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# Is Women's Multivitamin Consumption Reasoned, Planned, or Socially Cognitive? A Test of Three Social Influence Models



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# JOURNAL OF COMMUNICATION STUDIES

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# IS WOMEN'S MULTIVITAMIN CONSUMPTION REASONED, PLANNED, OR SOCIALLY COGNITIVE? A TEST OF THREE SOCIAL INFLUENCE MODELS

Lisa L. Massi Lindsey, Jenifer E. Kopfman and Christine E. Prue

*Neural tube defects (NTDs) are serious birth defects that affect approximately 3,000 pregnancies in the United States each year. Consuming the B vitamin folic acid can reduce the incidence of NTDs 50%–70%, and recent efforts to reduce NTD rates have focused on increasing the number of childbearing-aged women who take a vitamin containing folic acid every day. Future declines in NTDs must come from creative and compelling education and communication campaigns that will increase the number of childbearing-aged women who consume these vitamins. Therefore, conducting theory-guided research on multivitamin use is essential given the lack of knowledge surrounding this behavior. To this end, the current study tested three social influence models—the theory of reasoned action, the theory of planned behavior, and social cognitive theory—to determine which theory, or theoretical constructs, best predict(s) multivitamin use and might be used to guide message design to increase folic acid use. A nationally representative sample of 1,048 women of childbearing age was utilized, and results indicated that multivitamin use was best predicted by constructs from the theory of planned behavior*

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*and social cognitive theory. The practical and theoretical implications of the results are discussed.*

**Keywords:** theory of reasoned action, theory of planned behavior, social cognitive theory, message design

**B**irth defects are the leading cause of infant mortality in the United States (Sutton & Munson, 2005). Neural tube defects (NTDs) are serious birth defects of the spine (spina bifida) and brain (anencephaly) that currently affect over 3,000 pregnancies each year in the United States (Centers for Disease Control and Prevention [CDC], 2004a). Daily periconceptional consumption of the B vitamin folic acid reduces the occurrence of NTDs 50%–70% (CDC, 2004a). Because NTDs occur in the first 21 days of pregnancy—before many women know they are pregnant—and because folic acid is water soluble, women must consume folic acid every day *before* they become pregnant (CDC, 1992). To this end, the U.S. Public Health Service and Institute of Medicine issued separate recommendations that all women capable of becoming pregnant consume 400 micrograms ( $\mu\text{g}$ ) of folic acid daily (CDC, 1992; IOM, 1998). Also, the U.S. Food and Drug Administration mandated the fortification of cereal grain products such as bread, breakfast cereals, and pasta with folic acid in an effort to increase women's daily intake (FDA, 1996). Since fortification of the U.S. food supply began in 1998, it has resulted in a 26% reduction in NTDs (CDC, 2004a).

With fortification alone, most women do not reach the daily recommended level of 400  $\mu\text{g}$  of folic acid from their diets (CDC, 2004a, 2004b); therefore, increasing the use of vitamins containing folic acid remains an important component of NTD prevention (CDC, 1992, 2004a, 2004b). The most recent March of Dimes Gallup poll indicated that only 33% of U.S. women aged 18–45 years reported daily consumption of a vitamin containing folic acid (CDC, 2005; The Gallup Organization, 2005). Success in increasing sustained multivitamin use among women of childbearing age has been elusive (Lawrence et al., 2003). Because it is unlikely that fortification levels will be increased at this time, future declines in NTDs must come from creative and compelling programs that will increase the number of women who consume vitamins containing folic acid.

The current investigation contributes to efforts to develop such programs by testing three social influence models that might be used to guide interventions designed to increase multivitamin use among childbearing-aged women. Because using theory to guide message design can save resources (Murray-Johnson & Witte, 2003), conducting this research on multivitamin use is essential given the lack of knowledge surrounding this behavior. Also, many different theoretical foundations have been used in planning health campaigns in recent years. In an effort to determine which theories, or theoretical constructs, could best be used to guide a campaign encouraging women of childbearing age to consume multivitamins containing folic acid, this study examined three of those commonly used

theories—the theory of reasoned action, the theory of planned behavior, and social cognitive theory—in order to determine which theory or combination of theoretical constructs best predicts multivitamin use among reproductive-aged women in the United States. In what follows, each of the three theories is explicated and models are proposed to test each.

## THEORY OF REASONED ACTION

The theory of reasoned action (TRA; Ajzen & Fishbein, 1970, 1974, 1980a, 1980b; Fishbein & Ajzen, 1975) proposes three determinants of behavior. Individuals' attitudes regarding a behavior as well as their subjective norm—that is, their perceptions of what important others think about this behavior—predict their intent to perform the given behavior. This intent subsequently determines behavior. This theory has been used to understand myriad behaviors, and as a subset, many different health behaviors.

The TRA's principles have been used previously in interventions designed to increase the use of multivitamins among women of childbearing age (Lawrence et al., 2003). Although Lawrence et al. used the TRA to guide their intervention, their research did not specifically test the TRA model. Therefore, research is needed to establish whether the TRA is an effective theoretical foundation for encouraging multivitamin consumption.

In the current investigation, the TRA can lend insight into women's behavior regarding the daily consumption of multivitamins. Fishbein and Ajzen's (1975) theory was developed specifically for behaviors seen as volitional or voluntary; that is, behaviors that people perform because they choose to do so (Eagly & Chaiken, 1993). Taking a multivitamin fits within these parameters. Women who take multivitamins daily (the behavior) already intend to perform this behavior, and their attitudes and subjective norm are likely to reflect positively on multivitamin consumption. Women who do not consume multivitamins daily, however, are likely to be the target audience for a health campaign encouraging this behavior. Given that the TRA suggests that favorable attitudes toward multivitamin consumption could lead to increased intent to purchase and consume multivitamins, an intervention focused on increasing favorable attitudes might lead to the desired behavior. For example, because folic acid is not important to most women who are not planning a pregnancy (if they are not intending to become pregnant then they do not perceive a need for folic acid), messages focusing on the fact that folic acid prevents NTDs in pregnancy would not be effective in influencing most women's beliefs and subsequent attitudes despite the fact that a high percentage of pregnancies are unplanned (Lindsey et al., in press). Conversely, if other beliefs important to these women could be addressed in health campaigns (e.g., helping them stay energetic), then these beliefs are likely to promote a positive attitude toward multivitamin consumption, thus leading to increased intent to purchase and consume multivitamins. This increased intent should, according to the TRA, lead to the desired behavioral response.



Given this rationale and previous evidence that the TRA has been shown to explain adequately behaviors in myriad health contexts, the current study proposes that one could assume reasonably that the TRA could explain women's decisions to take a multivitamin. Thus, the following hypothesis is offered:

H1: The TRA will explain reported multivitamin consumption behavior among women of childbearing age.

## THEORY OF PLANNED BEHAVIOR

Building on the TRA, Ajzen (1985, 1987, 1988, 1991) proposed the theory of planned behavior (TPB) to include an additional variable he labeled *perceived behavioral control*, which is defined as the belief that one can perform the desired behavior. According to Stiff and Mongeau (2003), "Ajzen argued that people's intentions to perform a behavior are often thwarted by a lack of confidence in their ability to perform that behavior" (p. 66). At its core, Ajzen's argument indicated that one's perception of his or her ability to perform the behavior would predict both behavioral intention and the extent to which one actually engaged in the behavior. The TPB, therefore, suggests that attitudes, subjective norm, and perceived behavioral control predict behavioral intention, and both intent and perceived behavioral control have a direct impact on behavior.

This theory has been found to explain successfully many different health-related behaviors. According to a recent study, the TPB explains multivitamin use among African-American female students quite well, explaining 65% of variance in behavioral intentions (Pawlak, Connell, Brown, Meyer, & Yadrick, 2005). Ajzen and his coauthors also examined the issue of taking daily vitamins as one outcome behavior in a test of the TPB (Madden, Ellen, & Ajzen, 1992). Although their study claimed that the TPB significantly enhanced the prediction of behavioral intentions over the TRA, it is interesting to note that there was virtually no difference between the TPB and the TRA when specifically examining taking a multivitamin. This behavior demonstrated the lowest increase in explained variance of all 10 behaviors for both intentions and behavior outcomes. Thus, although studies have attempted to show the theoretical superiority of the TPB over the TRA, it is clear that both theories could predict the behavior of taking a multivitamin (e.g., Madden et al., 1992).

For the current study, the implications of the TPB are apparent. Although attitude and subjective norm might be useful components in understanding whether or not women take multivitamins daily, perceived behavioral control could play a role in determining whether or not this behavior actually occurs. Even though women indicate a positive attitude toward taking a multivitamin and perceive that others would respond positively to this behavior, factors such as forgetfulness, cost, time, and negative pill attributes such as size and taste (CDC, 2005; Lindsey et al., in press) might prevent women from actual

performance of the behavior. If this is the case, then effective health campaigns targeting perceived behavioral control might be the most effective method of increasing women's multivitamin consumption.

Given this rationale and previous evidence that the TPB has been shown to explain multivitamin-taking behavior, the current study proposes the following hypothesis:

H2: The TPB will explain reported multivitamin consumption behavior among women of childbearing age.

## SOCIAL COGNITIVE THEORY

Scholars have argued that social cognitive theory (SCT) provides an explanatory mechanism for how people acquire new behaviors (e.g., DeFleur & Ball-Rokeach, 1989). Originally called social learning theory, SCT (Bandura, 1977, 1986) borrows from the early learning theories that suggest that people learn behavior by pairing performance with the rewards or punishments generated by this behavior, but it differs from the earlier theories in that it emphasizes humans' ability to learn through observation rather than direct experience of the reinforcement. The fundamental assumption of SCT is that by observing others, one forms an idea of how new behaviors are performed, as well as how they are rewarded or punished, and this information serves as a guide for personal behavior.

Although the TRA and TPB incorporate the idea of other people being important in a decision-making process through subjective norm, SCT brings the role of others to the forefront. By observing the behavior of others and the outcomes received as a result of the action, people consider whether or not a particular behavior is one they would want to perform. Several factors come into play during these considerations. According to SCT, the goals that people set for themselves, and the behaviors they choose to enact to make progress toward those goals, are determined by three factors: self-efficacy, outcome expectations, and environmental supports and resources relevant to their goal pursuit (Bandura, 1986, 1997).

Self-efficacy refers to people's beliefs in their capability to organize and confidently execute the course of action required to perform a given behavior successfully (Bandura, 1986). Similar in nature to the TPB's construct of perceived behavioral control, a person with high self-efficacy is confident that he or she can perform the chosen behavior, and a person with low self-efficacy doubts his or her ability to perform this behavior. SCT makes a clear distinction between beliefs about the ability to enact a behavior (i.e., self-efficacy) and beliefs about the outcomes that will result from the behavior. This latter concept has been called outcome expectations, which are the effects or consequences (physical, social, self-evaluative, or other) that are believed to result from performing a particular behavior. As Maibach and Cotton (1995) stated, "People are motivated to perform behaviors that they

believe will produce outcomes they desire” (p. 49). A single behavior could have more than one expected outcome; thus, those outcomes viewed as more important tend to have a stronger influence on whether or not the behavior will be performed. Finally, environmental supports and resources comprise the third factor determining behavior according to SCT. This construct suggests that certain environmental factors could help or hinder one's decision to perform a particular behavior. Issues such as financial considerations and physical limitations could affect this decision, as well as opinions of other people who might be important to an individual. SCT suggests that these three factors—self-efficacy, outcome expectations, and environmental supports—all work together to determine how people make progress toward their goals.

Although it could be assumed that self-efficacy, outcome expectations, and environmental supports all contribute to behavior directly, a recent review by SCT's original author (Bandura, 2004) indicated that an additional step in the cognition-to-action path might be included. Intentionality and forethought are identified as core features of behavior. Bandura suggested that “people are not only agents of action” (p. 618), but that people form intentions that include action plans and strategies for realizing them prior to performing the action or behavior. Thus, self-efficacy, outcome expectations, and environmental supports could be assumed to affect intentions, which then predict whether or not the behavior will occur. Consistent with Bandura's recent thinking, the current study presumes that self-efficacy, outcome expectations, and environmental supports will impact intention, and intention will act as the sole predictor of behavior. Indeed, previous research on myriad health behaviors showed that SCT can be used successfully (see e.g., Coleman, Horodyski, Contreras, & Hoerr, 2005; Netz, Wu, Becker, & Tenenbaum, 2005; Winett, Tate, Anderson, Wojcik, & Winett, 2005).

SCT implications for the current project indicate that before women will consider taking multivitamins daily, they will need to perceive that certain health outcomes will result from this behavior (outcome expectations—women might need to believe that vitamin consumption prevents birth defects, prevents illness, or simply improves general health), as well as view these outcomes as important to them. In addition to perceiving these outcomes as desirable, women must perceive that they are capable of performing this behavior (self-efficacy). If factors such as limited budget or inability to swallow pills are present, self-efficacy might decline, but women who perceive that they can afford to purchase vitamins and are capable of swallowing them (or taking an alternative form like a chewable tablet) will have high self-efficacy. In addition to outcome expectations and self-efficacy, environmental supports will come into play. If women perceive that others will disapprove of multivitamin use, this environmental pressure could affect their decision regarding the behavior negatively; likewise, perceptions of positive environmental support could encourage this behavior. Thus, outcome expectations, self-efficacy, and environmental

supports all affect women's intentions to take multivitamins, and these intentions will determine whether or not the behavior is performed.

Given this rationale, the current study proposes that one could assume reasonably that SCT could explain women's decision to take a multivitamin. Thus, the following hypothesis is offered:

H3: SCT will explain reported multivitamin consumption behavior among women of childbearing age.

## COMPARING THE THEORETICAL CONSTRUCTS

Because all three of these social influence models have been used effectively in a variety of health contexts, it remains unclear which would provide the strongest guidance in an effort to increase multivitamin consumption among women of childbearing age. Although all three theories could provide acceptable foundations for public health messages surrounding this issue, one goal of this investigation is to examine all of the constructs that comprise the three models to determine which combination of theoretical constructs best explains this target behavior. Therefore, the following research question is offered to address this issue:

RQ1: Which constructs from the theories examined—the TRA, the TPB, or SCT—best predict intent to consume multivitamins and subsequent multivitamin consumption (behavior) reported among reproductive-aged women?

## METHOD

### Procedure

The current study was part of a larger investigation included in a nationwide consumer mail panel survey. The sampling and data collection were conducted by Synovate, Inc. Respondents were recruited to join the mail panel through a 4-page recruitment survey in early 2004. In return for their participation, respondents were given small gifts (e.g., a 20-minute telephone calling card) and were entered into a sweepstakes with a first-place prize of \$1,000 and five second-place prizes of \$50 each. In October 2004, a total of 5,947 surveys were mailed by Synovate to potential participants. Responses to the survey were received from 4,214 participants using the provided postage-paid envelopes, yielding a response rate of 71%. The data were poststratified and weighted so that the sample distribution of age, race, sex, household size, and household income matched that of the

general population according to the 2000 U.S. census. This weighting adjusted for over- or underrepresentation of categories within these demographic variables.

## Participants

Because the authors were interested only in women of childbearing age, the data from women 18–45 years old ( $M = 33.50$ , median = 34.00, mode = 24.00,  $SD = 7.45$ ) were examined, resulting in a final sample of 1,048 women on which all subsequent analyses were based. A majority of the women were married (55.5%), with 30.7% never married and 12.2% either widowed, divorced, or separated. Participants' education level included women who attended elementary or high school (3.5%), graduated from high school or trade school (25.1%), attended college (41.3%), graduated from college (20.6%), and attended graduate school (9.2%). Most participants held full-time jobs (62.7%), 10.8% worked part time, and 16.7% identified themselves as "homemakers." Annual household incomes ranged from less than \$5,000 to over \$300,000 ( $M = \$34,000$ , median = \$40,000–\$44,999). Most respondents were White (64.2%), 14.0% were African-American, 15.5% were Hispanic, 2.4% were Asian, and 3.9% indicated a race/ethnicity of "other."

## Instrumentation

With few exceptions, measures were composed of five-point, Likert-type items on a scale ranging from strongly disagree to strongly agree, and were scored such that higher scores indicated greater perceptions of the construct being measured (alternate measurement will be discussed in detail where necessary). Given that specific items were specified a priori to measure one and only one factor, confirmatory factor analysis was employed to test the measurement model (Anderson, Gerbing, & Hunter, 1987; Hunter & Gerbing, 1982; Levine, 2005). The data were found to be consistent with the proposed factors. Internal consistency tests showed that the inter-item correlations were substantial, and errors calculated between items measuring the same construct were within sampling error of zero. Likewise, the parallelism test indicated that the errors calculated between items measuring different constructs were within sampling error of zero.

*Attitude toward multivitamin use.* Three items modified from previous health behavior research (e.g., Kopfman, Smith, Morrison, Lindsey, & Yoo, 2002; Smith, Kopfman, Lindsey, Yoo, & Morrison, 2004; Smith, Lindsey, Kopfman, Morrison, & Yoo, in press) measured attitudes for each of the models (e.g., "I think it is a good idea for me to take a multivitamin every day."). Attitudes toward multivitamin use had a mean of 3.74 ( $SD = 1.13$ ) and standardized item alpha ( $SI\alpha$ ) was found to be .89.

*Subjective norm (environmental support).* Three items measured subjective norm (for tests of the TRA and TPB) and environmental support (for the test of SCT) (e.g.,

“People who are important to me believe that I should take a multivitamin every day.”). Subjective norm (environmental support) had a mean of 3.13 ( $SD = 1.16$ ,  $SIá = .93$ ).

*Self-efficacy (perceived behavioral control).* Self-efficacy (for the test of SCT) and perceived behavioral control (for test of TPB) were measured using three items (e.g., “Taking a multivitamin every day is easy for me.”). The items were consistent with previously published scales and conceptualizations of the construct (e.g., Bandura, 1997; Pastorelli, Caprara, Barbaranelli, Rola, Rosza, & Bandura, 2001; Witte, 1992). Self-efficacy (perceived behavioral control) had a mean of 3.75 ( $SD = 1.05$ ,  $SIá = .77$ ).

*Intent.* Three items modified from previous research (e.g., Kopfman et al., 2002; Lindsey, 2005; Lindsey, Ah Yun, & Hill, 2007; Smith et al., 2004; Smith et al., in press) measured behavioral intention for each of the models (e.g., “I plan to take a multivitamin every day.”). Intent had a mean of 3.47 ( $SD = 1.34$ ,  $SIá = .95$ ).

*Outcome expectations.* Outcome expectations were measured by creating a composite variable that had two sets of items: (a) the likelihood of various outcomes and (b) the personal importance of each outcome. First, participants were asked to indicate how likely they perceived each of seven outcomes to be on a scale from 1 (very unlikely) to 5 (very likely). This index is consistent with previously published scales and conceptualizations of this variable (e.g., Bandura, 1986; Solomon & Annis, 1989) and multivitamin-related outcomes measured previously (e.g., CDC, 2004b, 2005).

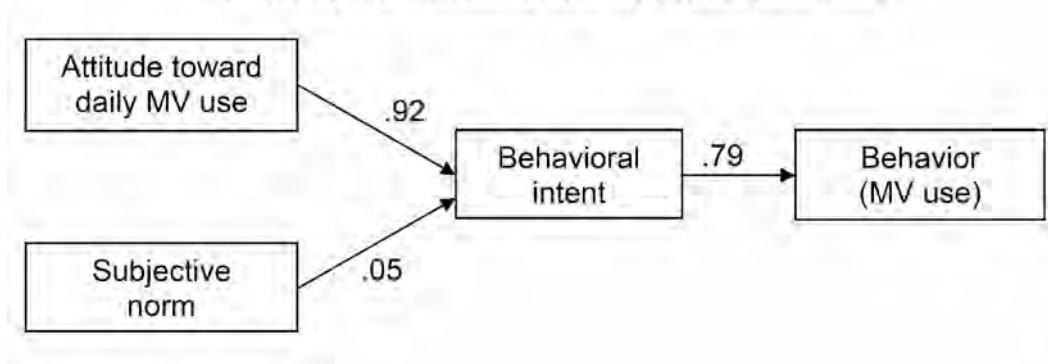
Outcomes included items such as “I will be healthier if I take a multivitamin,” “Taking a multivitamin every day will lower my risk of having a baby with certain birth defects,” and “Taking a multivitamin every day will keep me from getting sick.” The second set of items asked respondents to rate how personally important each outcome was on a scale from 1 (not important) to 5 (very important) and included items such as “Becoming healthier,” “Lowering your risk of having a baby with certain birth defects,” and “Getting the vitamins you do not get from the food you eat.” For each participant, the likelihood of each outcome was multiplied with its corresponding importance item (e.g., likelihood of “I will be healthier if I take a multivitamin” x importance of “becoming healthier”), and the resulting products were averaged to create the final variable. Values possible for the resulting outcome expectations variable ranged from 1.00 to 25.00, and had a mean of 14.43 ( $SD = 4.59$ ,  $SIá = .80$ ).

*Behavior.* Multivitamin use was measured with a single open-ended item asking respondents to write the number of times they took multivitamins in a week. Responses ranged from 0 to 7 with a mean of 3.34 ( $SD = 3.06$ , median = 4.0).

## RESULTS

To test each of the hypothesized models, the ordinary least squares criterion (Hunter & Gerbing, 1982) was used to estimate the parameters, parameter size was examined, and

Figure 1  
Hypothesized TRA Model With Path Coefficients  
Corrected For Attenuation Due To Measurement Error



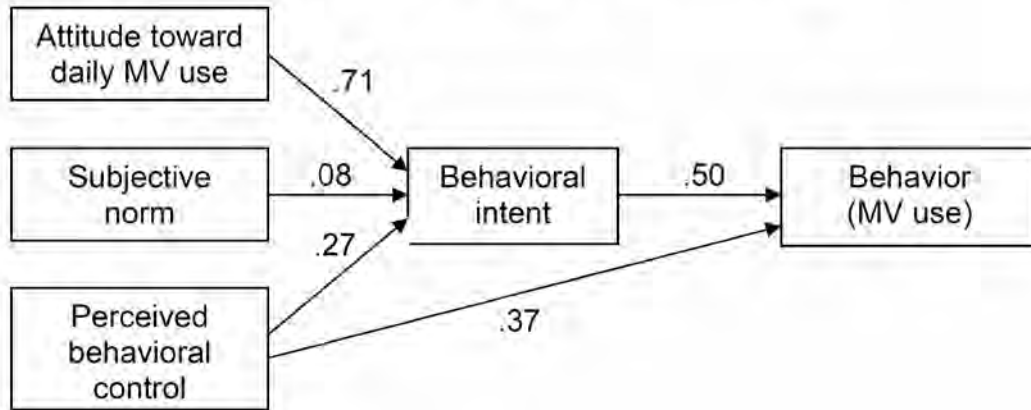
the fit of each model was assessed. Parameter size was determined in each path diagram by performing a simple regression of each endogenous variable onto its causal antecedent, and model fit was tested by comparing the estimated parameter size to the reproduced correlations (see Hunter & Gerbing, 1982 for information on reproducing correlations in path analysis). Models are said to be consistent with the data when path coefficients are substantial and the differences between parameter estimates and reproduced correlations (errors) are attributable to sampling error. If the path coefficients are within sampling error of zero or the errors are larger than what is expected from sampling error alone, the model is said to be inconsistent with the data.

### Theory of Reasoned Action

The TRA posits that both attitude and subjective norm impact behavioral intent, which in turn predicts behavior. The path coefficients for this model, presented in Figure 1, showed that each of the path coefficients was in the direction predicted by the TRA, but not all relationships were substantial. The coefficient linking attitude and intent was 0.92,  $P(0.88 \leq \hat{\alpha} \leq 0.96) = .95$ , indicating that attitude had a substantial effect on intentions to take daily multivitamins. Intent, in turn, affected behavior (path coefficient = 0.79) indicating a tendency for respondents who intended to take a multivitamin daily to engage in that behavior,  $P(0.77 \leq \hat{\eta} \leq 0.81) = .95$ . Subjective norm, however, had little impact on behavioral intent. The coefficient linking subjective norm and intent was .05,  $P(-0.02 \leq \hat{\alpha} \leq 0.13) = .95$ , and was within sampling error of zero.

The differences between predicted and obtained correlations for all unconstrained bivariate relationships in the model were examined, and none differed substantially from what was expected from sampling error (errors ranged from -.02 to -.07). Although the

Figure 2  
Hypothesized TPB Model with Path Coefficients  
Corrected For Attenuation Due To Measurement Error



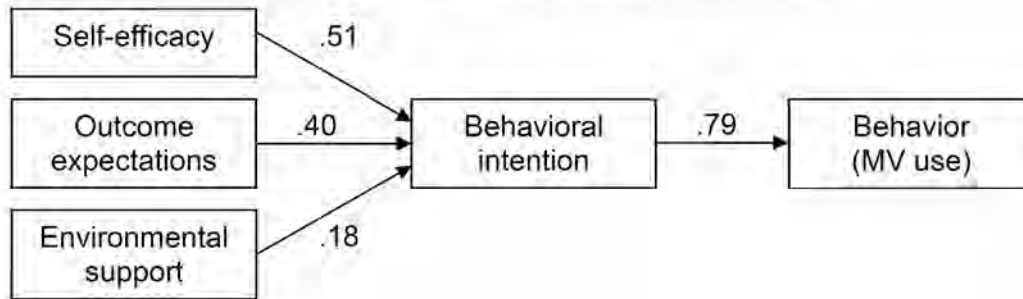
errors were small, a confidence interval around a path coefficient that includes zero indicates that there is no real link between the two constructs. Therefore, it is clear that subjective norm cannot be declared a predictor of intent. For these reasons, the data were judged to be inconsistent with the TRA model, hence inconsistent with the first hypothesis, and suggested that the TRA did not explain women's behavior regarding multivitamins because "important others" appeared not to be very important when it comes to multivitamin use.

### Theory of Planned Behavior

The TPB proposes the same conceptual structure as the TRA with the inclusion of an additional variable: perceived behavioral control. The TPB predicts that attitude, subjective norm, and perceived behavioral control all impact intent, and perceived behavioral control and behavioral intention both directly influence behavior. Path coefficients for the TPB, presented in Figure 2, indicate that each was in the direction predicted, but not all relationships were substantial. Attitude demonstrated a substantial effect on intentions to take multivitamins, as the coefficient linking these variables was .71,  $P(0.63 \leq \hat{\alpha} \leq 0.79) = .95$ . Subjective norm showed little effect on intent with a coefficient of .08,  $P(0.01 \leq \hat{\alpha} \leq 0.15) = .95$ . Although not very large in magnitude, the coefficient linking subjective norm and intent was not within sampling error of zero, and can be viewed as acceptable. Perceived behavioral control demonstrated a substantial effect on both intent [path coefficient = .27,  $P(0.19 \leq \hat{\alpha} \leq 0.35) = .95$ ] and behavior [path coefficient = .37,  $P(0.27 \leq \hat{\alpha} \leq 0.47) = .95$ ]. Finally, the coefficient linking intent and behavior was .50,



Figure 3  
Hypothesized SCT Model With Path Coefficients  
Corrected For Attenuation Due To Measurement Error



$P(0.42 \leq \hat{\alpha} \leq 0.58) = .95$ , indicating that intent remained a substantial predictor of behavior.

The differences between predicted and obtained correlations for all unconstrained bivariate relationships in the model were examined, and none differed substantially from what was expected from sampling error (errors ranged from  $-.02$  to  $-.03$ ). Thus, given that errors were small and the path coefficients were ample in size, it could be concluded that the TPB provided an acceptable explanation for multivitamin-taking behavior. Therefore, the data were consistent with the second hypothesis. One should be cautious when interpreting these results, however, given that subjective norm demonstrated a minimal effect on intent and the resulting path coefficient might be a statistical artifact of the large sample size.

### Social Cognitive Theory

For the current investigation, SCT was conceptualized to include five key variables identified by Bandura (1977, 1986, 2004). Self-efficacy, outcome expectations, and environmental support were predicted to impact behavioral intention, which, in turn, affects behavior. Path coefficients for SCT, presented in Figure 3, indicate that all were ample and in the predicted direction for each of the proposed relationships. The coefficient linking self-efficacy and intent was  $.51$ ,  $P(0.45 \leq \hat{\alpha} \leq 0.57) = .95$ , indicating that self-efficacy demonstrated a substantial effect on intentions to take multivitamins. Similarly, outcome expectations had a significant effect on intent, with a path coefficient of  $.40$ ,  $P(0.32 \leq \hat{\alpha} \leq 0.48) = .95$ . Somewhat smaller in effect but still ample in size, the coefficient linking environmental support with intent was  $.18$ ,  $P(0.10 \leq \hat{\alpha} \leq 0.26) = .95$ . Finally, intent demonstrated a strong relationship with behavior, yielding a path coefficient of  $.79$ ,  $P(0.77 \leq \hat{\alpha} \leq 0.81) = .95$ . These results indicated that expected outcomes, personal beliefs about one's capability to take multivitamins daily, and perceived support from others all

influenced participants' intentions to take multivitamins, and this intent determined whether or not they actually engaged in the behavior.

An examination of the errors for all unconstrained bivariate relationships in the model indicated that most did not differ substantially from what was expected from sampling error, as they ranged primarily from  $-.02$  to  $-.07$ , but that one error of  $.14$  was slightly larger than preferred although it was not large enough to be considered unacceptable. Despite this slightly larger than preferred error, the path coefficients were quite substantial and the errors were within an acceptable range, both of which suggest that SCT does provide a satisfactory explanation for multivitamin consumption behaviors. Therefore, the data were consistent with the third hypothesis.

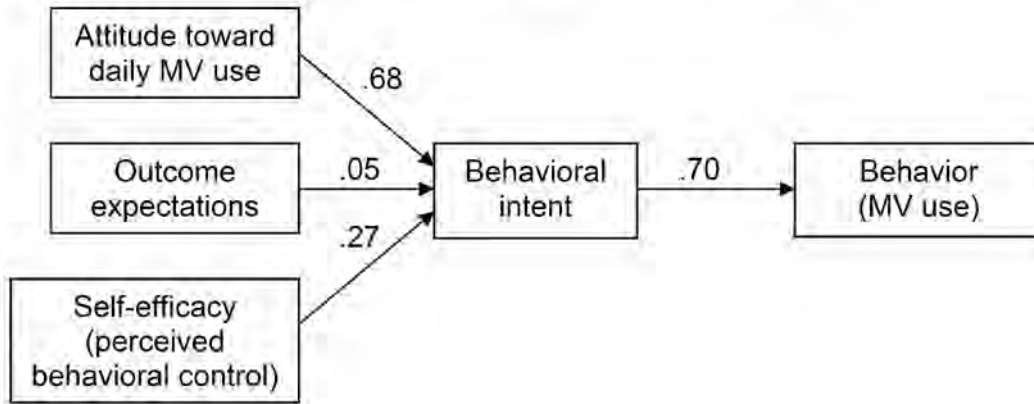
### Research Question

Although all three theories examined in this investigation—the TRA, the TPB, and SCT—could have provided an acceptable foundation for public health messages surrounding multivitamin use, the goal of this study was to determine which constructs from these theoretical frameworks would best explain this target behavior. To assess which of the theoretical constructs best explain multivitamin consumption among reproductive-aged women, the results of all three path analyses were examined to determine which antecedent variables would be included in the post hoc analysis. The strongest predictors of behavioral intent were attitude (from the TRA and TPB), self-efficacy (from the TPB and SCT), and outcome expectations (from SCT). These three theoretical constructs were then used to create a post hoc model that was tested to determine which constructs were the best predictors of reproductive-aged women's intent to take multivitamins daily and the women's ensuing behavior.

The post hoc model posits that attitude, self-efficacy, and outcome expectations impact intent to take a daily multivitamin, which in turn predicts behavior. Path coefficients for this post hoc model, presented in Figure 4, show that each was in the direction predicted, but not all relationships were substantial. The coefficient linking attitude and intent was  $0.68$ ,  $P(0.62 \leq \hat{\alpha} \leq 0.74) = .95$ , indicating that one's attitude had a substantial effect on intentions to take daily multivitamins. Similarly, self-efficacy had a significant effect on intent, as the path coefficient was  $0.27$ ,  $P(0.21 \leq \hat{\alpha} \leq 0.33) = .95$ . Intent, in turn, affected behavior (path coefficient =  $0.70$ ), indicating a tendency for those respondents who intended to take a multivitamin daily to engage in that behavior,  $P(0.66 \leq \hat{\alpha} \leq 0.74) = .95$ . Outcome expectations, however, had little impact on behavioral intent. The coefficient linking outcome expectations and intent was  $.05$ ,  $P(-0.03 \leq \hat{\alpha} \leq 0.13) = .95$ , and was within sampling error of zero.

The differences between predicted and obtained correlations for all unconstrained bivariate relationships in the model were examined, and one differed from what was

Figure 4  
Post Hoc Model With Path Coefficients



expected from sampling error (.14). Although the errors were acceptable, a confidence interval around a path coefficient that includes zero indicates that there was no real link between the two constructs. Therefore, the post hoc model indicates that outcome expectations did not predict intentions and behavior as well as attitude and self-efficacy, and that outcome expectations should not be viewed as a strong predictor of intent. In answer to the research question, results from this analysis clearly suggest that the strongest predictors of intentions and subsequent behaviors related to taking a multivitamin daily were attitude and self-efficacy.

## DISCUSSION

In an effort to determine which social influence theories, or theoretical constructs, might best be used to guide a campaign encouraging women of childbearing age to consume multivitamins containing folic acid, the current study tested three theoretical models—the TRA, the TPB, and SCT—in order to determine which constructs best predicted multivitamin use among reproductive-aged women in the United States.

Results from the test of the first hypothesis examining the TRA indicated that the opinions of others regarding multivitamin use (subjective norm) did not exhibit a significant influence on women's intent to take multivitamins, and because of this, the TRA did not provide a satisfactory explanation of the target behavior (daily consumption of multivitamins). Although the findings of this study suggest that the TRA did not provide an adequate explanation of the behavior examined here, these results do not discredit the TRA, which has been a popular social influence theory for a wide variety of contexts. Rather, it has become apparent that normative considerations did not play an important role in

women's decisions about multivitamins. Although the opinions of others might matter more when weighing other behavioral options, they are not given much consideration by women in this particular context, and these results are consistent with previous research on multivitamins (Lindsey et al., in press). Recent research has begun looking at the distinction between descriptive and injunctive norms, as well as variables that moderate the relationship between norms and behaviors (e.g., Lapinski & Rimal, 2005). Future use of the TRA to examine multivitamin behaviors might find stronger predictive values of norms when considering different explications of this construct.

Having rejected the TRA as an effective theoretical model in the current study, the statistical findings for the remaining two hypotheses presented a challenge for interpretation. The TPB yielded low errors but a rather weak path coefficient for subjective norm. SCT, on the other hand, produced substantial path coefficients, and one error somewhat larger than preferred. Although results for both models indicated acceptable predictive ability, neither model produced statistical evidence that it explained the dependent variables better than the other. In fact, both models offer viable explanations of the target behavior. Therefore, post hoc analyses examined a combination of the strongest constructs from each of these models to determine which of the theoretical constructs best predicts women's multivitamin consumption intent and behavior.

Examining a model in which attitude, self-efficacy, and outcome expectations all predicted intent, which then predicted behavior, provided a clear answer to the research question. Although it appeared to be a strong predictor of multivitamin use when examined with the SCT model, outcome expectations was not found to have a strong impact on intent when compared with attitude and self-efficacy. The strongest predictors of multivitamin use among women of childbearing age were attitude and self-efficacy. The theoretical and practical implications of these findings will be considered.

### Theoretical Implications

All of the theories examined in this investigation—the TRA, the TPB and SCT—have been used as theoretical underpinnings for innumerable persuasive endeavors, including myriad health-related topics. In this study, attitude, self-efficacy, and outcome expectations demonstrated the strongest influence on intent when testing the individual hypotheses, and intent consistently produced a significant impact on behavior across theories. For campaigns targeted to women of childbearing age, post-hoc analyses examining constructs elicited from these theories clearly suggest that attitude is the most influential factor contributing to intent, but that self-efficacy, or a woman's own belief about whether or not she can perform a particular behavior, plays a significant role in determining both intent and behavior. Subjective norm (perception of important others' attitudes) and outcome expectations were found to affect women's intent to take multivitamins, but these

effects were either insignificant or weak. Finally, consistent with much of the previous work testing the attitude-behavior relationship, intent to consume multivitamins had a strong relationship with the corresponding behavior.

When examining the strongest constructs that emerged from the theories guiding this study, an interesting picture emerges for consideration. If constructs from these theories are used to guide message design, multivitamin messages aimed at women of childbearing age should focus on increasing positive attitudes toward multivitamins and increasing women's perceived self-efficacy. The theoretical implications of this study provide clear practical considerations for any attempt to persuade women to take multivitamins.

More broadly, the findings of this investigation suggest that perhaps social influence researchers and practitioners ought not limit themselves to the use of one theoretical perspective to guide their work. Testing several different theories and selecting the constructs that are most relevant for the particular context or application will provide a stronger foundation on which to base persuasive efforts.

### Practical Implications

No single influence theory dominates health communication research or practice because each theory offers a different perspective of audiences, behaviors, and the contexts in which those behaviors occur. Communication campaigns might have the greatest impact if they use a combination of theories to understand a problem and articulate solutions. By reviewing these theories, clues emerge for practitioners related to overall program objectives and strategies, message and materials development, and selection of messengers and message channels.

Each of the three theories offers insights that health communication professionals can use in developing clear and compelling messages to influence the target behavior of multivitamin use. In the current study, attitude was found to be the strongest predictor of intent to consume multivitamins. This finding suggests that practitioners seeking to increase women's use of multivitamins should target persuasive messages at creating favorable attitudes. Despite the fact that multivitamins containing folic acid are one of the best ways to prevent birth defects, previous research has shown that this information does not necessarily create positive attitudes toward consumption (Lindsey et al., in press). Instead, practitioners might employ other creative methods to encourage both multivitamin use and the knowledge that taking multivitamins is an important daily behavior. Clearly, the theories examined here indicate that creating a positive attitude toward the desired behavior is an important step in the persuasive process.

Also, self-efficacy (perceived behavioral control) was found to be a strong predictor of intent to consume multivitamins. Women of childbearing age need to feel that taking a multivitamin is something they can do easily. New evidence suggests that certain factors can

affect self-efficacy, and thus the successful performance of this behavior. For example, women have noted that they are not capable of taking a multivitamin every day because of time (hard to fit it into a busy schedule), high costs of multivitamins (e.g., too expensive, not in women's tight budgets), negative attributes of multivitamin pills (e.g., problems swallowing pills, unappealing smell/taste), forgetfulness, and misperceptions about getting necessary nutrients from food sources even when women acknowledge having poor diets (Lindsey et al., in press). Persuasive messaging is vital to increasing women's perceived self-efficacy around daily multivitamin use. Although persuasive messages cannot overcome unappealing product attributes or cost barriers, they can point out the many types of multivitamins from which women can choose (pill, chewable, liquid, gummy bears, etc.), correct misperceptions about costs, or identify locations where multivitamins can be purchased inexpensively, to overcome these barriers. Practitioners seeking to increase multivitamin use would be wise to address these issues of self-efficacy.

### Limitations

*Measurement of norms.* Regardless of the theoretical model, subjective norm (environmental support) consistently showed a weak effect on behavioral intention. The items used to measure subjective norm included general referents (e.g., "people who are important to me"). Although this generalized approach is used frequently, increased specificity of the referent (e.g., my mother, my friends, my doctor) could have resulted in different conclusions. There is evidence to suggest that a doctor's recommendation might be an influential antecedent of this behavior. For example, 20% of women not taking vitamin or mineral supplements indicated that a doctor's recommendation might motivate them to do so; however, among women who reported not consuming a vitamin or mineral supplement daily, 31% indicated they had received a doctor's recommendation (CDC, 2005). Exploration of normative influences should be focused on pursuing specific influencers (e.g., mothers and doctors), pursuing different types of norms (e.g., descriptive and injunctive norms, Lapinski & Rimal, 2005), validating or invalidating their influence on this behavior, and using that information to develop effective intervention strategies.

In the test of SCT, environmental support was measured in terms of perceived support from important people. This is a narrow definition given that environmental supports for multivitamin use could include a wide array of factors including visibility of and access to multivitamins. These are important areas for consideration, and future examinations of multivitamin use should include an expanded assessment of environmental support.

*Outcome expectations.* Although outcome expectations were found to demonstrate a strong influence on intent to take multivitamins in the test of SCT, it had little predictive ability in the current investigation when compared to attitude and self-efficacy. If it is true

that to perform this behavior, women must perceive that certain outcomes will result from taking a daily multivitamin, it is possible that the current study did not include those outcomes that are most influential with women. Understanding women's expectations about what multivitamins can do for them (e.g., stave off sickness) and marrying those expectations with legitimate, credible, science-based information about multivitamin benefits is important. One should note, however, that the current study examined outcomes such as general health, prevention of birth defects, and getting nutrients not obtained from food. Although these are outcomes one might expect from multivitamins, future research should explore what other expectations women might have and seek to better understand their perceptions of the costs and benefits of taking a multivitamin. Practitioners attempting to increase women's multivitamin use must determine which outcomes are perceived as most valuable to the target audience and which are legitimate (e.g., have scientific evidence consistent with the outcomes), and then use these findings to test the predictive ability of outcome expectations.

### Conclusion

The comparison of three influence models regarding their ability to predict multivitamin use among women of childbearing age demonstrates the utility of using several theories both to understand a public health problem and also to design effective interventions to address the problem. None of the theories in this examination provided an exceptional explanation of multivitamin behaviors, but two constructs from these theories should be considered when designing persuasive messages aimed at increasing multivitamin consumption: attitude and self-efficacy. Campaigns designed around the constructs of these theories might improve the odds of getting women to take multivitamins daily, thereby decreasing the number of babies born with birth defects in the United States.

### REFERENCES

- Ajzen, I. (1985). From intentions to actions: A theory of planned behavior. In J. Kuhl & J. Beckman (Eds.), *Action-control: From cognition to behavior* (pp. 11-39). New York: Springer-Verlag.
- Ajzen, I. (1987). Attitudes, traits, and actions: Dispositional prediction of behavior in personality and social psychology. In L. Berkowitz (Ed.), *Advances in experimental social psychology* (Vol. 20, pp. 1-63). San Diego, CA: Academic Press.
- Ajzen, I. (1988). *Attitudes, personality and behavior*. Chicago: Dorsey.
- Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, 50, 179-211.

- Ajzen, I., & Fishbein, M. (1970). The prediction of behavior from attitudinal and normative variables. *Journal of Experimental and Social Psychology, 6*, 466-487.
- Ajzen, I., & Fishbein, M. (1974). Factors influencing intentions and the intention-behavior relation. *Human Relations, 27*, 1-15.
- Ajzen, I., & Fishbein, M. (1980a). Prediction of goal-directed behavior: Attitudes, intentions, and perceived behavioral control. *Journal of Experimental Social Psychology, 22*, 453-474.
- Ajzen, I., & Fishbein, M. (1980b). *Understanding attitudes and predicting social behavior*. Englewood Cliffs, NJ: Prentice-Hall.
- Anderson, J. C., Gerbing, D. W., & Hunter, J. E. (1987). On the assessment of unidimensional measurement: Internal and external consistency, and overall consistency criteria. *Journal of Marketing Research, 24*, 432-437.
- Bandura, A. (1977). *Social learning theory*. Englewood Cliffs, NJ: Prentice Hall.
- Bandura, A. (1986). *Social foundations of thought and action: A social cognitive theory*. Englewood Cliffs, NJ: Prentice Hall.
- Bandura, A. (1997). *Self-efficacy: The exercise of control*. New York: Freeman.
- Bandura, A. (2004). Swimming against the mainstream: The early years from chilly tributary to transformative mainstream. *Behavior Research and Therapy, 42*, 613-630.
- Centers for Disease Control and Prevention (CDC). (1992). Recommendations for the use of folic acid to reduce the number of cases of spina bifida and other neural tube defects. *Morbidity and Mortality Weekly Report, 41*.
- CDC. (2004a). Spina bifida and anencephaly before and after folic acid mandate – United States, 1995-1996 and 1999-2000. *Morbidity and Mortality Weekly Report, 53*, 362-365.
- CDC. (2004b). Use of vitamins containing folic acid among women of childbearing age – United States, 2004. *Morbidity and Mortality Weekly Report, 53*, 847-850.
- CDC. (2005). Use of vitamins containing folic acid among women of childbearing age – United States, 2005. *Morbidity and Mortality Weekly Report, 54*, 955-958.
- Coleman, G., Horodyski, M. A., Contreras, D., & Hoerr, S. M. (2005). Nutrition education aimed at toddlers (NEAT) curriculum. *Journal of Nutrition Education and Behavior, 37*, 96-97.
- DeFleur, M. L., & Ball-Rokeach, S. (1989). *Theories of mass communication*. New York: Longman.
- Eagly, A. H., & Chaiken, S. (1993). *The psychology of attitudes*. New York: Harcourt College Publishers.
- Food and Drug Administration. (1996). Food standards: Amendment of standards of identity for enriched grain products to require addition of folic acid. *Federal Register, 61*, 8781-8797.
- Fishbein, M., & Ajzen, I. (1975). *Belief, attitude, intention, and behavior: An introduction to theory and research*. Reading, MA: Addison-Wesley.
- The Gallup Organization (2005, September). Folic acid and the prevention of birth defects: A national survey of pre-pregnancy awareness and behavior among women of childbearing age 1995-2005. Princeton, NJ: The Gallup Organization.
- Hunter, J. E., & Gerbing, D. W. (1982). Unidimensional measurement, second order factor analysis, and causal models. *Research in Organizational Behavior, 4*, 267-320.
- Institute of Medicine. (1998). *Dietary reference intake: Folate, other B vitamins, and choline*. Washington, D.C.: National Academy Press.



- Kopfman, J. E., Smith, S. W., Morrison, K., Lindsey, L. L. M., & Yoo, J. (2002). The influence of race on cognitive and affective reactions to organ donation messages. *Transplantation Proceedings*, *34*, 3035-3041.
- Lapinski, M. K., & Rimal, R. N. (2005). An explication of social norms. *Communication Theory*, *15*, 127-147.
- Lawrence, J. M., Watkins, M. L., Ershoff, D., Petitti, D. B., Chiu, V., & Postlethwaite, D., et al. (2003). Design and evaluation of interventions promoting periconceptional multivitamin use. *American Journal of Preventive Medicine*, *25*, 17-24.
- Levine, T. R. (2005). Confirmatory factor analysis and scale validation in communication research. *Communication Research Reports*, *22*, 335-338.
- Lindsey, L. L. M. (2005). Anticipated guilt as behavioral motivation: An examination of appeals to help unknown-others through bone marrow donation. *Human Communication Research*, *31*, 453-481.
- Lindsey, L. L. M., Ah Yun, K., & Hill, J. B. (2007). Anticipated guilt as motivation to help unknown-others: An examination of empathy as a moderator. *Communication Research*, *34*, 468-480.
- Lindsey, L. L. M., Carter, H. K., Prue, C. E., Flores, A. L., Kopfman, J. E., Correa-Sierra, E., & Valencia, D. (In press). Understanding optimal nutrition among women of childbearing age in the United States and Puerto Rico: Employing formative research to lay the foundation for national birth defect prevention campaigns. *Journal of Health Communication*.
- Madden, T. J., Ellen, P. S., & Ajzen, I. (1992). A comparison of the theory of planned behavior and the theory of reasoned action. *Personality and Social Psychology Bulletin*, *18*, 3-9.
- Maibach, E. W., & Cotton, D. (1995). Moving people to behavior change: A staged social cognitive approach to message design. In E. Maibach & R.L. Parrott (Eds.), *Designing health messages: Approaches from communication theory and public health practice* (pp. 41-64). Thousand Oaks, CA: Sage.
- Murray-Johnson, L., & Witte, K. (2003). Looking toward the future: Health message design strategies. In T. L. Thompson, A. M. Dorsey, K. I. Miller, & R. Parrott (Eds.), *Handbook of health communication* (pp. 473-495). Mahwah, NJ: Erlbaum.
- Netz, Y., Wu, M-J., Becker, B. J., & Tenenbaum, G. (2005). Physical activity and psychological well-being in advanced age: A meta-analysis of intervention studies. *Psychology and Aging*, *20*, 272-284.
- Pastorelli, C., Caprara, G. V., Barbaranelli, C., Rola, J., Rozsa, S., & Bandura, A. (2001). The structure of children's perceived self-efficacy: A cross-national study. *European Journal of Psychological Assessment*, *17*, 87-97.
- Pawlak, R., Connell, C., Brown, D., Meyer, M. K., & Yadrack, K. (2005). Predictors of multivitamin supplement use among African-American female students: A prospective study utilizing the theory of planned behavior. *Ethnicity & Disease*, *15*, 540-547.
- Smith, S. W., Lindsey, L. L. M., Kopfman, J. E., Morrison, K., & Yoo, J. (In press). Predictors of family discussion about organ donation. *Health Communication*.
- Smith, S. W., Kopfman, J. E., Lindsey, L. L. M., Yoo, J., & Morrison, K. (2004). Encouraging family discussion on the decision to donate organs: The role of the willingness to communicate scale. *Health Communication*, *16*, 333-347.
- Solomon, K. E., & Annis, H. M. (1989). Development of a scale to measure outcome expectancy in alcoholics. *Cognitive Therapy and Research*, *13*, 409-421.

- Stiff, J. B., & Mongeau, P. A. (2003). *Persuasive communication* (2nd ed.). New York: Guilford Press.
- Sutton, P.D., & Munson M. L. (2005, January). Births, marriages, divorces, and deaths: Provisional data for January 2005. *National vital statistics reports* (Vol. 54). Hyattsville, MD: National Center for Health Statistics.
- Winett, R. A., Tate, D. F., Anderson, E. S., Wojcik, J. R., & Winett, S. G. (2005). Long-term weight gain prevention: A theoretically based Internet approach. *Preventive Medicine: An International Journal Devoted to Practice and Theory*, 41, 629-641.
- Witte, K. (1992). Putting the fear back into fear appeals: The extended parallel process model. *Communication Monographs*, 59, 329-349.