myself a typical user of dietary supplements. (1 = definitely not, 7 = definitely do)

11. I see myself as a typical user of dietary supplements. (1 = definitely do, 7 = definitely do not) (R)

Note: R = reverse scored item
Appendix I

Past Behavior Measurements (5 items)

1. On how many days in the course of the past month have you consumed dietary supplements? [Write your answer]

2. In the course of the past month, how often have you taken dietary supplements? (1 = every day, 2 = almost every day, 3 = most days, 4 = on about half the days, 5 = a number of times, but less than half, 6 = a few times, 7 = never)

3. Please estimate how often you have consumed dietary supplements in the past month. (1 = never, 7 = every day)

4. Please estimate the number of dietary supplements you have consumed in the past month. (rated on a 7-point scale from 1-7+)

5. What types of dietary supplements have you taken within the past year? [Write your answer]
Appendix J

Behavioral Intention Scale (5 items)

1. I intend to take/consume dietary supplements during the next month. (1 = definitely do not, 7 = definitely do)

2. I will try to take/consume dietary supplements during the next month. (1 = strongly agree, 7 = strongly disagree) (R)

3. I intend to increase the frequency of my dietary supplement use during the next month. (1 = unlikely, 7 = likely)

4. I intend to increase the number (i.e., different types) of dietary supplements I take/consume during the next month. (1 = unlikely, 7 = likely)

5. I expect to take/consume dietary supplements during the next month. (1 = unlikely, 7 = likely)

Note: R = reverse scored item