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Individual Differences in Perceptions of Health-Related Behaviors

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INDIVIDUAL DIFFERENCES IN PERCEPTIONS OF HEALTH-RELATED BEHAVIORS

by

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Dedications

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Abstract

When provided an opportunity for thought, individuals experience a strengthening of their already moderate attitude toward some attitude object. This process was studied in the context of variables – attitudes toward behavior, norms about behavior, and perceived behavioral control – known to predict intentions to engage in health-related behavior. A potential moderator of this process – locus of control beliefs – was also investigated. In this study, 195 participants indicated their attitudes toward eight health-related behaviors. Participants were randomly assigned to either a high or low opportunity for thought during which time they were asked to focus their thoughts on the health behavior getting 8 hours of sleep a night. Participants then responded to 18 items measuring Theory of Planned Behavior constructs and the 18-item Multidimensional Health Locus of Control scale. Although self-generated attitude polarization was not observed in this study, evidence was found which supports previous Theory of Planned Behavior and Multidimensional Health Locus of Control research findings. Study limitations and implications are discussed.

Keywords: attitudes, attitude change, health locus of control, theory of planned behavior

Individual Differences in Perceptions of Health-Related Behaviors

Now more than ever we are bombarded with information reminding us how important our health is and why an active lifestyle is key to happiness. Health maintenance is more available than ever with aerobics, yoga, strength training, and Pilates classes on television that start when we are ready. There are video games in which we are coached toward improvement and motivational programs such as *The Biggest Loser* that show us it is possible for anyone to make a positive change regarding health. There are more than 20 different exercise and health magazines from *Shape* and *Self* to *Fitness Rx.* McDonald's and other fast-food companies are required to provide nutritional information about their food while an increasing number of restaurants (e.g., Chile's and Outback Steak House) offer more reasonably sized portions allowing one to remain within the specifics of many popular diet programs. All of these examples serve to keep our own health and health maintenance salient.

Making heath salient to people may do more than simply bombard them with daily reminders of something easily taken for granted until problems arise. Each of these examples could be used to provide people with positive information about health to be stored for later processing. It does not seem like a stretch to suggest that a majority of people would agree that behaviors such as running for 45 minutes three times a week, getting at least eight hours of sleep a night, and eating a low-fat diet are all favorable and beneficial to living a healthy life. Yet of this majority, it is likely many would deny participating in all or even one of these behaviors despite generally favorable impressions of them. What then might be done to strengthen these generally favorable attitudes toward behaviors that are beneficial to overall health? Perhaps if we can strengthen people's attitudes, we can in turn increase the likelihood of behavioral performance.

Self-Generated Attitude Change

Abraham Tesser (1978) was first to posit the theory of self-generated attitude change, claiming individuals had the potential to strengthen moderate attitudes regarding some attitude object using thought alone. With self-generated attitude change (i.e., self-persuasion), mere thought can effectively increase the extremity of a moderate attitude (for reviews, see Eagly & Chaiken, 1993; Tesser, Martin, & Mendolia, 1995). In other words, an individual's initially favorable attitude toward exercising may become more favorable given a thought opportunity, whereas an individual's initially unfavorable attitude toward exercising may become more unfavorable given a thought opportunity. To recap, self-persuasion can occur for both initially favorable and initially unfavorable attitudes.

Attitudes can be defined as a current evaluation resulting from all affective, cognitive, and behavioral information available regarding some attitude object (Albarracín & Vargas, 2010; Banaji & Heiphetz, 2010; Eagly & Chaiken, 1993, 1998). Let us assume an individual has a favorable attitude toward running. Affective (i.e., emotional) components of this individual's attitude may be discerned through frequent proclamations of a love for running or even how excited this person becomes when opportunities to run present themselves. Cognitive components of this individual's attitude would consist of thoughts, beliefs, and prior experiences regarding running: comfortable shoes, fast, 26.2 miles, and stress-reliever. Behavioral components might be demonstrated by this individual's training regimen to qualify for the Boston Marathon. All salient information from these three components influence an individual's attitude at any given time. People can use this same information for self-persuasion.

When we think about attitudes in a colloquial sense, we typically think in terms of emotions. It should then come as no surprise that affect plays a strong role in the beliefs that

make up our attitudes (Frijda, Manstead, & Bem, 2000). Our attitude toward some object, at least in part, results from the influence of these emotions on our beliefs (Boden & Berenbaum, 2010). Let us assume we ask a hypothetical participant's opinion toward running for 45 minutes three times a week. If all beliefs and past experiences salient to that person are positive, it would be safe to assume that person's overall opinion toward running for 45 minutes three times a week would also be favorable. When an opportunity for thought is presented, a confluence of these affective and cognitive components can lead to self-persuasion.

When thinking about an attitude object (i.e., person, place, or concept), beliefs an individual has toward that object tend to align to be similar with that initial attitude (Chaiken & Yates, 1985; Eagly & Chaiken, 1998; Leone, 1984, 1996). Thought about an object allows for beliefs to be analyzed and aligned with an initial attitude eventually leading to a change (i.e., increase in extremity) in that attitude. As beliefs are analyzed during thought, beliefs consistent with the initial attitude accumulate causing a change in the affective evaluation of the attitude object. This change in beliefs that eventually leads to an attitude change demonstrates the "big picture" (e.g., macroprocesses) of self-persuasion theory (Tesser et al., 1995). To summarize, self-persuasion macroprocesses about an attitude object allows for a change in salient beliefs that facilitates an increase in attitude extremity. In accordance with self-persuasion theory, how does thought cause this increase in beliefs preceding attitude change?

Thought provides individuals an opportunity to generate new information, reinterpret equivocal information, or even remove incongruous information in order to facilitate an alignment of beliefs with an initial attitude (Chaiken & Yates, 1985; Clary, Tesser, & Downing, 1978; Eagly & Chaiken, 1993; Sadler & Tesser, 1973; Tesser & Cowan, 1975). Generation, reinterpretation, and removal of beliefs are microprocesses which facilitate a change in beliefs

that leads to an attitude change. Assume we ask our hypothetical participant from earlier to think about running. Initially our participant may think running is a good way to lose weight and might have a moderately favorable attitude about running. While thinking about running, our participant may generate thoughts such as "losing weight means being healthier," and "being healthy is better than being unhealthy." These newly generated beliefs, congruent with the initial attitude that running is favorable, should serve to strengthen (e.g., polarize) our participant's attitude (Clarkson, Tormala, & Leone, 2011; Harton & Latane, 1997; Leone & Ensley, 1985). However, not all salient information may align with our attitudes. Our hypothetical participant might recall that running can leave you feeling sore. While this thought could be interpreted as muscles becoming stronger, it could also be interpreted as a decision to willingly harm one's self. One of these thoughts is positive and the other is negative. According to self-generated attitude change theory, individuals with a favorable attitude toward running should use the former interpretation to bolster their attitude whereas those with an initially unfavorable attitude should use the latter. Of course a third possibility is that those with favorable attitudes might discount altogether thoughts of running leaving them sore. These microprocesses can either work alone or in combination to effect a change in one's attitude (Tesser, 1978). To sum, individuals will generate new beliefs, reinterpret ambiguous beliefs, and discount opposing beliefs to align beliefs with their initial attitude (Chaiken & Yates, 1985; Eagly & Chaiken, 1998; Leone, 1984, 1996).

Numerous studies have been conducted using self-persuasion for a myriad of attitude objects (Eagly & Chaiken, 1993; Tesser, 1978; Tesser et al. 1995). Everything from football tackles (Tesser & Leone, 1977) to capital punishment (Chaiken & Yates, 1985) and has been

used to demonstrate the effects of mere thought on attitudes. One of the most interesting studies using self-persuasion focused on phobias.

Leone and Baldwin (1983) investigated self-persuasion for individuals with a strong fear of snakes to see if the presence or absence of a phobic object affected thought. They suggested that the presence of a phobic object would inhibit individuals generating thoughts and beliefs originating from faulty reasoning thereby forcing accuracy when thinking about this object. Indeed, Leone and Baldwin found individuals provided with an opportunity to think while in the presence of a phobic object (i.e., a black nonpoisonous snake) showed increased approach behavior when asked to confront a phobic object a second time. Conversely, individuals who either had an opportunity to think without a phobic object present or were not provided an opportunity to think about a phobic object showed little to no difference in approach behavior between both approach opportunities.

Leone and Baldwin (1983) demonstrated applicability of self-persuasion to affect an attitude so rooted in emotion as to cause individuals to live in fear and avoidance of a phobic object for most of their lives. If self-persuasion theory has implications for specific areas of mental health treatment (i.e., confrontation of phobic fears), perhaps it can also have applications for physical health and wellbeing. Can individuals effectively create and strengthen specific beliefs regarding health-related behaviors? Can specific references regarding health behaviors be made salient to participants while they think? Could these attitude changes regarding health behaviors allow for increased behavioral performance?

Theory of Planned Behavior

One basis for predicting an individual's behavior has been the Theory of Reasoned Action (Ajzen, 2012; Ajzen & Fishbein, 1980; Fishbein & Ajzen, 1975). Predictive accuracy of

a behavior is achieved through ascertaining an individual's intention. More simply, peoples' behavior can be best predicted through understanding their intention to perform that behavior. The amount of time and effort an individual is willing to invest toward performing a behavior in addition to the motivation to perform that behavior is summarized by that individual's intention (Ajzen, 1991). According to the Theory of Reasoned Action, behavioral intention is the most proximal and significant predictor for behavioral performance (Cooke & French, 2008; Conner & Sparks, 2005; Langdridge, Sheeran, & Connolly, 2007).

According to the Theory of Reasoned Action, an individual's intention is comprised of two components: attitude and subjective norm (Ajzen, 1991). An individual's attitude, as explained above, consists of all salient beliefs (i.e., thoughts, feelings, and prior experiences) relating to an attitude object. When an attitude object is a behavior, these beliefs often involve perceived consequences of performing or not performing that behavior (Conner & Sparks, 2005). Although numerous beliefs may exist for any given behavior, it is salient (i.e., readily recallable) beliefs that have greatest influence on one's attitude toward a behavior (Conner & Sparks, 2005). This relationship between one's attitude and behavioral beliefs is relatively robust (Armitage & Conner, 2001).

Another important component that makes up an individual's intention according to the Theory of Reasoned Action is subjective norm (Ajzen, 1991; 2006). Subjective norm refers to an individual's perception of beliefs important others might hold regarding a particular behavior. In other words, a subjective norm consists of a perceived probability that salient groups or individuals, whose opinions one deems important, will approve or disapprove of a particular behavior. This perception could potentially influence one's intention to perform a given

behavior (Johnston, White, & Norman, 2004; Manning, 2009). Important others are generally perceived to approve of positive behaviors and disapprove of negative behaviors (Ajzen, 2006).

To summarize, using the Theory of Reasoned Action, one can predict specific voluntary behavior by knowing an individual's intention to perform that specific behavior. This intention is comprised of an individual's attitude toward a particular behavior in addition to the perception of how important others regard a behavior. Positive attitudes lead to a greater intention to perform a behavior and negative attitudes lead to a reduced intention to perform a behavior. Likewise, a behavior that is perceived as positive by important others is more likely to be performed than a behavior that is perceived as negative by important others.

Although it is useful to have a predictive measure of one's voluntary behaviors, a number of behaviors one performs during any given day are not completely volitional (Ajzen, 1988). That is, some behaviors one engages in on a daily basis have obstacles and other variables that can impede or completely prohibit performance. Regarding exercise, one might think this seemingly volitional behavior needs only conscious intention to remove one's butt from the couch for performance. However, there are other factors that must be considered. Does one have necessary equipment (e.g., weights, treadmill, clothes) or available time not dedicated to other responsibilities (e.g., school, work, family) to spend exercising? Because numerous behaviors are not completely volitional, the Theory of Reasoned Action falls short in its usefulness to explain or predict these behaviors.

As a means of addressing this shortcoming, Ajzen expanded upon the Theory of Reasoned Action to create the Theory of Planned Behavior (Ajzen, 1985, 1988, 1991). Ajzen included the Theory of Reasoned Action components of attitude and subjective norm to infer an individual's intention to perform a behavior and added a third component: perceived behavioral

control. This concept of perceived behavioral control has been suggested to be analogous to Bandura's construct of self-efficacy (Ajzen, 1998; Armitage, 2005). Perceived behavioral control is an appraisal process during which individuals examine a specific behavior and all factors pertaining to successful execution of that behavior. By including perceived behavioral control with one's attitude and subjective norms, Ajzen was able to increase accuracy in the prediction of behaviors.

Our control over behavior is moderated by internal and external factors (Ajzen, 1988). Internal factors include information, skills, and abilities that allow for successful behavioral performance. Certain behaviors one intends to engage in may require particular attributes necessary for successful performance. Recall our hypothetical participant from earlier. If we asked our participant's attitude toward running 45 minutes three times a week, our participant might list thoughts like, "running is a good way to lose weight" and "losing weight means being healthier." These beliefs suggest our participant has a positive attitude regarding running. These beliefs may be so strong that our participant may intend to run later today. This intention may not be sufficient as obstacles could stop our participant before our participant even begins. Our participant may not have appropriate running attire or footwear, or could be limited by ailments that prohibit running (e.g., too overweight to run, bad knees).

There are also external factors which moderate control over behavioral performance. Factors such as opportunity or dependence on others can influence behavioral performance. That is, a lack or total absence of control over a behavior is to be expected if an opportunity for performance never presents itself. Perhaps our participant intends to lose weight through a training regimen; unfortunately, there is no gym nearby with experienced trainers who could help maximize our participant's results. Our participant might struggle alone for a while but would

eventually give up with no noticeable results and no trainer motivating our participant to continue.

The Theory of Planned Behavior is a practical model to predict an individual's behavior. By combining peoples' attitude with their beliefs of how important others view performance or nonperformance of that behavior while taking into account their perception of their own ability to control a successful performance, we can theoretically predict one's intention to perform a given behavior. The Theory of Planned Behavior and its components have been utilized to examine sundry behaviors. Gao and Kosma (2008) investigated mediating effects of Theory of Planned Behavior components on future weight training behavior for students enrolled in an 8-week class. Consistent with Ajzen's definition of intention (1991), Gao and Kosma found intention to have the most significant effect on students' weight training behavior.

In the Netherlands, de Bruijn and Van den Putte (2009) found intention and perceived behavioral control correlated with soft drink consumption and television viewing amongst adolescent students from several schools. Perceived behavioral control was the strongest Theory of Planned Behavior component to correlate with students' intention to limit soft drinks and television viewing time. Application of the Theory of Planned Behavior in the area of cancer research has provided insight to people's intentions to engage in various physical and psychosocial maintenance behaviors after diagnosis. Andrykowski and colleagues found Theory of Planned Behavior components attitude, subjective norm, and perceived behavioral control accounted for a "statistically significant and substantial" portion of the variance in behavioral intention (Andrykowski, Beacham, Schmidt, & Harper, 2006).

Multidimensional Health Locus of Control

As important as perceived control over behavior per se is, equally important are perceptions of whether our outcomes are or are not dependent on that behavior. In its most basic conceptualization, people either believe their outcomes are dependent on their actions or not. Rotter (1966) suggested that *internal* and *external control* beliefs result from an individual's perception of the source of the majority of control over outcomes: their own behavior (i.e., internal) versus some outside influence (i.e., external). Rotter further claimed these control beliefs developed as a learned process in which favorable resolution of a situation brings about a desired reinforcement and strengthens one's expectancy for a similar outcome given a similar situation.

We experience various and sundry situations everyday: matching our outfit appropriately, getting to work on time, sinking a 25 foot putt, going for a run. If people want to go for a run, they need simply get off the couch, tie their shoes, and shut the door behind them. A desired reinforcer of this behavior could be a first step toward being healthier, a sense of accomplishment, or the flood of endorphins and adrenaline known as "runner's high." Runners have control over every aspect of their trip from paths taken, distance they travel, and how long they exercise. Don't they?

External forces can influence our plans and potentially reduce our control over outcomes. A path one desires to run might be closed because of flooding, roadwork may cause you to shorten or extend your intended distance, and unexpected cramps or dangerous weather might determine how long you can exercise. Take a moment to think about your own perceptions regarding the three aforementioned situations that could affect your plans. Do you believe you still have control in these instances or could they potentially derail your plans?

One with internal control beliefs may presume all above situations could be avoided or overcome either through careful attention or problem solving. One with external control beliefs may presume any one of the above situations may hinder or impede intentions to run. To sum, individuals who perceive an outcome of an event as contingent upon their own behavior likely have internal control beliefs regarding that outcome. Individuals who perceive an outcome of an event as contingent upon forces outside their own control likely have external control beliefs regarding that outcome.

Building upon Rotter's theory that there are two loci (i.e., internal and external) of control over outcomes, Wallston, Wallston, Kaplan, and Maides (1976) developed the Health Locus of Control Scale. Wallston et al. created an 11-item scale designed to assess the degree to which individuals believed their health outcomes were either directly related to their own behaviors (i.e., internal) or were due to extraneous and otherwise uncontrollable variables (i.e., external). The higher an individual's score on this unidimensional measure, the more that individual is presumed to have a generalized expectancy that health outcomes are due to chance or some other external factor. In other words, individuals with low scores had more internal control beliefs and individuals with high scores had more external control beliefs. As data was collected, a pattern began to emerge and the Health Locus of Control scale was quickly revamped in search of more accuracy.

Levinson (1973) subdivided the external facet of Rotter's original Internal-External concept into chance and powerful others. By distinguishing beliefs in powerful others from beliefs in chance, Levinson was better able to predict and explain people's behavior. Within the realm of health, it made sense to investigate these same factors as chance and powerful others could logically be seen as differentially influencing beliefs regarding health outcomes. Wallston,

Wallston, and DeVellis (1978) revamped the original Health Locus of Control scale to create the Multidimensional Health Locus of Control scale.

Use of the Multidimensional Health Locus of Control scale allows for a clearer picture of how individuals perceive their own behavior's influence over health outcomes. Questions in the Multidimensional Health Locus of Control are designed to glean whether individuals perceive health-related outcomes resulting from their own actions (i.e., internal), adherence to the advice of health professionals or others (i.e., powerful others), or luck and happenstance (i.e., chance). Wallston et al. developed 36 new items creating two forms for the Multidimensional Health Locus of Control scale that could be used separately or in conjunction. In developing this new scale, Wallston et al. found scores from the Internal, Powerful Others, and Chance Health Locus of Control subscales correlated most significantly with their analogue from Levinson's scale.

The Multidimensional Health Locus of Control scale has been validated across numerous behaviors (Athale, Aldridge, Malcarne, Nakaji, Samady, & Sadler, 2010; Luszczynska & Schwarzer, 2005; Wallston, 2005). Steptoe and Wardle (2001) investigated effects of health locus of control for 10 health related behaviors (e.g., exercise, smoking, alcohol consumption, seatbelt use) using data from 7,115 participants across 21 countries. In their investigation, Steptoe and Wardle discovered individuals with higher internal ratings indicated they were more likely to exercise, eat breakfast daily, brush their teeth daily, as well as attend to their diet by eating fiber, limiting salt, and avoiding fat. Conversely, it was discovered that individuals with higher chance scores were more likely to engage in unhealthy behaviors (e.g., smoking and alcohol consumption) and were less likely to attend to their diet by avoiding fruits and fiber with little to no attention regarding salt or fat intake.

Using a Japanese version adapted from the MHLC scale developed by Wallston et al. (1978), researchers in Japan have shown a significant difference across dimensions for treatment of lower back pain. Utilizing a national Japanese sample, Ono and his colleagues found individuals willing to try "complementary and alternative medicine" versus western medicine alone showed more internality (Ono et al., 2008). Grotz, Hapke, Lampert, and Baumeister (2011) analyzed data from a representative national German Telephone Health Survey and found significant health locus of control differences regarding self-reported health behavior. Grotz and her colleagues found individuals with higher internal control scores participated in more activities for health-related reasons and consumed alcohol less frequently than did individuals with lower internal scores. Individuals with higher chance control scores participated less in sports activities, had fewer dental visits, and were less likely to seek information regarding their health.

These findings seem to support the theoretical assumptions regarding each health locus of control dimension: internal health locus of control is associated with positive health behavior, chance health locus of control is compatible with negative health behavior, and powerful other health locus of control displays no clear association (Grotz et al., 2011; Wallston & Wallston, 1982; Wallston et al., 1978). Wallston and Wallston (1982) cautioned however about putting too much faith in health control beliefs alone to predict human behavior. They believed human behavior was subject to multiple influences too intricate for health control beliefs to offer much predictive validity on their own. Health control beliefs would seem to be of interest to one investigating the potential persuasive effects of thoughts and beliefs regarding health behaviors.

Hypotheses

Given the aforementioned ideas and findings concerning self-persuasion, the Theory of Planned Behavior, and differences in health locus of control, we derived the following hypotheses. First, we hypothesized that increased thought about a health-related behavior will not only strengthen people's attitudes about that behavior but also strengthen subjective norms about and perceived control over that behavior. Second, the effects of increased thought on attitudes, subjective norms, and perceived control will be moderated by individual differences in locus of control. For individuals who believe they control their health outcomes, increased thought will be associated with increasingly favorable attitudes, subjective norms, and perceived control. For individuals who believe chance controls their health outcomes, increased thought is not expected to be associated with increased attitudes, subjective norms, nor perceived behavioral control. (For individuals who believe powerful others control their health outcomes, no predictions were made given the aforementioned empirical evidence that beliefs in powerful other as a source of outcome control has no consistent relationship to health-related behavior.)

Method

Participants

A total of 195 students volunteered for a study titled "Individual Differences in Perceptions of Health-Related Behaviors." Participation in this study was one option available for students to earn extra credit in an undergraduate course. Students who were less than 18 years of age or had already participated in a related attitude study during the same semester could not participate in this study.

Researchers collected data from 145 female and 50 male participants utilizing the software program *MediaLab*. As sex is not confounded with self-generated attitude change or

our health behavior of interest (i.e., getting 8 hours of sleep a night), an equal ratio of females to males was unnecessary. Of these participants, 68% were Caucasian, with the remainder indicating their race as African-American, Latino, Pacific Islander, or Other. Most participants (64%) were 18-22 years-of-age.

Experimental conditions were randomized for each timeslot prior to being made available to participants. Researchers obtained a signed informed consent document from every participant before proceeding further with this study. Data for six participants were removed due to computer malfunction, school alarms, or prior participation. All participants were treated in accordance with the Ethical Principals of Psychologists and Code of Conduct (American Psychological Association, 2010).

Procedure and Materials

One of two researchers (one male or one female) greeted participants as they arrived at a designated lab. A maximum of four participants could enroll in each session that was conducted by only one researcher. To begin, we informed participants of the purpose of this study. We explained that while being healthy was generally accepted as important, discussion continued as to what behaviors were "best suited" for becoming and staying healthy. To ascertain what participants considered important, they were told they would be presented questions regarding specific health behaviors and health in general. Participants were informed that included in this study were questions about themselves to investigate any influence individual differences may have on beliefs toward health. At this point, we asked participants if they had any questions regarding this study.

A researcher handed each participant an informed consent document to read and sign. We reminded participants that continuing with this study was voluntary, responses would remain

confidential, and withdrawal from this study was allowable at anytime without penalty. A researcher answered any questions participants asked. Once all questions, if any, were answered, we collected the informed consent documents and initiated this study on a computer located in front of each participant. Participants completed the remainder of this study using the software program *MediaLab*.

On a screen in front of them, participants read instructions to indicate their attitude toward several health-related behaviors using a provided scale. A 3-point scale was provided allowing participants to indicate whether they considered a given behavior to be (a) *beneficial*, (b) *neither beneficial nor detrimental,* or (c) *detrimental.* Participants viewed eight health-related behaviors randomly presented one at a time (i.e., getting 8 hours of sleep, sending/receiving text messages while driving). After indicating their attitudes toward all eight behaviors, participants continued to this study's next phase.

On the screen in front of them participants read instructions regarding the next phase of this study. All participants were presented with the health-related behavior *getting 8 hours of sleep a night* and asked to focus on their beliefs regarding this behavior. Participants read this was a timed exercise and that they should continue to think about and list all beliefs until prompted by their computer to stop. We used two experimental conditions for this study, a high (i.e., 240 seconds) and low (i.e., 120 seconds) thought opportunity, which a researcher randomized prior to allowing participants to volunteer. We instructed participants to use their allotted time to think about and list their beliefs regarding the behavior *getting 8 hours of sleep a night.* We suggested participants also think about what friends or family members might think about *getting 8 hours of sleep a night* as well as participants' own abilities to engage in this behavior.

Once participants' thought opportunity had expired, they read instructions regarding a series of questions pertaining to specific beliefs they had regarding the behavior *getting 8 hours of sleep*. These 18 questions were adapted from components of Icek Ajzen's Theory of Planned Behavior (1988, 1991, 2006). Ajzen (2006) provides instructions for developing items to assess the different components in his Theory of Planned Behavior: attitude, perceived norms, intention, and perceived behavioral control. From these instructions, we created 18 items.

To assess participants' attitudes, we included six items such as "For me to get at least 8 hours of sleep each night in the forthcoming month is *valuable/worthless*." To assess participants' subjective norms, we included six items such as "Many people like me get at least 8 hours of sleep each night *extremely likely/extremely unlikely.*" To assess participants' behavioral intention, we included three items such as "I intend to get at least 8 hours of sleep each night in the forthcoming month *extremely likely/extremely unlikely.*" To assess participants' perceived behavioral control, we included three items such as "It is mostly up to me whether or not I get at least 8 hours of sleep each night in the forthcoming month *strongly agree/strongly disagree.*" Participants were asked to indicate their reactions to these statements using a 7-point scale.

Numerous studies have been conducted using the Theory of Planned Behavior allowing repeated observation of the reliability and validity of measures derived from this theory. In their investigation of the potential mediation effects of the Theory of Planned Behavior, Armitage et al. (2002) found favorable internal reliability for scores for measures of all theoretical constructs. Cronbach's alphas ranged from 0.62 (e.g., subjective norms) to 0.95 (e.g., behavioral intention and perceived behavioral control). In our study, internal reliability for Theory of Planned Behavior constructs was consistent with past research. Cronbach's alphas for behavioral attitude

(α = .78), perceived norms (α = .68), perceived behavioral control (α = .83), and behavioral intentions (α = .82) were all within range of previous studies.

There is evidence of construct validity for components of the Theory of Planned Behavior. Armitage and Conner (2001) investigated 161 separate journal articles that included 185 separate empirical tests of measures derived from the Theory of Planned Behavior. When weighted for sample size, the average multiple correlation found of attitude, subjective norm, and perceived behavioral control with intention was R = .63 and accounted for 39% of the observed variance. Individually each of the TPB components still maintained medium correlations with behavioral intention. Attitudes had the highest observed correlation (r = .49) and subjective norm had the lowest (r = .34). Perceived behavioral control was also found to have a moderate correlation (r = .43) and when controlling for attitude and subjective norm still accounted for 6% of the total variance (also see Albarracín, Johnson, Fishbein, & Muellerleile, 2001; Godin & Kok 1996).

Next, participants completed Form A of the Multidimensional Health Locus of Control Scale (Wallston et al., 1978). The Multidimensional Health Locus of Control Scale (MHLC) was used to assess whether individuals believed their health outcomes were controlled by themselves or by external influences. Participants were instructed to indicate their agreement with each item using a 6-point Likert scale with endpoints *"strongly agree"* (1) and *"strongly disagree"* (6). Participants read items in the same order suggested by Wallston et al. (1978).

This scale is comprised of three subscales consisting of six questions each. Items for the Internal Health Locus of Control subscale are designed to establish the extent to which individuals believe their health outcomes are dependent on their own behavior (e.g., "The main thing which affects my health is what I myself do"). Items for the Powerful Others Health Locus

of Control subscale are designed to determine the extent to which individuals believe powerful others (i.e., parents, health care professionals) control their health outcomes (e.g., "Regarding my health, I can only do what my doctor tells me to do"). Items for the Chance Health Locus of Control subscale are designed to ascertain the extent to which individuals believe chance (i.e., luck) controls their health outcomes (e.g., "No matter what I do, if I am going to get sick, I will get sick").

Scores from responses were summed separately to create a total score for each subscale. Each subscale score could range from 6 to 36. To classify participants, we used median splits of the full range of scores on each subscale. To clarify, an individual with a score above 15 on the internal locus of control subscale was classified as having a strong beliefs that their health outcomes are dependent on their own behavior, whereas an individual with a score below 14 was classified as having a weak beliefs that their health outcomes are dependent on their own behavior. This median split procedure was similar for scores on both the Powerful Others (*mdn* = 15) and Chance (*mdn* = 15) subscales.

In development of their Multidimensional Health Locus of Control Scale, Wallston et al. (1978) found internal consistency for scores form all three Form A subscales. Cronbach's alphas for items in this initial sample were .76 (Internal), .67 (Powerful Others), and .75 (Chance). More recently, Masters and Wallston (2005) have found internal consistency coefficients for each subscale: .68 (Internal), .65 (Powerful Others), and .56 (Chance). In this study, we found congruent internal consistency coefficients: α = .73 (Internal), .61 (Powerful Others), and .58 (Chance).

Convergent validity for the Multidimensional Health Locus of Control scale has been observed with the combined forms of each subscale correlating most highly with its theoretical

counterpart from Levinson's Internal, Powerful Others, and Chance locus of control scales (Wallston et al., 1978): Internal MHLC scale and I Scale ($r = .56$, $p < .001$), Powerful Others MHLC scale and P Scale ($r = .27$, $p < .01$), and Chance MHLC scale and C Scale ($r = .77$, $p < .001$). Although Wallston et al. observed no significant correlations with sex, Form A of the Powerful Others scale was found to correlate significantly with both age ($r = .19$, $p < .05$) and education level ($r = -.22$, $p < .05$). Health status of participants was also found to correlate positively with scores on Internal MHLC ($r = .40$, $p < .001$), negatively with scores on Chance MHLC ($r = -.27$, $p < .01$) but not with scores on Powerful Others.

Upon completion of all study measures, participants then answered several basic demographic questions. We asked participants to indicate their sex with response options *Male* or *Female.* We asked participants to indicate their age with response options *18-22, 23-27, 28-32, 33-37,* or *38 or more.* Finally, we asked participants to indicate their ethnicity with response options *African-American, Asian/ Pacific Islander, Caucasian, Hispanic,* or *Other*. Additionally, three questions were posed to assess the amount of sleep each participant received (a) the night before the study, (b) on a typical weeknight, and (c) on a typical weekend night. Participants indicated the number of hours they slept using the response options *Less than 6, 7, 8, 9,* or *10 or more*. After completing this study, we escorted participants out of the lab space and asked if they had any questions.

Results

Preliminary Analyses

In this study, we measured participants' health locus of control beliefs using the Multidimensional Health Locus of Control scale (Wallston et al., 1978). The Multidimensional Health Locus of Control scale consists of three subscales: Internal, Powerful Others, and Chance.

Because locus of control beliefs are measured and not manipulated, it is possible scores on these three subscales may be confounded. To determine if there was multicollinearity among these three measures, we correlated the full range of scores across the three subscales.

No correlation was found between scores on the Internal subscale (the extent to which individuals believe they control their health outcomes) and scores on Powerful Others subscale (the extent in which individuals believe health outcomes are controlled by powerful others), r = .03, p = .639. No correlation was found between scores on the Powerful Others subscale and scores on the Chance subscale (the extent to which individuals believe health outcomes are controlled by chance), r = .07, p = .278. There was, however, a reliable but small correlation between scores on the Internal subscale and the Chance subscale, r = -0.29, p < .001.

As suggested by Cohen, Cohen, West, and Aiken (2003), the squared value of a correlation between two variables is an appropriate index of multicollinearity. The squared value of the correlation between scores on the Internal subscale and scores on the Chance subscale is .09. With the amount of shared variance between the Internal and Chance subscales only reaching 9%, this correlation was treated as insignificant. Given that there is no evidence of multicollinearity in our sample, we treated scores on the three subscales of Multidimensional Health Locus of Control as independent predictors in our analyses.

Overview of Design and Analysis

In this study, we utilized a 2 (high opportunity for thought vs. low opportunity for thought) by 2 (high MHLC dimension vs. low MHLC dimension) factorial design. Both thought opportunity and Multidimensional Health Locus of Control dimension were between-subject factors. Dependant variables of interest are attitudes, subjective norms, and perceived behavioral control pertaining to the health behavior of interest for this study (i.e., getting 8 hours of sleep a

night). We analyzed these dependant variables in a series of 2 x 2 ANOVAs. In these ANOVAs, we analyzed different individual difference measures and different dependant variables.

We expected individuals provided with more time to think will have more polarized attitudes, perceived norms, and perceived behavioral control than will individuals provided with less time to think. That is, we hypothesized a main effect of thought opportunity on self-generated changes in attitude, subjective norms, and perceived behavioral control. It was also hypothesized that individual differences in locus of control beliefs (i.e., Internal, Powerful Others, Chance) will moderate the effects of thought on attitudes, perceived norms, and perceived behavioral control. In other words, for each of the dependant variables (attitudes, perceived norms, perceived behavioral control), we are expecting an interactive effect of thought opportunity and individual differences in locus of control beliefs.

Main Analyses

Internal Locus of Control Beliefs. We first analyzed participants' attitudes regarding getting 8 hours of sleep a night. Contrary to our hypotheses, there was neither a main effect of thought opportunity nor an interactive effect of thought opportunity with internal locus of control beliefs on behavioral attitudes, all $Fs < 1.00$. There was however an unanticipated main effect of internal locus of control beliefs on behavioral attitudes, $F(1,191) = 6.50$, $p = .012$. Participants had increasingly favorable attitudes about getting 8 hours of sleep a night if they had an internal locus of control ($M = 37.59$, $SD = 4.38$) than if they had an external locus of control ($M = 35.68$, $SD = 5.90$).

We next analyzed participants' perceived norms regarding our behavior of interest. We found neither a main effect of thought opportunity nor an interactive effect of thought

opportunity with internal locus of control beliefs and perceived behavioral norms, all Fs < 1.00. The previously unanticipated main effect of internal control beliefs on our dependant variable of interest was observed again, $F(1, 191) = 8.99$, $p = .003$. Participants' had increasingly favorable perceived behavioral norms if they had an internal locus of control ($M = 29.74$, $SD = 5.99$) than if they had an external locus of control ($M = 27.35$, $SD = 5.05$).

Finally we analyzed participants' perceived behavioral control. We again found neither a main effect of thought opportunity nor an interactive effect of thought opportunity with internal locus of control beliefs on perceived behavioral control, all Fs < 1.54. However, there was a marginal main effect of internal control beliefs on participants' perceived control of getting 8 hours of sleep per night, $F(1, 191) = 2.25$, $p = .135$. Mean scores for perceived behavioral control were higher for individuals with strong internal control beliefs ($M = 15.10$, $SD = 4.69$) than for individuals with weak internal control beliefs ($M = 14.20$, $SD = 4.92$). Although this trend was not significant at conventional levels of statistical significance, it is worth noting.

Powerful Others Locus of Control Beliefs. As before, we first analyzed participants' attitudes toward getting 8 hours of sleep a night. We found neither a main effect for thought opportunity nor a main effect for beliefs in powerful others on behavioral attitudes, all Fs < 1.00. Additionally, there was no interactive effect of thought opportunity with beliefs in powerful others on behavioral attitudes, $F < 1.00$.

Analyzing participants' perceived norms toward our behavior of interest, we found no main effect for thought opportunity, $F < 1.00$. There was however a main effect for beliefs in powerful others on perceived norms, $F(1, 191) = 4.78$, $p = .030$. Participants had more favorable perceived norms regarding getting 8 hours of sleep a night if they had stronger beliefs in powerful others ($M = 29.38$, $SD = 5.38$) than if they had weaker beliefs in powerful others ($M =$

27.58, *SD* = 5.81). There was also an interactive effect of thought opportunity and beliefs in powerful others regarding perceived norms, $F(1, 191) = 3.97$, $p = .048$. Participants provided with a low thought opportunity had more favorable perceived behavioral norms if they had stronger beliefs in powerful others (*M* = 30.17, *SD* = 5.52) than if they had weaker beliefs in powerful others (*M* = 26.83, *SD* = 5.68). This difference was not observed for participants provided with a high thought opportunity: stronger beliefs in powerful others (*M* = 28.54, *SD* = 5.16) and weaker beliefs in powerful others (*M* = 28.39, *SD* = 5.91).

Finally, we analyzed perceived behavioral control. Although there was no interactive effect between thought opportunity and beliefs in powerful others on perceived control, $F < 1.00$, there was a trend in the data toward a main effect of thought opportunity, $F(1, 191) = 1.84$, $p = .178$. Participants perceived themselves as having more control over the behavior in the low thought opportunity condition (*M* = 15.09, *SD* = 4.69) than in the high thought opportunity condition (*M* = 14.16, *SD* = 4.92). There was also a main effect of beliefs in powerful others on perceived behavioral control, $F(1, 191) = 5.10$, $p = .025$. Interestingly, participants with stronger beliefs in powerful others perceived themselves as having more control over getting 8 hours of sleep a night (*M* = 15.38, *SD* = 4.42) than did participants with weaker beliefs in powerful others (*M* = 13.83, *SD* = 5.12).

Chance Locus of Control Beliefs. The results involving the relationship between beliefs in chance either alone or in combination with thought opportunity can be summarized succinctly. For all three dependent variables (i.e., attitudes, perceived norms, and perceived behavioral control), there was neither main effects of thought opportunity nor beliefs in chance nor interactive effects between these two variables, all Fs ≤ 1.87 and all ps $\geq .173$.

Exploratory Analyses

Moderating Effects of Thought Opportunity. Recall that according to Ajzen and Fishbein, intention to engage in performance of a specific behavior is best determined by understanding an individual's attitude, perceived norms, and perceived control regarding a specific behavior. Although we expected thought opportunity to influence people's attitude, perceived norms, and perceived behavioral control, it is possible that thought operates to moderate the connection between these variables and behavioral intentions. To explore this possibility, we conducted a series of multiple regression analyses (one for each of the three predictive components in the Theory of Planned Behavior). In these analyses, thought opportunity was a categorical predictor variable and attitudes, perceived norms, and perceived behavioral control were continuous predictor variables. Our dependent variable was participants' intentions to get 8 hours of sleep a night.

We found a main effect of attitude about the behavior on behavioral intentions, $F(1, 191) = 121.82$, $p < .001$. The more favorable participants attitudes were about getting 8 hours of sleep a night, the more they said they intended to engage in that behavior, $r = .64$, $p < .001$. However, there was no main effect of thought opportunity nor did thought opportunity moderate the effect of attitudes on behavioral intentions, both Fs < 1.00.

This pattern was repeated when subjective norms were regressed onto behavioral intentions. We found a main effect of subjective norms on behavioral intentions, $F(1, 191) = 84.31$, $p < .001$. Participants with more favorable subjective norms intended to engage in the behavior more than did individuals with less favorable subjective norms, $r = .56$, $p < .001$. Again, we found neither a main effect of thought opportunity nor a moderation of the effects of subjective norms on behavioral intentions, both Fs < 1.00.

Analyzing perceived control, we found the same story. There was an main effect of perceived control on behavioral intentions, $F(1, 191) = 79.18$, $p < .001$. Participants who perceived themselves as having more control over the behavior were more likely to say they intended to engage the behavior, $r = .54$, $p < .001$. Again neither a main effect nor an interactive effect of thought opportunity with perceived behavioral control occurred for behavioral intentions, both Fs < 1.00.

Moderating Effects of Locus of Control Beliefs. It is also possible that individual differences in health locus of control beliefs moderate the connection between attitudes, perceived norms, and perceived control and behavioral intentions. To explore this possibility, we conducted a series of multiple regression analyses (one for each of the types of locus of control beliefs in the Multidimensional Health Locus of Control Scale).
. In these analyses, locus of control beliefs were a categorical predictor variable and attitudes, perceived norms, and perceived control toward getting 8 hours of sleep a night were continuous predictor variables. Our dependent variable was intentions to engage in getting 8 hours of sleep a night.

When investigating individuals' beliefs that their health outcomes are dependent on their own behavior, we again found a main effect of individuals' attitude toward getting 8 hours of sleep a night, $F(1, 191) = 158.83$, $p < .001$, and we also found a main effect of individuals' beliefs that their health outcomes are dependent on their own behavior, $F(1, 191) = 20.33$, $p < .001$. The more participants believed that getting 8 hours of sleep a night was something that was contingent on their own actions, the more they said they intended to engage in that behavior, $r = .13$, $p = .067$. There was also an observed interaction between individuals' belief that their health outcomes are dependent on their own behavior and behavioral attitudes on behavioral

intentions, $F(1, 191) = 21.08$, $p < .001$. For participants with relatively weak beliefs that their health outcomes depend on their own behavior, there was a positive correlation between their attitudes about the behavior and their intentions to engage in the behavior, $r = .53$, $p < .001$. For participants with relatively strong beliefs that their health outcomes depend on their own behavior, there was an even stronger positive correlation between their attitudes about the behavior and their intentions to engage in the behavior, $r = .78$, $p < .001$. Given the main effect and interactive effect previously mentioned, a belief that one's health outcomes are contingent on one's own behavior has a direct as well as an indirect effect on behavioral intentions about getting 8 hours of sleep a night.

Those same beliefs that health outcomes are dependent on their own behavior, however, did not moderate the effects of norms and perceived behavioral control on participants' behavioral intentions. We again observed main effects for norms, $F(1, 191) = 77.25$, $p < .001$, and perceived controllability, $F(1, 191) = 76.49$, $p < .001$, on behavioral intentions. However, the main effect of beliefs that their health outcome are dependent on their own behavior and interaction effects of those beliefs with perceived norms or perceived controllability regarding getting 8 hours of sleep a night were non-significant, all Fs <1.00.

When investigating people's beliefs in powerful others, we found the aforementioned main effect of individuals' attitude toward getting 8 hours of sleep a night, $F(1, 191) = 144.04$, $p < .001$, and we also found a main effect of beliefs in powerful others, $F(1, 191) = 6.83$, $p < .009$. The more participants perceived that getting 8 hours of sleep a night was controlled by powerful others, the more they said they intended to engage in that behavior, $r = .20$, $p = .006$. There was also an interaction between individuals' beliefs in powerful others and behavioral attitudes on behavioral intentions, $F(1, 191) = 4.61$, $p < .033$. For participants with relatively strong beliefs

that their health outcomes depend on powerful others, there was a positive correlation between their attitudes about the behavior and their intentions to engage in the behavior, $r = .61$, $p < .001$. For participants with relatively weak beliefs that their health outcomes depended on powerful others, there was an even stronger positive correlation between their attitudes about the behavior and their intentions to engage in the behavior, $r = .70$, $p < .001$. Given the main effect as well as interactive effect previously mentioned, a belief in powerful others ability to control their own health outcomes has a direct as well as an indirect effect on behavioral intentions about getting 8 hours of sleep a night.

Those beliefs in powerful others, however, did not moderate the effects of norms and perceived behavioral control on participants' behavioral intentions. We again observed main effects for norms, $F(1, 191) = 80.09$, $p < .001$, and perceived controllability, $F(1, 191) = 75.53$, $p < .001$, on behavioral intentions. However, the main effect of beliefs in powerful others and interaction effects of those beliefs with perceived norms or perceived controllability regarding getting 8 hours of sleep a night were non-significant, all Fs <1.00.

The results involving the relationship between beliefs in chance and (a) attitudes, (b) subjective norms, and (c) perceived control with peoples' intentions to get 8 hours of sleep a night can be summarized succinctly. As before, we found main effects for attitudes, $F(1, 191) = 130.66$, $p <.001$, perceived norms, $F(1, 191) = 87.48$, $p < .001$, and perceived control, $F(1, 191) = 80.87$, $p < .001$, on people's behavioral intention. There was, however, neither a main effect of beliefs in chance nor interactive effects of beliefs in chance with any predictor variable (i.e., attitudes, perceived norms, and perceived behavioral control), all Fs < 2.09 and all ps > .15.

Discussion

In this study, we investigated people's self-generated changes in attitude, subjective norms, and perceived control regarding health-related behaviors. Because the vast majority of our participants had initially favorable attitudes about getting 8 hours of sleep, our original hypotheses were altered such that we hypothesized that individuals would tend to show more favorable attitudes, subjective norms, and perceived behavioral control as thought opportunity increased. We also hypothesized that the self-persuasion experienced would be moderated by individual differences in locus of control beliefs. This is to say that with more time to think, participants would tend to show more favorable attitudes, subjective norms, and perceived behavioral control regarding our health behavior of interest. Likewise, these thought-induced changes in attitudes, subjective norms, and perceived control would increase in favorability as a function of peoples' health locus of control beliefs, with those who believe health outcomes are dependent on their own behavior showing the greatest increase and those who believe health outcomes are dependent on chance showing the least increase. Support was found for some, but not all, of these hypotheses.

Overall, we did not find an effect of thought opportunity on peoples' attitudes, subjective norms, and perceived control regarding the behavior getting 8 hours of sleep a night. Although not hypothesized, we examined the possibility that perhaps thought does not function to strengthen attitudes, subjective norms, and perceived behavioral control, but instead functions to moderate the influence of each of those variables on behavioral intentions. Here again, we found no effects of thought opportunity with attitudes, subjective norms, or perceived control. The exception to this was observed regarding individuals who believe health outcomes are dependent on powerful others. For perceived behavioral control, we did in fact find the expected effects of

thought as well as an unexpected moderating effect of belief in powerful others. In the low thought opportunity, participants with strong beliefs in powerful others were found to have significantly more favorable perceived norms regarding getting 8 hours of sleep a night than participants with weak beliefs in powerful others. This significant difference was not observed in the high thought opportunity.

Although we did not find evidence to support the mere thought phenomenon, we were, however, able to replicate many findings of previous Theory of Planned Behavior (Ajzen, 1991; 2006; Armitage, 2005) and Multidimensional Health Locus of Control studies (Grotz et al., 2011; Steptoe & Wardle, 2001). We found robust effects of attitudes, subjective norms, and perceived behavioral control on participants' intentions to get 8 hours of sleep a night. In accord with previous research, the more favorable participants' attitudes, subjective norms, and perceived control toward getting 8 hours of sleep a night, the more they said they intended to engage in that behavior. Also, we found direct and indirect effects of internal and powerful other control beliefs on behavioral intentions to get 8 hours of sleep a night. Participants with strong internal or powerful other control beliefs had stronger behavioral intentions than did participants with weak internal or powerful other control beliefs. These control beliefs were also found to interact with participants' attitudes to affect behavioral intention. That is, the connection between behavioral attitudes and behavioral intentions became stronger as the belief that powerful others controlled participants' health outcomes became weaker.

Potential Limitations and Alternative Explanations

The paucity of results regarding the mere thought effect on attitudes, subjective norms, and perceived behavioral control is somewhat surprising. This mere thought effect is well documented and robust for numerous attitude objects (Tesser, 1978; Tesser et al., 1995).

However, there is evidence to suggest that this relationship of thought opportunity with attitude polarization might not be a strictly linear one. Clarkson et al. (2011) found evidence that too little or too much thought can serve to undermine attitude polarization. Numerous thought opportunities have been used throughout the self-persuasion literature. Clarkson et al. suggest the perception of time passed is more important to attitude polarization than actual time passed. If participants perceive insufficient time to access their beliefs, these individuals may not be able to organize their beliefs which would thereby hinder polarization. Likewise, if participants perceive too much time having passed, these individuals may not be able to generate any more beliefs which would thereby undermine their confidence in their attitudes.

For example, researchers have recently discovered that an important factor for attitude polarization is thought confidence (Chaiken, Liberman, & Eagly, 1989; Petty, Bri ol, & Tormala, 2002). Regardless of initial attitude direction (i.e., positive or negative), as confidence in thoughts increases, so too does attitude strength. However, too much time to think can cause "thought exhaustion" undermining thought confidence and, as a result, attitude polarization (Clarkson, et al. 2011). Much like participants who feel they don't have enough time to express their thoughts, individuals who perceive too much time to think reach a point of "thought exhaustion." Once this threshold is reached, participants may begin to have trouble generating attitude consistent thoughts. This inability to generate new thoughts could undermine confidence in previously listed thoughts causing attitude attenuation (i.e., weakening).

One definite limitation for this study is the measurement, not manipulation, of participants' attitudes, subjective norms, and perceived behavioral control as well as locus of control beliefs. As a result, we are unable to make causal inferences based on any correlational relationship found for these variables and behavioral intention. There are two potential problems

in this study: directionality and third variables (Aronson, Wilson, & Brewer, 1998). The directionality problem concerns the inability to determine which variable is a cause and which variable is an effect based on a correlation alone (Aronson et al., 1998). We cannot determine if favorable attitudes, subjective norms, and perceived control affect peoples' intentions to engage in a behavior, or if because people intend to engage in a behavior, they have favorable attitudes, subjective norms, and perceived control. Our ability to make cause and effect inferences are also hampered by the third variable problem: the possibility of another variable explaining our findings. Locus of control beliefs pertain to what brings about a desired reinforcer: self, powerful others, or chance. All else being equal, people faced with a choice between two contradictory goals should favor the goal they value most. If scores on a health values measure were found to correlate with beliefs about the control of health outcomes and behavioral intentions, any obtained relationship between health locus of control beliefs and behavioral intentions could be spurious. Therefore, the possibility exists that had we measured and controlled additional variables, we would have observed different relationships between intentions and attitudes, norms, and perceived behavioral control as well as locus of control beliefs.

Another potential limitation to this study is the use of a self-report method. Although self-report allows for quick and easy data collection, there are several disadvantages. Self-report is only an indicator of peoples' explicit attitudes regarding attitude objects. Explicit attitudes are deliberate and under conscious control making them susceptible to various favorable self-presentation techniques (Krosnick, Judd, & Wittenbrink, 2005; Paulhus & Vazire, 2007). Each participant responded anonymously to all study related items, which we hoped would reduce the impact of socially desirable responding. However, participants may still engage in self-deception. As a result of this self-deception, participants might have answered items in such a

way to allow them to maintain their favorable self-impressions (Krosnick et al., 2005; Paulhus & Vazire, 2007). By supplementing self-report with unobtrusive behavioral observations and/or psychophysiological measures, we could access individuals' implicit attitudes (i.e., attitudes not under conscious control) thereby potentially removing the confounding effects of self-presentation biases (Bassili & Brown, 2005; Krosnick et al., 2005).

Future Directions

In an attempt to rectify some of the limitations of this study, it might be prudent to first address the health behavior of interest. In this study, the health behavior of interest was getting eight hours of sleep a night. Although this behavior was one that could easily be performed by all participants, we found it was also one for which there was little initial attitudinal variability. An overwhelming majority of participants believed sleep to be a favorable behavior which may have limited our ability to find self-persuasion effects. There are other behaviors that have more attitudinal variability. The use of artificial sweeteners has come under scrutiny lately. There have been claims of harmful side effects resulting from ingestion such as headaches and gastrointestinal issues. Likewise, there is much new information about the potential uses of marijuana to alleviate various ailments without risk of serious side effects. It is likely there are opposing points of view on this matter. Using behaviors with more attitude variability increases the potential of more participants having a moderate attitude toward the behavior of interest. Attitude objects with more variability would remove the effects of stronger attitudes preventing attitude change.

A second limitation needing attention involves the thought opportunity used in this study. By reducing the amount of time for both thought opportunities, researchers can limit the possibility that participants will become "bored" while engaged in thought, potentially

undermining their confidence and, by extension, self-persuasion. This change, in combination with a health behavior for which people have more variable attitudes, should improve the possibility of detecting mere thought effects on attitudes toward health-related behaviors as well as perceived norms and perceived control over those behaviors.

Another future direction would be the inclusion of other potential mediators and moderators. Thought confidence, habit strength, and health values all have potential to influence variables in this study. Thought confidence has been shown to be related to attitude polarization and can offer more information regarding the impact of thoughts people have (see Bri ol & Petty, 2009). Eagly and Chaiken (1993) have suggested that past behavior could influence future behavior as a result of factors that are stable over time. One of these stable factors could be habit strength which has been shown to affect behavior and intentions (de Bruijn, Kremers, de Vet, de Nooijer, van Mechelen, & Brug, 2007; Verplanken, 2006). Likewise, the value people place on their health can influence the thoughts and perceptions they have toward health and health behaviors. Among middle-aged men, higher health values scores have been shown to not only increase the likelihood of positive change regarding health behaviors but also decrease the likelihood of negative change (Shi, Nakamura, & Takano, 2004). Therefore, it makes sense to include these variables in future studies investigating the confluence of self-persuasion, the Theory of Planned Behavior, and health locus of control beliefs on health-related behaviors.

Concluding Remarks. The potential utility in understanding how individual differences in control beliefs affect attitudes, subjective norms, and perceived control regarding health behaviors could be demonstrated in numerous ways. First, by better understanding the source of peoples' perceived control over their health, intervention methods can be focused on internal, powerful others, or chance control beliefs to effect the most change. Second, health information

could be presented illustrating favorable attitude, subjective norms, and controllability thereby potentially making these instances more salient and easily recallable. These and other techniques may begin to maximize the impact of the barrage of health information to which we are all exposed on a daily basis. With a better understanding how this health information can influence attitudes, norms, and perceptions of control as a function of locus of control beliefs, we can implement interventions that promote a healthier population.

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