Tailoring Messages within the Stages of Change

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(ABSTRACT)

Tailored communications have been effective in increasing both recall and readership of health information. However, there is no clear evidence that tailoring is necessary or beneficial in creating behavior change. There are many possible sources for the inconsistencies in the empirical literature. This current research explores possible approaches to increase the effectiveness of message tailoring by incorporating components from the four main conceptual structures found in the literature.

In the first study, the Stages of Change Model was used to segment the sample into four distinct groups (precontemplative, contemplative, action, and maintenance). The behavioral determinants for respondents in each group were then identified. The differences between the precontemplative and contemplative segment suggest that an affective message will be more effective in changing intention for precontemplative respondents and a cognitive message will be more effective for the respondents in the contemplative segment. In a second study, an experimental study was conducted to test these alternative approaches. Results show that the proposed approaches did influence males as expected. However, females did not behave in the manner expected. Possible explanations for the differences between gender, such as behavior salience and information processing styles, are discussed. Overall, support is found for the use of tailoring messages to create behavior change.

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INTRODUCTION

The epidemics plaguing today's American population are of an entirely different strain than those of 100 years ago. At the turn of the 20th century, top causes of death were pneumonia and tuberculosis, both infectious diseases (USDHHS 2000). Effective public health efforts, however, have improved vaccination compliance and reduced the impact of such diseases. Today the country is faced with chronic diseases resulting from habitual, unhealthy behaviors. Seven of the ten leading health indicators outlined in *Healthy People 2010*, the nation's primary health initiative, are behavioral factors. Physical inactivity, overweight and obesity (a correlate to dietary practices and physical activity), tobacco use, substance abuse, and sexual behavior top the list (USDHHS 2000). Such behaviors not only have detrimental effects on the health of an individual but also create societal burden due to increased medical costs. Smoking cigarettes and overweight and obesity are currently the two leading causes of preventable death each year, accounting for 430,000 (USDHHS 2000) and 300,000 (Allison et al. 1999, CDC 2002) respectively. Yearly medical costs attributable to smoking are greater than $50 billion (USDHHS 2000). In 2000, the direct medical costs of obesity alone reached $61 billion. These figures do not include the indirect costs of earnings lost due to illness or premature death (USDHHS 2001).

The prevalence of overweight and obesity is reaching epidemic proportions. The National Health and Nutrition Examination Survey (NHANES), a cross-sectional nationally representative health survey, has been collecting and reporting data on the prevalence of overweightness and obesity since 1960. The most recent findings from

1999-2000 suggest that 65 percent of the adult population is overweight. This figure represents an increase of nine percent over data collected just five years previously. Prevalence of overweight and obesity rose approximately one percent a decade from 1960 to 1980. In the past two decades the numbers have increased approximately eight percent each period. Currently, just over thirty percent of the adult population is obese (see figure 1).

The NHANES results are calculated from actual measurements taken by health officials (Flegal 2002). Reports of overweight and obesity from self-report surveys such as the Behavioral Risk Factor Surveillance System (Mokdad et al. 1999) and the Harris Poll (Taylor 2002), though drastically underestimated, find similar upward trends for this health problem.
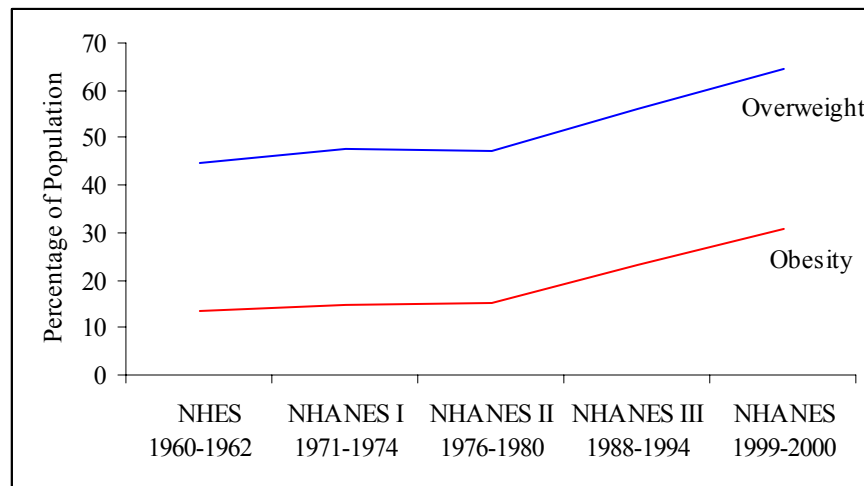
Figure 1. Prevalence of Overweight and Obesity in the United States Population

The combination of increasingly sedentary lifestyles with diets high in saturated fat suggests rising health problems for the nation. Overweight and obesity are associated

with a long list of health problems: heart disease, diabetes, stroke, hypertension, high blood cholesterol, some types of cancer, menstrual irregularities, asthma, gallbladder disease, psychological disorder, and more (NIH 1998, USDHHS 2000, USDHHS 2001. The risk of premature death is 50 to 100 percent greater for obese individuals compared to individuals with a healthy BMI (USDHHS 2001).

Overweight and obesity are operationally defined as body mass index (BMI) of greater than 25 and 30, respectively. The BMI is a mathematical function of an individual's height and weight. The National Institutes of Health and U.S. Department of Agriculture support the use of the BMI as a measurement tool for body fat (NIH 1998, USDA 2000). Results show that the BMI is significantly correlated with total body fat for most individuals (NIH 1998). However, the index does not account for muscle mass. Therefore body fat is overestimated for muscular individuals and underestimated for individuals who have lost muscle mass, such as the elderly (USDHHS 2001).

Dietary practices (caloric intake) and physical activity (caloric expenditure) are the behavioral components that influence an individual's amount of body fat. National trends in both behaviors have contributed to the increasing waist of the nation.

Fast food restaurants are increasingly popular with the American culture (Lin et al. 1999). *Healthy People 2010* addresses "the impact that away-from-home eating can have on weight management" in a call for public health officials to target this problem (USDHHS 2000). The typical combo meal includes a burger, fries, and carbonated soft drink. These meals are extremely high in total fat and saturated fat, deficient in many essential nutrients (calcium, fiber, and iron), and larger in portions than at-home-meals

(McCrory et al. 1999). One combo meal at a fast food outlet provides nearly an entire day's caloric recommendation for an individual. Studies have shown that the frequency of eating out is significantly associated with body fat (Binkley et al. 2000, McCrory et al. 1999). Additionally, only fifteen percent of the adult population currently meets federal recommendations for physical activity, thirty minutes of moderate activity most days of the week. Forty percent participated in no "leisure-time" physical activity (USDA 2000, USDHHS 2000). These trends indicate that the majority of the population is consuming more energy than they expend.

The Surgeon General's Call To Action (USDHHS 2001) outlines strategies and actions to address the nation's new epidemic. One initiative is to "conduct behavioral research to identify how to motivate people to increase and maintain physical activity and make healthier food choices." No longer can vaccinations control the diseases of the country. Behaviors must be addressed to promote healthier lifestyles among Americans. Behavioral interventions will be the key in reducing the impact of the chronic diseases plaguing today's United States.

REVIEW OF THE LITERATURE

Tailored Communications and Personal Relevance

The problem in creating communications for behavioral interventions is two-fold. The individual must be motivated to attend to and process the message or argument attempting to create behavior change. Then, the individual must have the skills and motivation to change their behavior.

The extent of processing information is determined by motivational and ability factors. The behavioral scientist has little influence over individual abilities to process message content. Motivational factors, however, can be influenced by the behavioral scientist. A key determinant in motivation to attend to or process a message is the personal relevance of the information. Arguments that contain some degree of personal importance will be processed at more thoughtful, effortful level. Personal relevance of communications can be achieved in several ways. "The attitude object (can be) linked to values, outcomes, groups, possessions, or the people that are important to the message recipient" (Petty 1995).

Behavioral researchers understand that people are "cognitive misers" (Taylor 1981) and aim to process only information necessary to make many decisions. Interventions that require individuals to sort through pages of information which are irrelevant to their own behaviors and problems, may be overwhelming to the individual and ultimately discarded. For example, a brochure teaching HIV prevention may contain information on safe sex practices and drug use. Non-drug users may open to a page on

sterilization of needles and determine that the message is irrelevant to their behaviors. Additionally, interventions that address an inclusive list of barriers for a preventive behavior may be perceived as unnecessarily time-consuming. To combat these issues, health professionals and researchers have begun tailoring communications to promote behavior change. Brug and colleagues (1999) note "because subjects have a limited information processing capacity, it is important to provide them only with information that is worth the processing effort."

Tailoring is essentially a segmentation strategy in which the segment of interest is the individual. Kreuter and colleagues (1999) define tailoring to be "any combination of strategies and information intended to reach one specific person, based on characteristics that are unique to that person, related to the outcome of interest, and derived from an individual assessment." Studies evaluating the effectiveness of tailored communications have been conducted in a variety of substantive areas including reducing smoking (Prochaska et al. 1993, Strecher et al. 1994, Curry et al. 1995), increasing cancer screening (Skinner 1994, Kreuter and Strecher 1996), changing dietary practices (Brinberg et al. 2000, Campbell et al. 1994), and increasing physical activity (Marcus et al. 1998, Kreuter and Strecher 1996).

Evidence from several studies indicates that tailored communications are significantly more effective in increasing recall, readership, and interest than non-tailored communications (Skinner et al. 1999, Brug et al. 1999). Skinner and colleagues (1994) compared tailored mammography recommendations to a non-tailored message developed from a public health service document. The non-tailored message was formatted to

resemble the tailored message in length, reading level, and appearance. Psychosocial variables addressed in the tailored document were also addressed in the non-tailored. Additionally, tailoring was hidden; the person's name was not in the message and no indication was given that the information was specific to the individual. Subjects in the tailored condition were more likely to have read most or all of the message (p < .01) and to remember reading the information (p < .05).

Brug and colleagues (1998) compared non-tailored letters, tailored letters, and tailored letters with ipsative feedback to disseminate nutrition education. All letters contained the individual's name and had similar appearances. Tailored communications, with and without ipsative feedback, were significantly more read, discussed, and rated as interesting and relevant (p < .01 each) than similar non-tailored communications.

In a review of the literature on computerized-tailored nutrition education, Brug et al. (1999) conclude, "personalized dietary and psychosocial feedback is more likely to be read, remembered, and seen as personally relevant compared to standard materials." These findings suggest that the personally relevant information in tailored communications does motivate people to attend to and process information at a deeper level than non-tailored communications regardless of inclusion of a person's name or disclosure of tailoring procedures.

Theoretical Frameworks: Tailored Communications and Behavior Change

After the individual has attended to the message, the second major challenge is to produce behavior change. The goal of some interventions is to increase preventative health behaviors such as exercising, cancer screening, and consumption of fruits and vegetables. Others attempt to reduce health risk behaviors including smoking, consumption of high amounts of fat, and sexual promiscuity. In order to create change, researchers and practitioners use well-established behavioral theory to guide their interventions and communications.

There have been mixed results in the efficacy of tailored messages to produce behavior change, even within a particular behavior (Kreuter et al. 2000). Studies that focus on the consumption of particular food categories are common in the tailoring literature. Two studies by Brug et al. (1998) and Campbell (1994) attempted to increase the fruit and vegetable intake. Brug et al. (1998) use components from the Stages of Change Model (e.g. motivation to change), Theory of Reasoned Action (e.g. attitudes and social influences) and Social Cognitive Theory (e.g. self-efficacy) for an intervention conducted in a worksite environment. A randomized three-group pretest-posttest experimental design was used. The first experimental group received computer-tailored feedback letters on their personal intake and psychological feedback. The second experimental group received the same letters as the first with additional ipsative feedback. The control group received letters with general information. All letters were similar in appearance. A posttest was conducted four weeks post intervention. Results from a repeated measures analysis of variance indicate a significant effect of tailoring for

both fruit (p< .01) and vegetable (p< .001) intake. Pairwise comparisons found that both tailored groups significantly increased vegetable consumption over the control group. For fruit consumption, only the tailored plus ipsative group significantly increased over the control.

Campbell et al. (1994) incorporate constructs from the Stages of Change Model (i.e. motivation to change), Health Belief Model (i.e. perceived risk), and Social Cognitive Theory (i.e. self-efficacy) to construct a tailored communications intervention. Again, a randomized three-group pretest posttest design was used. Participants were recruited from a North Carolina family practice. The experimental group received messages tailored to the individual's behavioral and psychological needs. The second group received non-tailored dietary recommendations. The third group received no communications. A posttest was conducted four months post intervention. No significant effect of tailoring was found. Differences between groups were not significant.

Brug and colleagues (1999) note in a review piece, "although no final conclusions about the effectiveness of computer-tailored nutrition education can be drawn, the available evidence seems to favor computer-tailoring over non-tailored communications." Many possible explanations for the inconsistency in the affect of tailored messages have been suggested including delivery methods, target populations and settings, measurement methods, message content, duration of intervention, theoretical frameworks etc. (Brug et al. 1999, Skinner et al. 1999, Rakowski et al. 1999, Brinberg and Hampton 2002).

Four theories typically provide the conceptual foundation for developing health education messages: the Theory of Reasoned Action (Ajzen and Fishbein 1980), the Health Belief Model (Becker 1974), the Social Cognitive Theory (Bandura 1986), and the Stages of Change Model (Prochaska and DiClemente 1984). No empirical evidence exists positing one theory as a better predictor of behavior change than another. Few researchers work primarily from the constructs of one theoretical framework to structure their messages (Prochaska et al. 1993, Marcus et al. 1998, Brinberg et al. 2000). The majority uses a combination of theoretical frameworks. Commonly two (Skinner et al. 1994, Kreuter and Strecher 1996) or three (Brug et al. 1998, Campbell et al. 1994) theories are used in conjunction. However, no consistency exists in the use of combinations of theories. A study has not yet been conducted combining aspects of all four major theoretical models.

Theory of Reasoned Action

The Theory of Reasoned Action, proposed by Ajzen and Fishbein (1980), is a behavioral prediction model (see figure 2). The model assumes that behavior is under volitional control and intention to perform a behavior is the best predictor of that behavior. Intention is a function of two components: attitude toward performing the behavior and subjective norms surrounding the behavior. The attitudinal component is derived from the sum of beliefs concerning positive and negative consequences (i.e. outcome expectancy) of performing the behavior multiplied by the counterpart evaluation of each belief. The normative component is the resulting sum of beliefs that "important

others" think the individual should perform the behavior multiplied by the individual's motivation to comply with those beliefs. Both components imply rational information processing on the part of the individual.
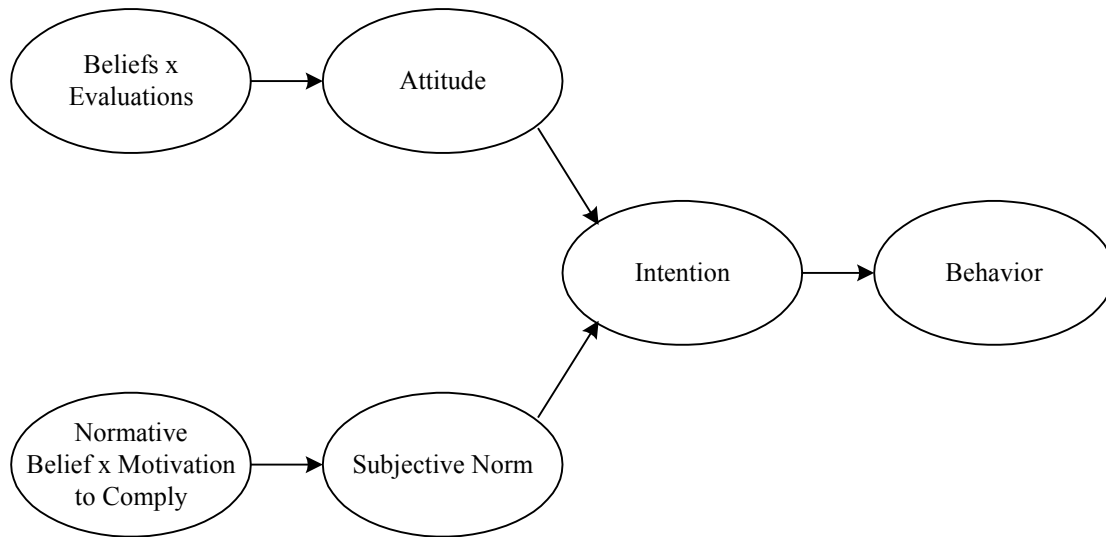
Figure 2. Theory of Reasoned Action

To predict intention, the measurement of each component of the model should correspond with respect to action, target, context, and time. Action is the active component of the behavior, or category of behaviors, of interest. Target is the object toward which the action is directed. The context refers to the conditions surrounding the behavior. Time is the period in which the behavior will take place. For example, the studies presented here will focus on reducing consumption (action) of fat (target) in daily dietary practice (context) over the next month (time).

The Theory of Reasoned Action assumes that additional variables such as age, income, barriers to action, and affect do not have a direct effect on an individual's

behavior. Rather the effects of these constructs are mediated through existing constructs within the model such as attitude and intention. Several researchers have criticized this assumption and propose additional constructs that have a direct effect on behavior (Ajzen 1991, Bodur et al. 2000). Ajzen (1991), for example, found evidence of direct link between self-efficacy and intention, not mediated through any of the current components of the model. Bodur et al. (2000) found evidence for a direct effect of emotion (i.e. affect) on intention. Additionally, some researchers proposed that certain constructs may not only be mediated through intention but may moderate the relationship between intention and behavior. The works of Triandis (1977) and Brinberg (1979) have provided evidence that the constructs of self-efficacy, past behavior, and environmental forces may have a direct effect on behavior. Results from these studies indicate that the Theory of Reasoned Action may be incomplete in defining predictors of both intention and behavior.

Health Belief Model

The Health Belief Model originally attempted to explain the lack of participation in detection and preventative health programs (Hochbaum 1958) such as cancer screening and vaccinations. Becker (1974) later reformed the model to explain behaviors of individuals who have been diagnosed with a disease. The model predicts that several conditions must exist for individuals to perform preventative health behaviors. The person must believe they are at risk for contracting a disease, which will lead to severe consequences (i.e. outcome expectancy of non-performance). Additionally, the

individual must believe that performance of the given behavior should be expected to reduce the risk of getting the disease or severity of having the disease (i.e. outcome expectancy of performance). The belief that perceived benefits of performing the behavior outweighs anticipated barriers results in this motivation. Motivation is necessary for performance of the behavior.

Perceived susceptibility is defined as the individual's subjective perception of developing some health condition. With the inclusion of individuals that have previously been diagnosed, this dimension refers to "acceptance of diagnosis, personal estimates of resusceptibility, and susceptibility to disease in general" (Rosenstock 1990). Perceived severity refers to the beliefs of the consequences and evaluation of those consequences under conditions of contracting the disease or leaving the disease untreated. The combination of perceived susceptibility and perceived severity is termed perceived threat. Perceived benefits of action depend upon perceptions of the effectiveness and feasibility of the action. Perceived barriers refer to the perceived obstacles in taking some course of action. "The combined levels of susceptibility and severity provided the energy or force to act and the perception of benefits (less barriers) provided a preferred path of action" (Rosenstock and Kirscht 1974).
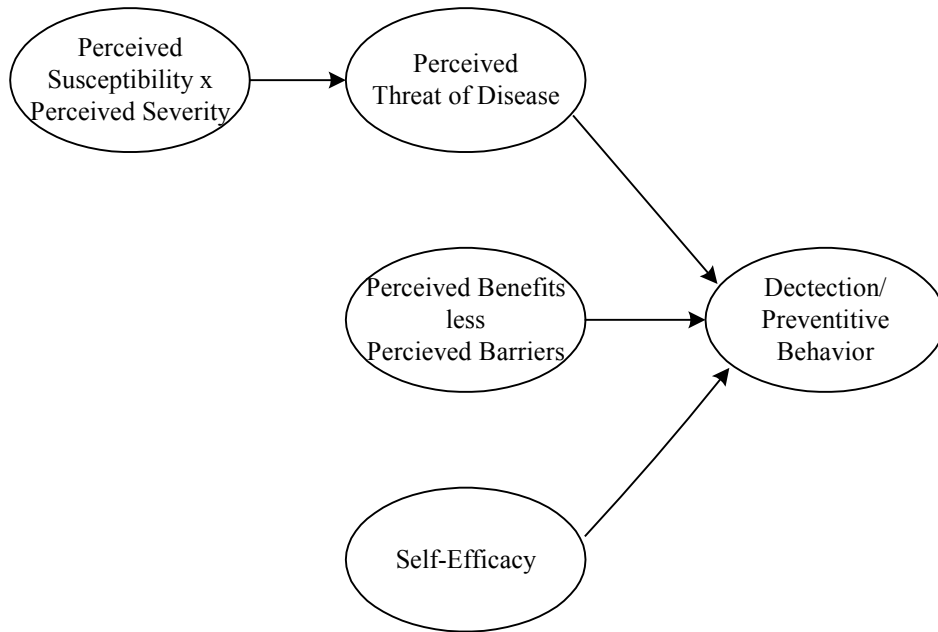
Figure 3. Health Belief Model

Rosenstock, Strecher, and Becker (1988) again altered the original Health Belief

Model to incorporate the construct of self-efficacy (see figure 3). Originally the model

proposed to predict behaviors in the context of a "one-shot" program such as an

immunization. However, these researchers have suggested that programs have developed

into life-style behaviors, which extend for the duration of individual's existence.

Therefore, self-efficacy, the self-expectancy that the individual can perform the behavior

change, should be considered separate from the outcome expectancies currently in the

model.

Social Cognitive Theory, unlike the previous two models, does not attempt to predict behavior. The theory, instead, attempts to explain behavior change. Bandura's (1986) Social Cognitive Theory extended traditional learning theory to address cognitive mediators of behavior change. The model for behavior change is triadic, dynamic, and deterministic (see figure 4). Behavior, personal, and environmental factors are constantly interacting and influencing one another simultaneously. Change in any one are has implications for change in another area. Bandura terms this assumption "reciprocal determinism."
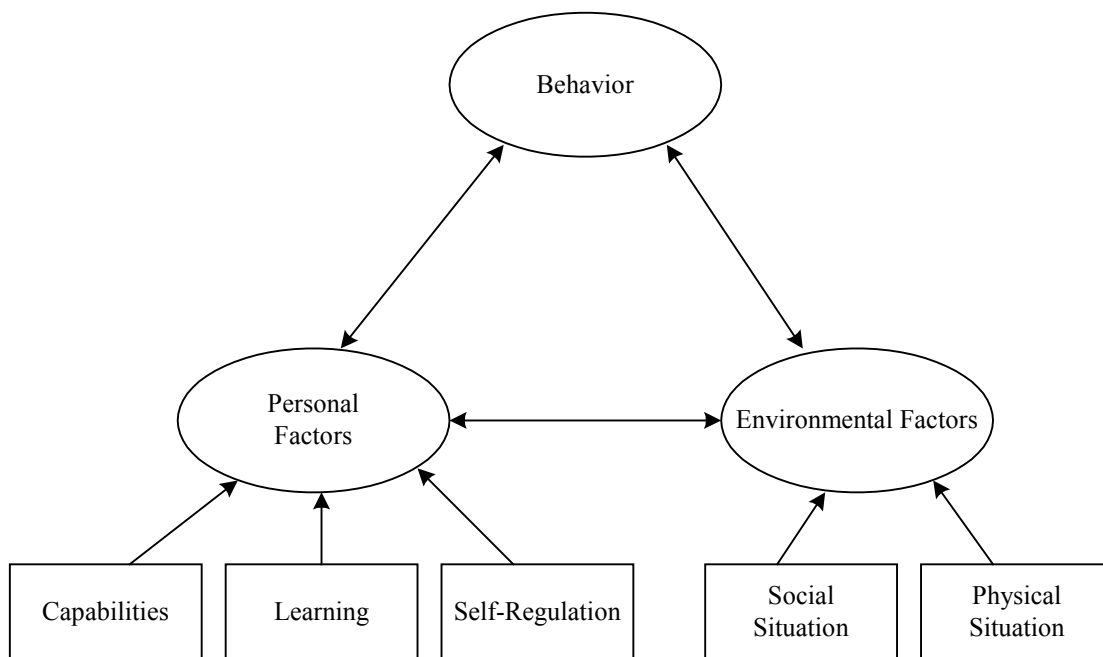
Figure 4. Social Cognitive Theory

Environmental factors include both the social (e.g. friends) and physical situation (e.g. grocery store) within which an individual acts. Cues from the environment are

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assumed to provide positive and negative consequences (i.e. outcome expectancies). Personal factors include capabilities to perform a particular behavior, expectations of behavioral outcomes, observational learning, self-regulation, and analyzing past experience. Self-regulation plays a large role in the process of behavior change and operates through three primary mechanisms: self-monitoring, judging personal behavior in relation to self-standards, and emotional coping (Bandura 1991). Lastly, self-efficacy, the self-perception of capability to perform some behavior, is proposed to be the most important component in the exercise of personal agency to produce behavior change.

Each concept in the theoretical framework has implications for inducing behavior change. For example, observational learning suggests the use of mastery models, "modeled successes by individuals of similar or lesser ability within the (same behavioral domain)" (Bandura 1997). Self-efficacy and behavioral capacity suggest approaching behavior change by providing skill training. Emotional coping implies training to improve problem solving and stress management (Perry et al. 1990). The theory notes that practicing skills under situation pressures, which would be experienced in daily life, are essential in maintenance of the health behavior. Lastly, the model proposes that given the deterministic nature of behaviors, behavior change can be accomplished through many outlets.

Stages of Change Model

The Stages of Change Model is formally a subset of Prochaska and DiClemente's (1984) Transtheoretical Model. The full model includes both the Stages of Change and the Processes of Change (see figure 5). The research community, however, often refers to the entire theoretical structure as "The Stages of Change Model" (Brug 1999, Skinner 1999). The model originated as a psychoanalytic framework to explain how individuals change. Prochaska (1979) felt the structures at the time focused too deeply on why people do not change rather than how they can change. The model is derived from studies of how individuals change on their own. The primary example used by Prochaska and DiClemente comes from smokers who successfully quit without the aid of behavioral interventions or health professionals.
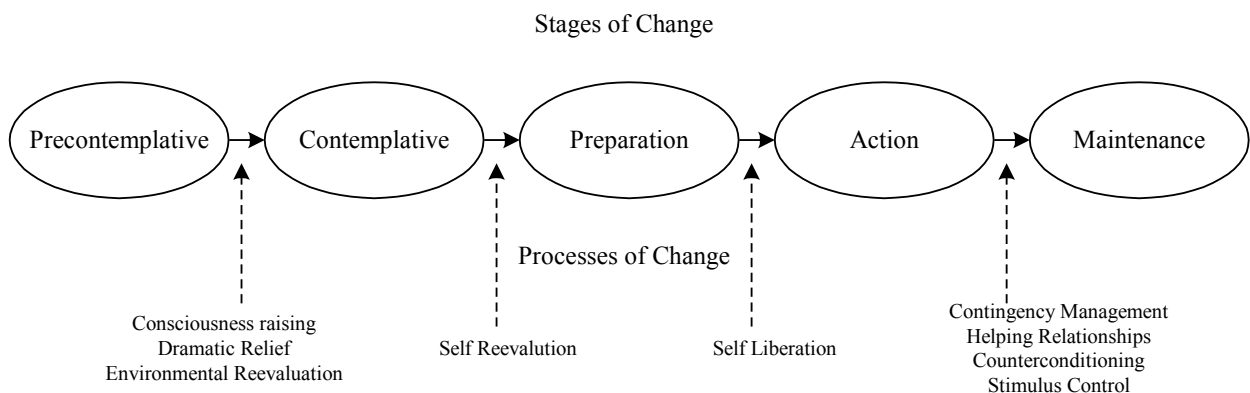
Stages of Change

Figure 5. Stages of Change Model

The Stages of Change are used to assess an individual's readiness for change. The framework serves as the central construct for the Transtheoretic Model. Individuals are not all at the same readiness for change when adopting health preventative behaviors

or eliminating health risk behaviors. Five specific stages are proposed: *precontemplative* (no intention to change/adopt behavior), *contemplative* (considering change in future), *preparation* (intention to adopt behavior in foreseeable future/attempts to adopt behavior), *action* (adoption of behavior), and *maintenance* (routine part of life). When attempting to change a person's behavior, the current stage of change should first be identified to determine the appropriate approach for change. This process is long-term, and change should be noted not only when behaviors have been adopted, but also with each progressive change in stage.

The Processes of Change are divided according to the transition between stages. The processes used to move individuals from preparation to action will not be the same as those used to move from action to maintenance. The model suggests that consciousness raising, dramatic relief, and environmental reevaluation should be used to move precontemplatives to contemplation. Consciousness raising involves increasing the awareness of a particular health problem through information concerning causes, consequences, and cures. Dramatic relief refers to arousing one's emotions about their current behavior and subsequently explaining the relief that occurs from behavior change. Environmental reevaluation concerns "both emotional and cognitive assessments of how one's behavior affects one's social environment and how changing would affect that environment" (Prochaska 1999). To move individuals from contemplation to preparation, the model suggests self-reevaluation, which concerns assessing how the individual would feel and think if unafflicted by the health problem. Self-liberation, the process to move from preparation to action, involves the self-belief that the individual is capable of change (i.e. self-efficacy) and the commitment to change. The processes to

move from action to maintenance are contingency management, helping relationships, counter-conditioning, and stimulus control. Contingency management is related to reinforcement structures such as rewards and punishments. Helping relationships are concerned with providing the individual a social support system. Counter-conditioning is the process of learning the new behaviors, which will replace the current behavior. Stimulus control involves changing environmental cues to promote the behavior change.

The concept of dividing individuals into distinct stages of motivation to change a behavior is not unique to the Transtheoretic Model. However, what is unique to the model is the importance placed on all stages of change, not just movement into behavior change. Another distinctive quality lies in the relevance of the prominent behavior and behavior change theories (i.e., the Health Belief Model, Social Cognitive Theory, and the Theory of Reasoned Action) to each specific stage of change. For example, Becker's Health Belief Model (HBM) would be most appropriate in understanding the transition from precontemplative to contemplative (Rossi et al. 1986). A main feature of the HBM is that the individuals must perceive themselves to be susceptible to the disease (i.e. acceptance of negative outcome) to be motivated to change. Precontemplators, people who are not considering changing the behaviors that place them at risk, may simply not perceive themselves as susceptible to any disease or aversive consequences of their current behavior. The Stages of Change Model and HBM both indicate that consciousness-raising in some form is necessary to move individuals to a point where they will simply begin to consider behavior change.

Clearly there are differences among the dominant theoretical structures in the tailoring literature. The Theory of Reasoned Action and the Health Belief Model are behavior prediction models. Alternatively, Social Cognitive Theory and the Stages of Change Model are both behavioral change models. Each originates from a different behavior change perspective: social psychological, public health, clinical, and psychoanalytical, respectively. Yet, the theories do share common constructs such as self-efficacy and outcome expectancies, whether termed attitudes or benefits and barriers. Social influences and pressures are major constructs in some models and measured through outcome expectancies in others.

The similarity between models has caught the attention of the research community (Fishbein et al. 2000, Weinstein 1993). Fishbein (Theory of Reasoned Action), Becker (Health Belief Model), Bandura (Social Cognitive Theory), and several other researchers gathered at a "theorists workshop" organized by the National Institute of Mental Health (Fishbein et al. 2000). (It should be noted that Bandura did participate in the workshop; however, at his request, his name does not appear on the resulting publication.) The purpose of the workshop was to "identify a finite set of variables to be considered in any behavioral analysis." Each researcher contributed their specialized knowledge in the area of behavior. After collaboration, the participants in the workshop agreed upon eight constructs that account for the majority of the variance in a volitional behavior. The list included intention, environmental constraints, skills, anticipated

outcomes (or attitude), norms, self-standards, emotion, and self-efficacy. However, the causal relationships among constructs were not determined.

	Condition
Necessary for Producing Behavior	1. The person has formed a strong positive intention (or made a commitment) to perform the behavior.
	2. There are no environmental constraints that make it impossible for the behavior to occur.
	3. The person has the skills necessary to perform the behavior.
Influence Strength & Direction of Intention	4. The person believes that the advantages (benefits, anticipated positive outcome) of performing the behavior outweigh the disadvantages (costs, anticipated negative outcomes); in other words, the person has a positive attitude toward performing the behavior.
	5. The person perceives more social (normative) pressure to perform the behavior than not perform the behavior.
	6. The person perceives that performance of the behavior is more consistent than inconsistent with his or her self-image, or that its performance dos not violate personal standards that activate negative self-sanctions.
	7. The person's emotional reaction to performing the behavior is more positive than negative.
	8. The person perceives that he or she has the capabilities to perform the behavior under a number of different circumstances; in other words, the person has perceived self-efficacy to execute the behavior in question.

Table 1. Conditions Determining and Influencing Behavioral Performance (Fishbein et al. 2000)

The group also identified eight conditions important in producing behavior change (see Table 1). The first three conditions are necessary for producing behavior change. The remaining five conditions will influence the strength and direction of the intention to perform the behavior. Suggestions were made to accurately measure and interpret each construct. Additionally, the group notes that certain variables are population-dependent, some behavior-dependent. These variables should be examined through the elicitation procedure, outlined by Ajzen and Fishbein (1980), prior to creation of an intervention. Upon establishment of all variables, a fixed item instrument can then be created for use in a full-scale intervention.

Research Project Overview

The purpose of this research project is two-fold: 1) To identify the profiles of individuals within each stage of change using the eight behavioral determinants identified by Fishbein et al. (2000) and 2) to conduct an experimental study to competitively test alternative approaches to increase intention to change. These approaches will be derived from the profiles found in the segmentation study.

SEGMENTATION STUDY

<u>Overview</u>

The segmentation study is conducted using the stages of change. Based on past work (Brug et al. 1997), I hypothesize that the stages, derived from motivational readiness for change, are significantly correlated with intention to change a behavior. Thus the stages provide a tool to segment individuals at progressive levels of intention to change a behavior. Additionally, I hypothesize that the behavioral constructs outlined in the "theorist's workshop" (Fishbein et al. 2000) will express different patterns across these segments. Brug and colleagues (1997) found differences between the stages of change in psychosocial variables such as attitude, self-efficacy, and social support. However, the group did not consider the complete set of behavioral determinants. I propose that the remaining constructs too will show differential patterns across the stages. For example, constructs such as affect or barriers may be highly prevalent for one group and relatively nonexistent in another. Therefore, the profiles for the segments will differ between groups.

To my knowledge, no previous study has attempted to profile these segments (i.e. stages) according to all major behavioral determinants. This information, given disparities of particular determinants, should suggest that the method to induce behavior change would likely be distinct for each segment. Thus, the segmentation study is expected to provide insights into the approaches to effectively increase intention and behavior change within each segment.

<u>Content Area</u>

The behavior chosen for this research is reducing fat consumption. This decision was based on four major considerations. First, dietary behavior is a necessary ingredient in the lives all people. To sustain life we must consume some level of energy. Other behaviors, such a smoking, affect only a subset of the human population based on the choices of the individual. Second, overweight and obesity is currently a major health problem in United States. Unlike many other current health issues, this problem has experienced a dramatic increase in prevalence. Fat consumption is a major factor in body weight. Third, the behavior has no addictive component that could complicate the choice to change. Smoking and drug use may not only be influenced by the psychosocial determinants of behavior but also by a chemical addiction. Lastly, though dietary practices may be a sensitive issue to some, it is likely less sensitive than other behaviors such as sexual practices.

<u>Elicitation</u>

Certain variables are expected to change with respect to the population being studied. For example, a wife or husband might be a very common referent in an adult population. In a college population, where the majority of people are single, a girlfriend or boyfriend would be a more typical referent. In order to develop the content for the population-specific variables, we first conducted an open-ended elicitation with a

representative sample of the population of interest. Questions from the elicitation explored perceived outcomes, relevant referents, barriers and facilitators, and personal characteristics. Perceived outcomes assess the salient beliefs of the target population. Relevant referents provide an understanding of the source of normative pressure for a given individual. Questions regarding barriers and facilitators explore environmental constraints, skill sets, and problem situations surrounding the behavior. Personal characteristics are collected to provide a basis for measuring self-sanctions.

Ten undergraduates (6 females, 4 males) from a range of majors (Marketing, Family and Childhood Development, Electrical Engineering, etc. at Virginia Tech were asked to complete the elicitation without any compensation. All elicitations were done in person. The format used for this elicitation was derived from the "theorists workshop" (Fishbein et al. 2001). (Appendix A contains the list of questions used in the elicitation.) Questions were adjusted to correspond with the behavior of interest. Responses that were given by at least 20% of the sample were kept for use in the questionnaire. Table 2 contains a complete list of responses kept for use in the survey instrument.

Variable	Responses	
Perceived Outcomes	• Helps me loose weight • Feel like I have more energy • Makes me healthier • Will miss out on foods that taste good	• Limits my food choices • Raises my self-esteem • May not get enough fat that my body needs
Relevant Referents	• Friends • Boyfriend/Girlfriend • Family	• Diet groups • Doctor • Athletic teams
Barriers and Facilitators	• Time constraints • Cost of low-fat foods • Eating out, no low-fat alternatives • Eating out, knowledge of fat content	• Don't receive support from others • Will power • General knowledge of fat content of foods • Skills to cook low-fat foods
Personal Characteristics	• Lazy/Motivated • Careless/Meticulous • Strong-willed/Weak-willed	• Satisfied/Unsatisfied • Healthy/Unhealthy

Table 2. Responses from Elicitation with Frequency ≥ 20%

Methods and Procedures

Two convenience samples were taken from an introductory marketing course at Virginia Tech (N=98 and N=85). All participants received extra-credit points toward their class grade. Sessions were administered in groups of no more than ten students. Upon arriving, students first signed informed consent forms (see Appendix B). Once all forms were returned, questionnaires were distributed. The questionnaires took approximately 45 minutes and 20 minutes for the respective samples. Students were then given debriefings to explain the purpose of the study (see Appendix C).

Sample one participated in a larger study with measures not used for the purposes of this study. The questionnaire used in the current study was the first portion of the

larger questionnaire. Therefore, exposure to the remainder of the questions in the larger study did not influence the responses relevant to this study. (Copies of the complete questionnaire will be distributed through requests to the researcher.) Sample two responded to only the subset of questions from the broader questionnaire pertinent to this study. Furthermore, items were added to measure height, weight, and sex. (See Appendix D for the version of questionnaire distributed to sample two.)

<u>Measures</u>

Fixed Content Variables

 Stage of Change was assessed using a simple algorithm. The staging algorithm has been used widely in the literature and has been found to be reliable across a range of behaviors (Prochaska, 1994). The algorithm was adapted to measure readiness for reducing fat consumption. Students responded to four self-report questions by indicating yes or no. The four questions were as follows:

  (1) In the past month, have you been actively trying to reduce your fat consumption?
  (2) In the past month, have you been actively trying to keep from eating a lot of fattening foods?
  (3) Are you seriously considering trying to reduce your fat consumption in the next six months?
  (4) Have you reduced your fat consumption for more than six months?

The preparation group is combined with the action group in this breakdown. Individuals in this group are often attempting to change the behavior but experiencing lapses. Individuals were categorized into the appropriate stage using the following algorithm:

	P	**C**	**A**	**M**
Question 1	NO	NO	YES	YES
Question 2	NO	NO	And/Or YES	And/Or YES
Question 3	NO	YES	-	-
Question 4	-	-	NO	YES

Intention was measured by asking respondents "Overall, all things considered, I intend to reduce my fat consumption in the next month." using a 7-point probability scale anchored with extremely unlikely/extremely likely. *Attitude* was assessed by asking respondents, "Overall, all things considered, my reducing my fat consumption in the next month is." Two 7-point semantic differential scales anchored with extremely bad/extremely good and extremely unfavorable/extremely favorable were used. *Affect* was assessed using a list of twelve emotional responses (fearful, surprised, nervous, active, anxious, happy, pleased, astonished, satisfied, elated, excited, aroused) that have been demonstrated by Watson and Tellegen (1985) to be a universal and encompassing set of emotions for most behaviors. Respondents rated the extent to which they might feel each emotion in regards to the statement, "About reducing my fat consumption in the next month, I feel _____." A 5-point scale was used (1 = not at all, 2 = a little, 3 = moderately, 4 = quite a bit, 5 = very much).

Variable (Population-Specific) Content Variables

Attitude ($\Sigma b_i e_i$) was measured indirectly by assessing the belief of the likelihood of some perceived outcome multiplied by the evaluation of that outcome. Products are then summed across each set of salient beliefs. Seven outcomes were kept from the elicitation: helps me to lose weight, makes me feel like I have more energy, makes me healthier, raises my self-esteem, limits my food choices, causes me to miss out of foods that taste good, and causes me to not get enough of the fat that my body needs. Respondents used a 7-point probability scale anchored by extremely likely/extremely unlikely to express the belief that reducing their fat consumption would lead to a particular outcome. The evaluation of each outcome was indicated using a 7-point semantic differential scale anchored with extremely good/extremely bad. Both components are coded in a bipolar fashion (-3 to 3). *Barriers* (environmental constraints and skill deficiencies) were assessed by asking, "When you are trying to reduce your fat consumption, how often do each of the following occur?" Respondents used a 5-point scale (1 = never, 2 = almost never, 3 = sometimes, 4 = almost always, 5 = always) to indicate the frequency of each barrier. Eight barriers were kept from elicitation. Environmental constraints consisted of (1) don't have enough time to cook foods low in fat, (2) can't afford the cost of low-fat foods, (3) don't receive support from others, and (4) no low-fat alternatives when eating out. Skill deficiencies included (1) don't know what foods are low in fat when eating out, (2) don't have the will power to keep away from fattening foods, (3) don't know what the fat content of foods are, and (4) don't know how to cook foods that are low in fat. It should be noted, the scale measures frequency of a barrier. *Normative Pressure* was measured by first multiplying a

respondent's belief that a particular referent thinks the respondent should or should not (7-point scale) reduce his/her fat consumption by the motivation to comply (7-point scale) with that referent. Products are then summed to attain a measure of normative influence. Salient beliefs concerning referents are coded in a bipolar fashion to assess the direction of social pressure, to perform or not perform the behavior. Motivation to comply is not coded in a bipolar fashion. Individuals are not assumed to act in opposition of the groups for which they do not wish to comply. The referents kept from elicitation were friends, boyfriend/girlfriend, family, diet groups (i.e. Weight Watchers), doctors, and athletic teams. *Self-Standards* discrepancies were assessed using five 7-point semantic differential anchored by two opposing characteristics of a person. The pairs of characteristics identified in the elicitation were lazy/motivated, careless/meticulous, strong-willed/weak-willed, satisfied/unsatisfied, and unhealthy/healthy. Respondents were first asked to rate themselves on each scale. Next, they were asked to rate a college student who always watches his/her fat consumption. An absolute discrepancy score was determined by summing the absolute differences for each pair of scales. *Self-Efficacy* was measured using a probability scale from zero to 100 (0 = Cannot do at all, 50 = Moderately sure can do, 100 = Certain can do). Respondents rated their certainty that they can reduce their fat consumption under six conditions retained from the barriers and facilitators portion of the elicitation: when eating out, when I'm very busy, even if low-fat foods cost more, when I don't have much time to cook, when told to do so by a doctor, and when others around me are eating fattening foods.

Results

Missing Data

Sample one had a large amount of missing data for the measures of intention and attitude (missing intention N=25, missing attitude—good/bad: N=18, missing attitude—un/favorable: N=19). T-tests were conducted to assess whether systematic differences exist between groups with and without missing data. Levene's Test for equality of variance was used to indicate the appropriate t-test to use for each variable. The sixty-five variables in the raw dataset that were without significant missing data were assessed for differences using either a parametric or nonparametric t-test. Analyses were run separately for each construct in question. The two groups were significantly different (p < .05) for two items, which is within the Type I error rate. Thus, the findings suggest that there are no systematic differences between individuals who did and did not provide answers in sample one. No substantial missing data exist for sample two. Samples were combined and all missing data was imputed using an Expectation-Maximization (EM) procedure.

Data Reduction

Exploratory and confirmatory factor analyses were run for constructs with greater than two measures. Exploratory factor analyses were conducted using Varimax Rotation. Confirmatory factor analyses were conducted with Structural Equation Modeling.

Cronbach's alphas calculated for all constructs. See Table 3 for a summary of the findings.

Construct	Number of Measures	Cronbach's Alpha	Fit Indices from SEM
Barriers			
-Environmental Constraints	3	.45	$\chi^2(8) = 18.8$
-Skills	4	.78	GFI = .97
			AGFI = .92
			CFI = .95
Attitude	2	.89	N/A
Affect			
-Positive	3	.80	$\chi^2(13) = 29.6$
-Negative	2	.56	GFI = .96
			AGFI = .91
			CFI = .93
Self-Efficacy	5	.83	$\chi^2(4) = 8.2$
			GFI = .98
			AGFI = .94
			CFI = .97

Table 3.

Table 3. Segmentation Study: Summary of Results from Data Reduction

Two factors were retained for the exploratory factor analyses of barriers. These two factors represent the latent constructs environmental constraints and skills proposed by Fishbein and colleagues (2001). All factor loadings were high (≥ 0.55). One barrier, lack of willpower, did not load on the appropriate construct. The item was predicted to load on skills because willpower is internal to the individual. Given the unexpected behavior of the item, it was dropped from further analyses. Another barrier, lack of time to cook, brought additional stress to the model. The barrier, an external constraint, was highly correlated with a skill indicator. A chi-square difference test ($\chi^2(5) = 10.85$, 0.05

$< p < .10)$ indicates that the fit of the model is significantly better without the indicator. The barrier measure was dropped from further analyses. The resulting structural equation model included three indicators of skills and three indicators of external barriers. Overall fit of the model was good ($\chi^2(8) = 18.8$, GFI = .97, AGFI = .92, CFI = .95). Composite scores were created for both constructs by summing the scores for each remaining item.

Two measures of attitude were taken. Reliability for attitude was high ($\alpha = .89$). A composite attitude score was formed by summing the scores of the two items.

Findings from previous research on affect aided in the construction of this construct's measurement model. Watson and Tellegen (1985) propose three affect indicators from the PANAS scale represent positive emotion and negative emotion each. Active, elated, and excited purportedly represent elation (i.e. positive affect). Fearful, nervous, and anxious were proposed indicators of distress (i.e. negative emotion). Bodur and colleagues (2000) found support for Watson and Tellegen's (1985) propositions. In using these indicators, exploratory analyses were conducted. All factor loadings for the positive emotions were high and loaded on one factor. Nervous and anxious loaded on a second factor. Fear did not behave as predicted. A possible explanation is that few subjects felt any fear regarding reducing their fat consumption ($M = 1.38$, $SD = 0.80$). This item was dropped from future analyses. The structural model for affect included three indicators of positive affect and two of negative affect. The fit of the model was very good ($\chi^2(4) = 8.20$, GFI = .98, AGFI = .94, CFI = .99). Composite scores were created for each construct by summing the indicators retained from the analyses.

The six measures of self-efficacy load on one factor in the exploratory factor analysis. All but one loading (doctor's recommendation) was .70 or greater. Participants appeared to have heightened perceptions of self-efficacy toward reducing fat consumption when told to do so by a doctor ($M = 82.74$, $SD = 20.57$). The poorly loading item was dropped from analyses. The structural equation model included five indicators of self-efficacy. Fit of the model was within an acceptable range ($\chi^2(5) = 27.0$, GFI = .95, AGFI = .83, CFI = .94). A composite self-efficacy score was created by summing the scores of the five individual items.

Gender Differences

Information on gender is available only for sample two. Forty-six males and thirty-nine females completed the questionnaire. Twenty-five males and nine females were in the precontemplative, three and seven in the contemplative stage, eleven each in the action stage, seven and twelve in the maintenance stage, respectively (see Table 4). Pearson's chi-square indicates there is a relationship between stage of change and gender ($\chi^2(3) = 9.94$, p $= 0.019$). There appears to be disproportionately more males than females in the precontemplative stage. The ratio is nearly three to one.

		Stage of Change				
		<u>P</u>	<u>C</u>	<u>A</u>	<u>M</u>	Total
Gender	Male	25	3	11	7	*46*
	Female	9	7	11	12	*39*
Total		*34*	*10*	*22*	*19*	*85*

Table 4. Segmentation Study: Cross-Tabulation of Gender and Stages of

Gender differences across the eight behavioral determinants were explored using t-tests. The composite score of attitude (i.e. direct measure), the $\Sigma b_i e_i$ score (i.e. indirect measure), positive affect and negative affect are evaluated separately. Levene's Test for Equality of Variances was conducted to determine the appropriate t-test for each variable. See Table 5 for a summary of the results.

Women have greater intention and perceptions of positive outcomes toward reducing their fat consumption within the next month than men. Both positive and negative affect are experienced more so by women than men. This suggests an overall heightened arousal present in women when thinking of reducing fat consumption in the near future. Perceptions of self-efficacy are lower for women than men. These results may suggest that the behavior is of greater importance to women than men. Females are interested in changing fat consumption. They perceive the outcomes to be beneficial. Yet self-doubt in the abilities to produce change is more prevalent for the group. This lack of self-efficacy may influence their increased negative affectivity.

Behavioral Determinant		Mean	Standard Deviation	t	df	Significance (two-tailed)
Intention	M	3.76	2.00	-2.23	82.2	.029*
	F	4.62	1.53			
Environmental Constraints	M	10.52	2.75	-1.39	83	.175
	F	11.26	2.09			
Skills	M	8.61	2.65	.157	83	.876
	F	8.51	2.99			
$\Sigma b_i e_i$	M	6.94	15.53	-3.39	83	.001**
	F	18.05	14.48			
Attitude	M	9.43	2.77	-1.66	83	.101
	F	10.41	2.62			
Normative Pressure	M	19.32	43.91	-1.46	83	.141
	F	-6.80	31.51			
Self-Standards	M	7.15	3.43	-1.48	83	.143
	F	8.44	4.58			
Positive Affect	M	7.47	2.93	-2.02	83	.047*
	F	8.79	3.12			
Negative Affect	M	2.97	1.48	-3.42	66.0	.001**
	F	4.36	2.13			
Self-Efficacy	M	61.63	23.46	2.15	83	.034*
	F	51.84	17.42			

Note. M represents males and F represents females. * $p < .05$. ** $p < .01$

Table 5. Segmentation Study: Gender Comparisons

Stage Differences

The final samples included 16 and 34 in the precontemplative (P) stage (N=50), 12 and 10 in the contemplative (C) stage (N=22), 46 and 22 in the action (A) stage (N=68), and 24 and 19 in the maintenance (M) stage (N=43), respectively (see Table 6).

		Stage of Change				
		<u>P</u>	<u>C</u>	<u>A</u>	<u>M</u>	Total
Sample	1	16	12	46	24	*98*
	2	34	10	22	19	*85*
Total		*50*	*22*	*68*	*43*	*183*

Table 6. Cross-Tabulation of Sample and Stages of Change

The purpose of this study was to examine patterns across the stages of change. Analysis of Variance was used to test for differences among the four groups. Each of the eight behavioral alternatives was used in the analyses. Table 7 contains a summary of the ANOVAs. If the groups were found to be significantly different on a particular variable, then Fisher's protected LSD was conducted to uncover which pairs of groups were significantly different from one another.

Intention has a positive, linear relationship with stage of change. Each progressive stage's mean intent was greater than the previous. The ANOVA results show intention to be significantly different between the four groups. Precontemplatives ($M =$ 2.77, $SD = 1.69$) expressed significantly less intent to change than all other groups, each $p < .01$. The mean difference between contemplatives and action ($M = 5.05$, $SD = 1.14$) was nearing significance, $p < .10$. Intention for contemplatives ($M = 4.52$, $SD = 1.19$) was significantly lower than maintenance ($M = 5.33$, $SD = 1.06$), $p < .05$. Intention was not significantly different between action and maintenance. Overall, progression through

the stages of change is highly correlated with increased intention to change, $r(183) = .60$, $p < .01$.

Behavioral Determinant		df	F	Significance
Intention	Between Groups	3	39.125	.000
	Within Groups	179		
Environmental Constraints	Between Groups	3	1.753	.158
	Within Groups	179		
Skills	Between Groups	3	3.246	.023
	Within Groups	179		
$\Sigma b_i e_i$	Between Groups	3	21.660	.000
	Within Groups	179		
Attitude	Between Groups	3	17.057	.000
	Within Groups	179		
Normative Pressure	Between Groups	3	7.754	.000
	Within Groups	179		
Self-Standards	Between Groups	3	1.442	.232
	Within Groups	179		
Positive Affect	Between Groups	3	9.599	.000
	Within Groups	179		
Negative Affect	Between Groups	3	6.874	.000
	Within Groups	179		
Self-Efficacy	Between Groups	3	5.062	.002
	Within Groups	179		

Table 7. Segmentation Study: Analysis of Variance for Behavioral Determinants

The result of the ANOVA for external constraints is non-significant. There does not appear to be significantly different perceptions of external constraints between the stages of change. However, individuals, as a whole, do perceive the existence of external

constraints when reducing fat consumption, t(182) = 53.84, p < .01. The correlation

between external constraints and stage of change is non-significant.

Lack of skills necessary for reducing fat consumption is significantly different

across the four stages. Existence of skill deficiencies is highest for the precontemplatives

(*M* = 8.68, *SD* = 2.87) and contemplatives (*M* = 9.23, *SD* = 2.62). Both groups are

significantly more deficient than the maintenance group (*M* = 7.37, *SD* = 2.43), p < .05

and p < .01. While no other group differences are significant, the trend appears to be that

the deficiencies decrease at all stages beyond contemplation. Stage of change is

negatively correlated with skill deficiencies, r(183) = -0.19, p < .01.

Both the indirect ($\Sigma b_i e_i$) and direct measures of attitude are significantly different

across groups. There is a positive, linear trend of $\Sigma b_i e_i$ with stage of change. All two-

group comparisons are significantly different (p < .05), except the comparison between

contemplative (*M* = 13.00, *SD* = 13.51) and action (*M* = 13.78, *SD* = 11.84). The

precontemplative's perception of outcomes is nearly neutral (*M* = 0.38, *SD* = 15.43).

Increasing outcome perceptions is significantly correlated with the successive stages of

change, r (183) = 0.50, p < .01. The direct measure of attitude is also significantly

different across group. However, this measure shows a slightly different trend than the

indirect measure of attitude. In this case, precontemplatives (*M* = 7.67, *SD* = 2.80) rate

their attitude significantly lower than all other groups, p < .01. However, the remaining

groups' attitude scores plateau (*M* = 10.41, *SD* = 2.42; *M* = 10.61, *SD* = 1.93; *M* = 10.48,

SD = 2.62; respectively), showing no significant differences. Again, increase in attitude

is significantly correlated with movement through the stages of change, $r(183) = 0.40$, $p < .01$.

The ANOVA for normative pressure indicates that there are differences between groups. The individuals in precontemplation ($M = -27.79$, $SD = 33.49$) and action ($M = -15.36$, $SD = 35.41$) feel significantly more pressure not to reduce their fat consumption than the contemplatives ($M = 11.37$, $SD = 44.39$) and the maintenance ($M = -0.42$, $SD = 37.26$), each $p < .05$. Additionally, the precontemplative and action groups are the only groups with any significant level of normative pressure, $t(49) = -5.86$, $p < .01$ and $t(67) = -3.58$, $p < .01$. For both groups, the pressure is against reduction of fat consumption. Normative pressure overall is positively correlated with stage, $r(183) = .20$, $p < .01$.

The ANOVA for self-standards is non-significant. This indicates no significant group differences in perceptions of inconsistencies regarding self-image. Overall, individuals do perceive their self-image to be inconsistent with the behavior, $t(182) = 24.38$, $p < .01$. The correlation between self-standards and stage is non-significant.

Positive and negative affect are significantly different across the stages. Positive affect has a positive, linear trend within the progressive stages. Precontemplatives ($M = 6.07$, $SD = 3.05$) experience significantly less positive emotion than each of the other stages, each $p < .05$. Maintenance ($M = 9.37$, $SD = 3.15$) experiences more positive affect than action ($M = 8.17$, $SD = 3.03$), $p < .05$. Increases in positive affect are positively correlated with stage of change, $r(183) = .36$, $p < .01$. The general trend for negative affect is different than that of positive affect. Precontemplatives ($M = 2.79$, $SD = 1.53$) experience significantly less negative affect than all other groups ($M = 4.45$, $SD = $

1.77; $M = 3.64$, $SD = 1.59$; $M = 4.19$, $SD = 2.17$), each $p < .05$. Negative affect appears to remain relatively constant after contemplation. Negative affect is positively correlated with stage of change, $r(183) = 0.24$, $p < .01$

The ANOVA for self-efficacy indicates differences across groups. Precontemplatives ($M = 52.68$, $SD = 25.03$) and contemplatives ($M = 48.91$, $SD = 18.39$) have lower perceptions of self-efficacy than maintenance ($M = 66.60$, $SD = 17.26$), both $p < .01$. Contemplatives, also, have lower self-efficacy than the action group ($M = 58.83$, $SD = 19.62$), $p = .05$. Overall the trend is generally positive and linear post contemplation. Self-efficacy is positively correlated with stage of change, $r(183) = 0.25$, $p < .01$.

Results indicate the existence of significant or near significant changes ($p \leq .10$) in the behavioral determinants during the transition from one stage to the next. From precontemplative to contemplative, there are significant increases in intention, normative pressure, attitude, outcome expectancies ($\Sigma b_i e_i$), and negative and positive affect. From contemplation to action, intention again increases significantly. Also in this transition, self-efficacy increases and normative pressure and negative affect decrease. From action to maintenance, there is a significant decrease in skill deficiencies accompanied by increases in normative pressure, outcome expectancies ($\Sigma b_i e_i$), self-efficacy, and positive affect.

Discussion

The stage of change model is consistent with a segmentation strategy based on intention. As individuals move through the stages of change, their intention to change the behavior of interest also increases.

Individuals within each stage also have unique profiles. While external constraints and self-standards are consistent across the segments, the remaining behavioral determinants do express distinct patterns.

Precontemplatives, individuals not yet thinking of behavior change, have the lowest attitude and intention toward behavior change. They express that neither the perceived outcomes nor the actual behavior is favorable. This group may use heuristics to evaluate the behavior based on only the salient negative outcomes of behavior change. For example, when thinking of reducing fat consumption, precontemplatives may first think of limited food choices and form their attitude based on this outcome rather than contemplating the range of possible outcomes. Normative pressure for this group is in the negative direction. Precontemplatives are experiencing social pressure to not perform the behavior. Affect, both positive and negative, toward behavior change is relatively nonexistent for the precontemplative segment. This may be due to the current lack of cognition within the segment. When asked to evaluate their emotions toward the behavior change, they feel no current arousal and thus report lacking any emotion. In order to increase the intention and attitude of this group, precontemplatives need to start thinking about changing their behavior. Affect and normative pressure should be targeted in attempting to increase cognitions. Overall arousal of emotions is needed to

move individuals into a contemplative stage. Negative affect should be aroused to make this segment aware of the risks of not performing the behavior. Positive affect could be increased by presenting individuals with benefits of the behavior change. Additionally, individuals who are not yet thinking of change may need to experience some social pressure in the direction of performing the behavior to counter the negative pressure they currently experience. These changes are expected to move the precontemplative individuals to a contemplative stage.

Contemplatives, individuals thinking but not yet acting, have a much higher attitude and intention than previous group. Normative pressure from this group is highest. Individuals in this stage are considering acting due to perceived social pressure, but may not act because of a lack of self-motivation for change. The benefits of changing are not yet supplying enough motivation to act. Self-efficacy is lowest for these thinkers. Motivation may exist, yet these individuals do not feel capable of changing. This group does not perceive themselves to be able to handle difficult situations. Self-doubt may be another source of inaction. In order to move the contemplators into an acting state, motivation to act may be created by teaching these individuals how to handle difficult situations. This approach should increase the segment's beliefs of self-efficacy, and the benefits to action should motivate the individuals to take action for themselves and not solely in response to social pressures. Through teaching both skills to combat problem situations and benefits resulting from behavior change, the contemplators are expected to move into the action stage.

The action segment is actively working on the behavior change. Only through continuing action over time will this group move to the maintenance segment. Reinforcement of skills and positive outcomes is necessary to maintain action. Ultimately, the behavior will become ingrained in daily life and not require a heightened level of effort.

Implications

Patterns in the behavioral determinants across segments suggests that strategies to increase intention using tailored communications should be different for each group. Typically, the messages used in the tailoring literature focus on the same determinants for all individuals. However, the profiles for each segment suggest that key determinants ought to be targeted for certain segments and not others. These determinants should provide insights into the approaches necessary to move individuals through the stages of change segments.

Most behavioral interventions attempt to move individuals into action. Yet, few consider the differences between individuals who are and are not considering the change. A segment-consistent message will likely be more efficacious in increasing the intention of the precontemplative and contemplative groups. Tailored communications for individuals in the precontemplative stage should be affectively based to increase arousal. The resulting arousal is expected to move these individuals into the contemplative stage, and to increase their intention to perform the behavior. The contemplative group is expected to be more influenced by a cognitively based message. This group has already progressed to think about the behavior. Therefore, information concerning how to take

action will be beneficial. The information in the message should aid in increasing their

self-efficacy through skill building. Equipped with the skills to take action, the

contemplators should increase their intention to perform the behavior.

EXPERIMENTAL STUDY

<u>Overview</u>

The purpose of this study is to test the hypotheses derived from the segmentation study; that is, an affective message will be more efficacious in increasing intention for precontemplatives and a cognitive message likewise for contemplatives. A 2 x 2 factorial experiment is used to explore this hypothesized interaction between stage of change and message type.

<u>Pilot Testing</u>

The experiment makes use of two distinct message types. Before applying these messages in the main experiment, pilot tests were conducted to determine whether the affective and cognitive messages were each perceived as emotional and informational, respectively.

Both messages were created from factual information available from governmental agencies such as the U.S. Department of Agriculture and National Cancer Institute. The affective message conveyed the information in a manner that related statistics and information to the average college student. Additionally, the affective message contained a vignette about a man who had recently experienced a heart attack. The man was ten to fifteen years older than the average age of college students. His diet included pizza, hot wings, and other foods often consumed by a college population. (See

Appendix E for the final version of the affective message.) The cognitive message contained factual information and tips on how to handle problems situations identified in the previous study. (See Appendix F for the final version of the cognitive message.) Each message was revised once based on results from the pilot testing.

A total of 157 students from an introductory marketing and a research methods marketing course participated in the pilot testing. The study took approximately fifteen minutes and all participants were rewarded extra credit in their marketing course. Informed consent forms were signed by each respondent prior to participating in the study (see Appendix G). Participants were told they would be evaluating passages of information for use in a future study. Each participant read and evaluated only one message to eliminate benchmarking in their evaluations. The evaluation questionnaire contained a range of attributes including clear, readable, interesting, engaging, persuasive, memorable, helpful, action-oriented, thought provoking, informative, fear inducing, emotionally charged (see Appendix I). Not all items were used for analysis. Rather these items served as filler items to mask the primary comparison of interest. The respondents rated the message on each attribute using a five-point scale (1 = not at all, 2 = slightly, 3 = moderately, 4 = quite, 5 = very much). Upon completion of the pilot testing, all participants were given a debriefing (see Appendix J).

The following attributes were used in the analysis to determine the cognitive and emotional perceptions regarding the messages: informative, helpful, fear inducing, and emotional. No significant differences were found for these four variables when comparing each original message with its revised counterpart. Thus, all data was

combined for the analyses. Comparisons between the two message types across the

relevant attributes were conducted using t-tests. See Table 8 for results.

Message Attribute	Mean		Standard Deviation	t	df	Significance (two-tailed)
Informative	Affective	4.30	0.64	-0.90	155	.370
	Cognitive	4.40	0.78			
Helpful	Affective	3.68	0.92	-3.87	155	.001**
	Cognitive	4.22	0.84			
Fear-Inducing	Affective	3.36	1.11	3.90	155	.001**
	Cognitive	2.70	1.01			
Emotional [a]	Affective	3.14	1.13	2.65	146.8	.009**
	Cognitive	2.71	0.86			

Note. [a] Nonparametric t-test finding. * p < .05. ** p < .01

Table 8. Experimental Study: Comparisons of Affective and Cognitive Messages

The messages are seen as equally informational. However, there is a clear

difference in the type of information in each. The cognitive message is evaluated as

significantly more helpful. This suggests that the information contained in this message

can be used for a purpose (e.g. changing behavior). The informational component in the

affect message appears to be in relation to some level arousal produced by the message.

The affective message is evaluated as significantly more emotional and fear inducing.

Though individuals are not supplied with constructive information, they seem to be using

the resulting arousal as a proxy for some form of information. These results indicate that

the affective message is seen as emotional and the cognitive message as informative (i.e.

helpful). The manipulation check provides confidence that our messages will provide the

appropriate manipulation when used in the experimental study.

<u>Experimental Design</u>

The experimental design used in this study is a between-subjects 2 x 2 factorial design. Stage of change and message type are the independent variables of interest. Only respondents in the precontemplative and contemplative stages will be retained for analyses. The two message types are affective and cognitive. Each subject was screened to identify their current stage of change, and then randomly assigned to a message condition. Participants are only exposed to one condition in the experiment.

<u>Methods and Procedures</u>

Participants were recruited from an introductory marketing course. All were awarded extra credit for compensation. The total sample consisted of 259 students. Upon arriving, each student signed an informed consent form indicating agreement to participate in the study (see Appendix K). Screening questions, the staging algorithm used in the segmentation study, were then distributed. The purpose of the screening was to identify the respondent's stage of change in order to place them in the appropriate stage condition and randomly assign them to a message condition. The total eligible sample was 95 respondents ($N = 68$ precontemplative and $N = 27$ contemplative).

Upon completion of the screening, participants were given a packet containing a stage-specific instructions page, either the affective or cognitive message, and a full

questionnaire. See Appendix L for the precontemplative/affective condition packet. The

instructions page was tailored to the stages using the following statement, "Based on your

answers from the previous questionnaire, it seems that you are (not) thinking about

reducing the fat in your diet." This sentence contains the only tailored portion of the

message. Therefore, in order to increase readership and attention toward the message,

participants were asked to underline all information in the passage that was important to

them. After reading the message, participants were asked to write down any thoughts or

feeling produced by the message. A distraction task was then used to separate the

questions concerning fat consumption. All respondents completed the same

questionnaire, regardless of stage or message condition. Participants were given a

debriefing after completing the full questionnaire (see Appendix M).

Measures

Screening Questionnaire

The screening questionnaire contained two main components: the stages of

change algorithm and a section measuring actual and perceived knowledge. The staging

algorithm used was identical to the one used in the segmentation study. The remaining

portion of the screening questionnaire measured actual and perceived knowledge

regarding fat consumption. An eleven-question quiz was used to measure actual

knowledge. Participants received a score based on the number of questions answered

correctly. Two items were used to measure perceived knowledge. Respondents indicated

their perceived knowledge using an eleven-point scale (zero being not at all knowledgeable to ten being extremely knowledgeable) in response to the following two questions: "All things considered, how knowledgeable are you about fat consumption" and "All things considered, how knowledgeable are you about the consequences of a high fat diet." See Appendix N for the actual knowledge quiz and perceived knowledge measures. The knowledge measures were collected with the screening so that information given in the affective and cognitive messages would not bias the responses.

Full Questionnaire

Items from the full questionnaire are identical to those used in the segmentation study including intention, barriers (external constraints and skill deficiencies), attitude, normative pressure, self-standards, affect, and self-efficacy. All items were measured as previously stated. Sequence of items changed to eliminate possible biases in responses.

Results

Missing Data

No significant amount of data were missing for this study. As in the segmentation study, all missing data were imputed using an Expectation-Maximization (EM) procedure.

Main Effects and Interactions

Univariate analyses were conducted to explore the main effects and interaction within the 2 x 2 factorial design. Intention was identified as the dependent variable and stage of change and message type as independent variables. Stage of change had a significant effect on intention ($p < .01$). Neither message type nor stage by message affected intention, $r^2 = .27$.

Personal difference factors were explored for sources attenuating the non-significant interaction. Gender was considered an additional independent variable, in part because of the differences found in the previous study. Also, evidence has been found that males and females use different strategies to process information (Meyers-Levy and Maheswaran 1991). Results again indicate an effect of stage of change ($p < .01$) and no other main effects. Both two-way interactions are non-significant. The three-way interaction (stage x message x gender) approached significance ($p = .16$), $r^2 = .32$.

	Male		Female	
	Affective	Cognitive	Affective	Cognitive
Precontemplative	3.18	2.55	3.05	3.91
	(21)	(26)	(13)	(8)
Contemplative	4.06	5.23	5.03	4.89
	(5)	(6)	(9)	(7)

Source	df	F	Significance
Stage of Change (A)	1	21.93	.000
Message Type (B)	1	0.817	.369
Gender (C)	1	1.820	.181
A x B	1	0.345	.559
A x C	1	0.179	.673
B x C	1	0.014	.905
A x B x C	1	3.867	.053

Note. Numbers in parenthesis indicate number of respondents within the condition.

Table 9. Experimental Study: Means and Summary for Experimental Study

Actual and perceived knowledge were controlled for using a covariate analysis. Knowledge, perceived or actual, addresses the ability factor of an individual to process information. Petty (1995) notes that personal knowledge influences one's resistance to an informational message. These variables were used as a covariate to reduce the impact of personal resistance to information. Findings from this analysis show that stage of change is the only significant main effect ($p < .01$). The three-way interaction becomes the only significant interaction effect ($p = .05$). The effect size for this model is an improvement on the previous two, $r^2 = .37$. See Table 10 for means and summary of the experimental study.

Interaction contrasts were then conducted separately for men and women. The hypothesized two-way interaction of stage of change by message type is significant for men .05 < p < .1), but not for women (see Figures 6 and 7). Precontemplative males exposed to the affective message have higher intention than those exposed to the cognitive message. Contemplative males have a higher intention for the cognitive message than the affective message. Both messages show similar patterns for the females. However, precontemplative females have greater intention to reduce fat consumption than precontemplative males, regardless of message, $t(66) = -1.86$, $p = .06$. All simple main effects contrasts were non-significant, which is likely due to small sample sizes within each condition.
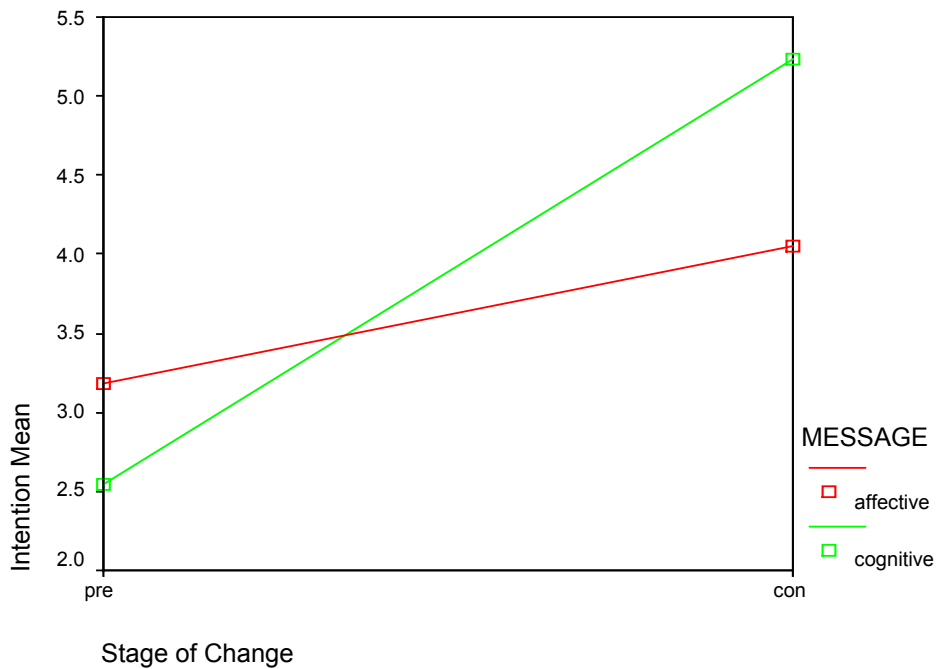
Figure 6. Experimental Study: Stage of Change by Message Interaction for Males
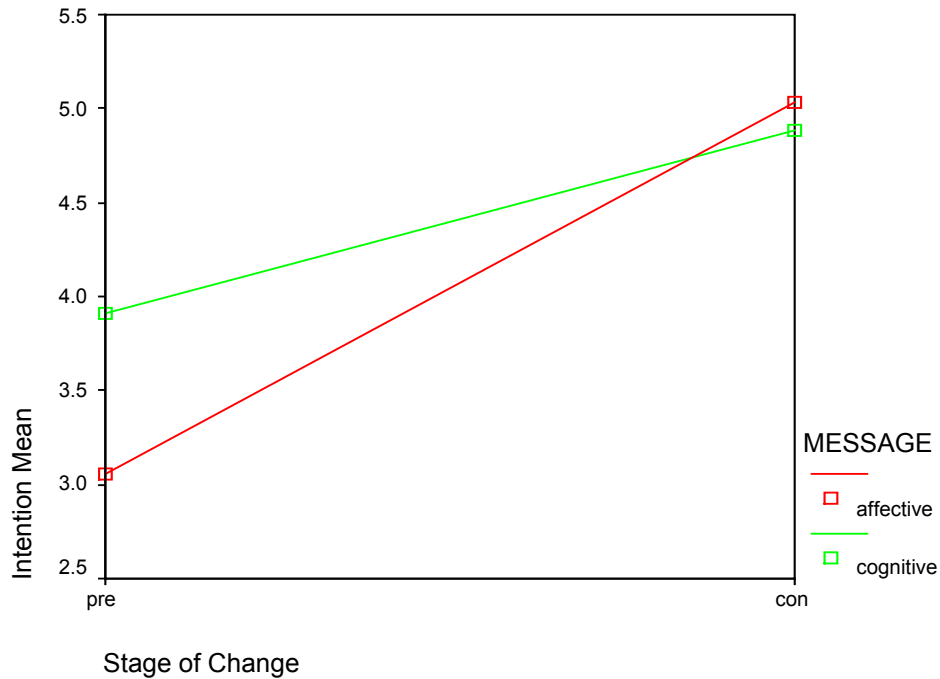
Figure 7. Experimental Study: Stage of Change by Message Interaction for Females

The source of the interaction effect is found in $\Sigma b_i e_i$, especially the beliefs that reducing fat consumption will make one feel like they have more energy or will lose weight. When controlling for these variables, the three-way interaction is eliminated. Controlling for the remaining behavioral determinants did not eliminate this interaction.

Discussion

The second order interaction of gender was not hypothesized originally. The finding does indicate that the hypothesized interaction of stage of change by message type is influenced by gender for this behavior. The affective message was more effective for increasing intention for precontemplative men, and the cognitive message was more

effective for contemplative men. The hypothesized interaction, however, was not present for women. For the women, the cognitive message appears slightly more effective in increasing the intention of precontemplatives. Neither message has a distinct advantage for the contemplative women. Overall, both messages have approximately the same affect on the females.

Two alternative explanations exist for the gender difference. One possible explanation for the difference may be that thoughts of weight and diet are so embedded within the American female population that women are never truly precontemplative. Societal pressures are so ingrained that this population is constantly alerted to the possible need for change and intention is ultimately heightened. Images of beauty from advertisements and media show extremely thin women as role models. Women are constantly exposed to the notion that weight control is important to be attractive in this society. Thus, the stage of change segmentation may not work properly for behaviors that are particularly salient to a population.

Alternatively, the female population may use a different processing strategy when reading the passages than men. Past research suggests that women "engage in more detailed elaboration of specific message content (Meyers-Levy and Maheswaran 1991)" than men. This processing style implies that the information within the passages would be more important to this population. The difference in processing strategy may explain why precontemplative men were more influenced by an affective message, as proposed, yet precontemplative women were more influenced by an informational message.

The construct of knowledge should be considered carefully when creating tailored health communications. Knowledge regarding the behavior change and outcomes of such may influence the persuasive capabilities of the information on message recipient.

The effect of the message appears to be influencing the cognitive structure of individuals. Ultimately this shift in cognitive structure is producing a change in intention. When controlling for the individual cognitive structures, the interaction was eliminated. Behavioral researchers should be aware of the source of the behavior change to more effectively produce behavior change.

Implications

From a theoretical perspective, the findings from the experimental study suggest additional research should explore the alternative explanations for gender differences. One possible study would identify a behavior that is salient to the male population (e.g., exercise). If the former explanation is consistent with the observed effects, and the stages of change segmentation does not work properly for behavior-salient populations, then the stage by message type interaction would be non-significant for men and significant for women. However, if the latter explanation is true, then finding similar to those found here will be replicated. Women will be more influenced by a cognitive, informational message. Either finding will have a substantial impact on the approach necessary to increase intention and ultimately behavior for behavioral interventions.

From an applied perspective, the research in both studies provides support for the use of tailored messages. The findings from the segmentation study show distinct

patterns in the behavioral determinants across the stages of change. These patterns

provide insight into the alternative approaches to customize messages to move

individuals into each successive stage of change. The customization of information was

tested in the experimental study and was found to produce differential effects on intention

for stage segments and gender. This finding supports the notion that messages tailored

specifically to the individual (or a homogenous group of individuals) will have greater

efficacy in creating behavior change. The behavioral researcher must be familiar with the

intended target audience to effectively construct health communications to produce the

desired behavior change.