THE INTERACTION OF ACTION-INACTION GOALS AND APPROACH-AVOIDANCE MOTIVATIONS: IMPLICATIONS FOR HEALTHY FOOD MARKETING

by

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DEDICATION

To my dad, Thomas Carino Sr., who lost a life long battle with addiction one year before the completion of this dissertation. I love you tremendously. I know you would have been so proud.

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CHAPTER I

Introduction

Obesity has become a public health crisis in the United States. Nationally representative survey data show that the prevalence of obesity has steadily increased over the past three decades with current evidence suggesting that two-thirds of adults are now overweight or obese (Wang et al., 2012). Although at a basic level obesity is caused by excess energy consumption relative to energy expenditure, the causes of obesity are highly complex and include genetic, physiologic, environmental, social, economic, and psychological factors that interact in varying degrees to advance the development of obesity (Hill & Melanson, 1999; Wright & Aronne, 2012).

Controlling obesity has become one of the highest priorities for public health professionals in the United States (U.S. Department of Health and Human Services, 2014). Over the past three decades numerous public health campaigns have been aimed at curtailing the rapidly rising obesity rates by promoting healthier dietary choices. Some of the more well known healthy eating campaigns include: the *National Five-a-Day for Better Health!* campaign (www.cdc.gov), which promotes the consumption of five servings of fruits and vegetables per day; The *NYC Calorie Awareness* campaign (www.nyc.gov), which discourages the consumption of

unhealthy foods by highlighting their high caloric content; and Georgia's controversial *Strong4Life* campaign (www.strong4life.com), which is aimed at parents and features photos of obese children along with "warnings" about the consequences of childhood obesity (see Appendix A for example campaign materials). Unsurprisingly, empirical research examining health message characteristics and design strategies is also on the rise (Snyder, 2001).

Most of these campaigns have focused on passively avoiding a goal-incongruent stimulus (e.g., "2,000 calories a day is all most adults should eat"; The *NYC Calorie Awareness* campaign; www.nyc.gov) or actively approaching a goal-congruent stimulus (e.g., "Eat five [fruits and vegetables] a day for better health!"; *National Five-a-Day for Better Health!* campaign; www.cdc.gov). In this way, the *direction* of action in relation to the goal stimulus (approach vs. avoid) is confounded with the *volume* of action in relation to the goal stimulus (inaction vs. action). Although at a basic level it is easy to confound action goals with approach motivations and inaction goals with avoidance motivations (Albarracín et al., 2008), this dissertation posits that these two motivational concepts are distinct both theoretically and practically. Furthermore, the interaction of these two orthogonal concepts may have important implications for the study of goal pursuit.

This dissertation is organized into three sections. The first section provides a background on action-inaction goals and approach-avoidance motivations before proposing a 2x2 framework of goal-pursuit that integrates the two concepts. Specifically, we argue that although action is often confounded with approach and inaction with avoidance, approach-avoidance speaks to the direction of goal-pursuit

behavior while action-inaction describes the volume of behavior. Similar to Skinner's (1953) model of operant conditioning that posits that behavior can be modified by either providing or withholding a reward or punishment, we propose a 2x2 framework of goal-pursuit in which goal progress can be made by approaching or not avoiding a positive stimulus or avoiding or not approaching a negative stimulus.

In the second section, we aimed to empirically establish that action-inaction goals and approach-avoidance motivations are theoretically and practically distinct concepts. Specifically, we manipulated action-inaction goals and approach-avoidance motivations using an abstract manipulation and examined how these manipulations influenced goal-relevant behavior. In the final section, we examined the interaction of the two concepts in the applied context of health messages promoting healthy eating habits.

The present paper outlines five studies to examine the interaction of action-inaction goals and approach-avoidance motivations in the context of healthy eating goals. In the first series of studies, Studies 1 and 2 used a computer game to independently manipulate action-inaction goals and approach-avoidance motivations. Across both studies, there is evidence that the two constructs do not influence behavior in the same manner. Furthermore, Study 2 highlights an important boundary condition of approach-avoidance motivations that does not exist for action-inaction goals.

The second series of studies sought to determine whether action-inaction goals and approach-avoidance motivation could be manipulated using healthy

eating messages. Studies 3A and 3B demonstrate that subtle changes in the wording of health messages can serve to simultaneously manipulate action-inaction goals and approach-avoidance motivations. In Study 4, participants were presented with these messages and their food consumption on a subsequent tasting task was examined.

CHAPTER II

BACKGROUND

In this chapter, we review relevant literature on approach-avoidance motivations and action-inaction goals. Furthermore, we propose a 2x2 framework of goal pursuit behavior in which approach-avoidance motivations tell us about the direction of behavior while action-inaction goals speak to the volume of behavior. Finally, we outline numerous problems that arise when these two orthogonal concepts are confounded.

Two-Factor Models of Behavior

Two-dimensional models of human behavior have been a staple in psychology since 1953 when B.F. Skinner introduced a model of human behavior known as operant conditioning. Skinner's (1953) model drew the distinction between reinforcement, designed to increase the occurrence of a desired target behavior, and punishment, designed to decrease the occurrence of an undesired target behavior. The second dimension is a positive-negative dimension, referring to the valence of the consequence paired with the target behavior. Taken together, these two orthogonal dimensions create a model of operant conditioning in which a target behavior can be increased by either providing a reward (positive

reinforcement) or withholding a penalty (negative reinforcement). Additionally, a target behavior can be decreased by either withholding a reward (positive punishment) or providing a penalty (negative punishment). Thus, these two orthogonal dimensions produce four quadrants corresponding to both amount and valence of behavior change (see Figure 1A).

Turning to the current study of goal-driven behavior, or goal pursuit, Skinner's reinforcement versus punishment dimension has been reframed in the form of approach versus avoidance motivations (Lewin, 1935; McClelland, 1951; Miller, 1944;). Although in the Skinnerian framework reinforcement versus punishment referred to an increase or decrease in the occurrence of a target goal behavior, current theories on goal pursuit categorize goal-driven behavior based on whether one progresses towards the desired end state by approaching positive goal stimuli or avoiding negative goal stimuli (Elliot, 2006). Over time, however, the other half of the 2x2 framework has received far less attention. As Skinner (1963) found, positive behavior can be increased by providing a reward *or* withholding a punishment and negative behavior can be decreased by providing a punishment *or* withholding a reward (see Figure 1A). The same premise may also hold for behavior related to positive and negative goal stimuli. One can presumably make progress towards a goal by approaching *or* not avoiding positive goal stimuli and by avoiding *or* not approaching negative goal stimuli (see Figure 1B). In other words, although approach versus avoidance motivation tells us the direction of behavior toward a goal stimulus, there is a less recognized but also important dimension that tells us the *volume* of stimulus-directed action.

Recently, this volume distinction has resurfaced in the goal literature under the umbrella of action versus inaction goals. Although patterns of overall activity and inactivity are regulated biologically, Albarracín and colleagues (2008) argue that similar patterns are also socially and culturally influenced and that individuals can develop broad-reaching general goals to "do" (action) or "not do" (inaction), regardless of a specific means to achieving those goals. Over the last six years, a significant body of work has been published on the regulation of activity under the framework of action and inaction goals (e.g., Albarracín et al., 2008; Albarracín, Wang, & Lepper, 2009; Albarracín, Hepler, & Tannenbaum, 2011; Hepler, Albarracín, McCulloch, & Noguci, 2012) but this line of work has yet to address the fact that regulation of activity can also manifest along the dimension of approach-avoidance motivations. In particular, action goals could increase the volume of both approach and avoidance motivations while inaction goals could decrease the volume of both approach and avoidance motivations.

Approach-Avoidance Motivation in Goal Pursuit

Approach-motivation is defined as the direction of behavior toward a positive stimulus and avoidance-motivation as the direction of behavior away from a negative stimulus (Elliot, 2006). Within the context of approach- avoidance-motivation, positive and negative stimuli are presumed to take on different meanings depending on the context and may not always align with traditional views of "positive" and "negative" (Elliot, 2006). For example, someone who is addicted to narcotics may experience an approach-motivation toward heroin. Although heroin

would not typically be considered a positive stimulus, it is defined as such in this context given the subject's motivation to approach. Thus, approach (versus avoidance) motivation implies direction, but not volume, of action.

The distinction of approach-avoidance motivation is a fundamentally important conceptual distinction. For one, approach- and avoidance-based behavioral adjustments to one's environment have adaptive significance. In fact, Tooby and Cosmides (1990) have argued that moving toward potentially beneficial stimuli and away from potentially harmful stimuli has been the single most adaptive decision that organisms have had to make throughout their evolutionary past. Another argument in favor of the fundamental importance of the approach-avoidance distinction is the relative automaticity of many approach- and avoidance-processes. A vast body of research suggests that humans evaluate most, if not all, encountered stimuli on a positive/negative dimension (Osgood et al., 1957) and that they do so without intention or awareness (Bargh, 1997; Zajonc, 1998). This automatic positive/negative evaluation is likely to instantaneously evoke approach or avoidance behavioral systems. Researchers and theorists from areas such as emotion (Lang, 1984; Lazarus, 1991), motivation (Corwin, 1921; Lewin, 1935; Young, 1959), and attitudes (Doob, 1947; Osgood et al., 1957) have all argued that the positive or negative evaluation of stimuli is inherently linked to the predisposition to move toward or away from the stimulus (Elliott & Covington, 2001).

Action-Inaction Goals

More recently, a second dimension of action and inaction goals, associated with volume, but not direction, of goal pursuit, has emerged in the literature. In particular, general action is defined as motor and/or cognitive output and general inaction as the lack of action (Albarracín et al., 2008). As with most social psychological constructs, action-inaction are not dichotomous entities but exist on a continuum of activity. It is also important to note that the definition of action-inaction is independent of implications regarding goals and/or effort. In other words, the action side of the spectrum can include both important, effortful behaviors such as studying or running a race as well as seemingly effortless behaviors such as tapping one's foot. As such, action (versus inaction) goals imply volume, but not direction, of action.

Early work exploring the impact of general action and inaction (Albarracín et al., 2008) demonstrated that semantic priming of general action (e.g., *go*, *move*) and inaction (e.g., *stop, rest*) concepts produced a corresponding increase or decrease in both motor (Experiments 1-3) and cognitive (Experiments 4-5) output. Furthermore, the impact of priming action and inaction concepts goes beyond mere concept activation, supporting the existence of general action and inaction goals (Experiments 6-7). For example, the behavioral effects of priming action (inaction) concepts were stronger for participants who were not given the opportunity to satisfy their action (inaction) goal during an intermediate task than for participants who had an earlier opportunity to act in accordance with an action (inaction) goal.

General action and inaction goals are likely to exist as a natural consequence

of evolutionary pressures (Albarracín et al., 2008; Pinkerton, 1997). Upon encountering new situations, for example, it may be more beneficial to adapt a general action goal than to immediately try and establish a specific motor or cognitive goal. There may also be situations in which a general inaction goal is the most advantageous, such as when new environmental input may be necessary before a decision can be made. Furthermore, given that energy is a finite resource necessary for survival, general inaction goals also function to conserve energy during times when action is unnecessary.

The activation of general action and inaction goals can influence extremely important behaviors. For instance, in a political domain, participants primed with action words reported stronger intentions to vote in an upcoming election and volunteered more time to make phone calls on behalf of a university policy than participants primed with inaction words (Noguchi, Handley, & Albarracín, 2011). In addition, in the realm of health behavior, after being exposed to messages from actual exercise campaigns (which often consist of action verbs such as *go* or *play*) or to words that are commonly associated with exercise (e.g., *active*), participants consumed a greater quantity of food compared to participants in the control condition (Albarracín et al., 2009). This finding is especially problematic because participants viewing the exercise messages actually increased net caloric intake compared to control participants. Given the possibility for the unintended consequences of invoking general action or inaction goals, it is important to develop a greater understanding of how these general goals are connected to related motivational constructs.

A 2x2 Framework of Goal Pursuit

From a theoretical perspective it is clear that for any avoidance motivation (e.g., eating less junk food) one can frame the goal behavior as an active goal (e.g., avoid junk food) or an inactive goal (e.g., don't eat junk food). The same is true for approach motivation (e.g., eating more vegetables), where one can use an active goal (e.g., add vegetables to every meal) or a more inactive goal (e.g., don't pass on vegetables). As mentioned above, however, we often see that healthy eating campaigns focused on approaching healthy foods rely on messages conveying an action goal (e.g., "Need a snack? Grab an apple from the caf!"; *Eat Healthy Save Money Campaign)* while campaigns focused on avoiding unhealthy foods frequently employ inaction goals (e.g., "Don't eat sugar. You're sweet enough!"; *www.turntrim.com*). This tendency to associate approach motivations with action goals and avoidance motivations with inaction goals may contribute to the loss of recognition of the quantity dimension of goal-driven behavior. By failing to recognize the full 2x2 array of goal-consistent behavior, we are limiting our understanding of goal pursuit. Below we outline limitations of the current approach that would be mitigated by a 2x2 framework of goal-driven behavior.

Consequences of Failing to Consider Inactive-Approach

Confounding action-inaction with approach-avoidance results in a lack of acknowledgement of inaction-approach behaviors. As a society that values action above inaction (McCulloch et al., 2010) this may not seem problematic, but there are numerous occasions in which inaction goals may be beneficial in the context of

approach motivations.

Inaction goals require fewer physical or cognitive resources. It is well documented that the active self is a limited resource (Baumeister, Bratslavsky, Muraven, & Tice, 1998; Baumeister, Heatherton, & Tice, 1994; Muraven, Tice, & Baumeister, 1998). Action goals, by definition, require physical or cognitive resources (Albarracín et al., 2008). Consistently framing approach behaviors as active goals may unnecessarily increase the amount of executive function required for goal pursuit. Take, for example, the two approach behaviors of packing healthy snacks to bring to work and keeping healthy snacks at work. Although both may be equally effective at encouraging individuals to make healthier food choices at work, packing healthy snacks to bring to work may feel like a much more active behavior than simply keeping healthy snacks at work. In situations of decreased executive function, one may find it overwhelming to think about all that is involved in packing healthy snacks while the latter option may not be as overwhelming. Thus, lower activity actions may boost self-regulation by increasing the probability that people will have the ability to enact target behaviors.

Action goals may unnecessarily bolster individuals' existing bias towards intensive medical treatments. Despite our society's preference for action (McCulloch et al., 2010), public health researchers have begun weighing the outcomes of active treatment against monitoring a patient's condition without active intervention, known as watchful waiting. Often times, patients exhibit a strong preference for active treatment when faced with a medical diagnosis because it provides them with a sense of control while watchful waiting feels like "giving up"

(Xu, Neale, Dailey, Eggly, & Schwartz, 2012). At the same time, active treatment often carries risks that may be under-acknowledged given patients' bias against "doing nothing" (Sweeny & Shepperd, 2007). One area in which the medical community has agreed that watchful waiting should be the default course of treatment is respiratory tract symptoms in primary care settings (Butler, Rollnick, Kinnersley, Jones & Scott, 1998). Although patients may prefer to take antibiotics when facing respiratory tract symptoms, it is now well established that antibiotics do very little to modify the course of throat infections, ear infections, sinus infections, and acute bronchitis (Little & Williamson, 1994; Orr, Scherer, Macdonald, & Moffatt, 1993; Stalman, van Essen, van der Graaf, & de Melker, 1997). Despite the relative lack of benefit, there are significant costs to prescribing antibiotics for respiratory tract symptoms. From a financial standpoint, 37.5 million dollars are spent on antibiotics for colds each year, not including the costs of physician visits (Mainous, Hueston, Clark, 1996). Researchers have also found that receiving antibiotics reinforces patients' perceptions that they should consult their physician for similar problems in the future and raises their expectations of subsequently receiving a prescription (Audit Commission, 1994). Perhaps the most urgent and serious consequence of the over-prescription of antibiotics is the development of bacterial resistance (Molstad, Arvidsson, Eliasson, Hovelius, Kamme, & Schalén, 1992). Prescribing antibiotics for conditions in which antibiotics provide little benefit lowers the effectiveness with which those same antibiotics could be used to treat more serious illnesses. Given the high costs and lack of benefit for treating respiratory tract symptoms with antibiotics it is clear why the medical community

has decided that inaction is the best course of treatment for these cases. Aside from the presentation of respiratory tract symptoms, the benefits of less intensive treatment options have recently been highlighted in the treatment of other conditions such as prostate cancer (Steineck et al., 2002), breast cancer (Veronesi et al., 2002), inguinal hernia (Fitzgibbons et al., 2006), and hypertension (Myers, Reeves, Oh, & Joyner, 1996).

Recent research on the practice of using hostile metaphors to talk about cancer (e.g., society's "war on cancer"; cancer as an enemy to be defeated) has demonstrated that the way in which we frame our health-related goals can have serious implications for the treatment options we pursue. Across three studies, Hauser and Schwarz (2014) demonstrated that enemy metaphoric framing lessens accessibility of and intentions to perform self-limiting cancer prevention behaviors. Following the same line of reasoning, the framing of health goals in terms of action-approach behaviors likely increases the already present preference for active treatment, which can be detrimental in situations such as those outlined above where there are high costs and low benefits of active treatment.

Action goals can hinder attitude change. Finally, research on action-inaction goals suggests that action goals hinder attitude change to a greater extent than inaction goals. Across seven studies, Albarracín and Handley (2011) demonstrated that action primes facilitate conscious retrieval of prior attitudes. Given that prior attitude retrieval blocks the influence of persuasive counter information (Ajzen & Fishbein, 2005; Albarracín et al., 2004; Fazio, Ledbetter, & Towles-Schwen, 2000), action goals were shown to decrease attention to

counterattitudinal messages and subsequently decreased attitude change. Thus, doing is not the time for changing. This insight is particularly relevant for health interventionists who are trying to change a target health behavior. Ironically, targeting behavior change using an active approach may actually backfire compared to having participants in an inactive state if action makes participants insensitive to new information.

Consequences of Failing to Consider Active-Avoidance

Perhaps even more troublesome than the failure to consider inactive-approach behaviors in goal pursuit is the failure to consider active-avoidance behaviors. The examples below explore reasons why adopting an action versus inaction goal, even in the presence of an avoidance motivation, may be beneficial.

Action words are viewed more positively and are more salient than inaction words. Existing literature on the evaluation of action and inaction goals has shown that active words are viewed more positively than inactive words (McCulloch et al., 2010). This may be due to the societal value placed on work ethic, praising hard work and condemning idleness (Miller, Woehr, & Hudspeth, 2002). Furthermore, actions are more salient than inactions, a phenomenon seen in research on learning, self-perception, and decision-making (Senay, Wang, McCulloch, & Albarracín, 2010). Taken together, individuals may feel more positively about, and be more likely to selectively attend to, goal behaviors presented as actions as opposed to inactions.

Actions increase feelings of commitment to a goal. Turning to goal pursuit

specifically, a large body of research has shown that individuals view actions as more connected to commitment than inactions. Stemming from Bem's (1965) theory of self-perception, this pattern has presented itself across many social psychological phenomena (e.g., foot-in-the-door, Green, 1965; overjustification, Lepper, Greene, & Nisbett, 1973). Bem's theory of self-perception postulates that a major source for individuals' inferences about their attitudes and other internal beliefs is the observation of their own overt behavior. Although non-behaviors should also be useful in the self-inference process, a growing body of research suggests that individuals have a bias towards action when making inferences about their own and others' goals and attitudes (Fazio, Sherman, & Herr, 1982). In other words, individuals are likely to infer that they are more committed to a goal after actively avoiding negative goal stimuli (e.g., responding "no" when offered a dessert) than after inactively avoiding the same stimuli (e.g., not taking a dessert from a buffet).

Inaction activates feelings of helplessness. Confounding avoidance motivations with inaction goals may be particularly disadvantageous for individuals in situations of powerlessness. Elevated power, whether situational or general, is associated with increased rewards and freedom while reduced power is associated with increased threat and constraint (Keltner, Young, Heerey, Oemig, & Monarch, 1998). As a result, inhibited behavior (inaction) activates feelings of powerlessness while disinhibited behavior (action) actives feelings of power (Albarracín, Helper, & Tannenbaum, 2011; Keltner, Gruenfeld, & Anderson, 2003). Presenting inactive-avoidance goal behaviors may perpetuate feelings of helplessness. This pairing may

be particularly deleterious for groups who are already low in power, such as disenfranchised individuals, or those for whom the goal is particularly difficult.

Avoidance motivations may *require* more active processing. Perhaps the largest problem with confounding avoidance motivations with inaction goals stems from the literature on the difficulty and paradoxical effects of thought suppression. In particular, conscious thought suppression is very difficult (McGranahan, 1940; Sears, 1943) and may even result in significant unintended consequences (Wegner et al., 1987). Across two studies Wegner and colleagues (1987) found that attempted thought suppression (e.g., trying not to think of a white bear) had a paradoxical effect on self-control, producing the very preoccupation that the thought suppression was directed against. Furthermore, research on dieting indicates that passively avoiding food is a reliable precursor of later binge eating (Polivy & Herman, 1985). Wegner and colleagues argue that one of the most problematic issues with planned thought suppression is that suppression requires one to be constantly searching for the unwanted stimuli in order to suppress that stimulus before a certain threshold is reached. Given this view of thought suppression, it follows that avoidance may require more action than frequently assumed. By framing avoidance motivations as inaction goals (e.g., don't smoke) and failing to consider corresponding action goals (e.g., have a lollipop instead of a cigarette) these campaigns may be setting participants up for failure.

Current Project

The goal of the current project is to disentangle the concepts of action-

inaction and approach-avoidance to develop a better understanding of how these two often-confounded motivational concepts interact. For the purposes of this line of research, we chose to examine the interaction between action-inaction and approach-avoidance motivations in the context of food choice. Several factors contributed to our decision to use this context. First, we needed a domain in which there was a well-established set of both positive (approach) and negative (avoid) stimuli. We felt that, after priming participants with a healthy-eating goal, the evaluation of fruits and vegetables as positive and junk food as negative was fairly ubiquitous. Furthermore, prior work suggests that action-inaction goals influence eating (Albarracín et al., 2009); yet we hypothesize that these effects may be moderated by the direction of the action orientation (in this case approach versus avoidance motivation). Additionally, we felt that this domain lends itself to real world applications of vital importance. Nationally representative survey data show that the prevalence of obesity has steadily increased over the past three decades with current evidence suggesting that two-thirds of adults are now overweight or obese (Wang et al., 2008). Furthermore, obesity-related diseases and health problems account for 61 percent of healthcare costs in the United States (Lehnert, Sonntag, Konnopka, Riedel-Heller, Konig, 2013).

Overview of Studies

This dissertation presents five studies that are designed to examine the interaction between action-inaction goals and approach-avoidance motivations in the context of food choice behavior. Chapter III examines the orthogonal nature of

these two concepts by using an abstract manipulation of action-inaction goals and approach-avoidance motivation across two studies. Study 1 examined the orthogonal nature of action-inaction goals and approach-avoidance motivations. To explore this issue, participants were randomly assigned to one of four conditions: (a) action-approach, (b) action-avoidance, (c) inaction-approach, or (d) inaction-avoidance. Following priming, participants answered questions about both healthy and unhealthy foods and then were offered the opportunity to choose a reward from amongst both healthy and unhealthy snacks. Study 2 offers a deeper examination of Aim 1 and seeks to examine whether the influence of an approach-avoidance manipulation will generalize outside the context of a specific and activated goal.

Chapter IV examines the interaction of these two concepts in a more applied setting by manipulating action-inaction goals and approach-avoidance motivation in the context of healthy eating messages. Studies 3A and 3B develop and pre-test seven sets of messages designed to encourage healthy eating behavior. Each set consists of four messages, representing each of the four possible combinations of action-inaction and approach-avoidance. Study 4 used the messages developed in Study 3 to manipulate action-inaction goals and approach-avoidance motivation in order to explore the influence of such messages on food choice and consumption.

CHAPTER III

ORTHOGONAL NATURE OF ACTION-INACTION AND APPROACH-AVOIDANCE

Study 1

The purpose of Study 1 was to test the hypothesis that action-inaction goals and approach-avoidance motivation can be theoretically and practically distinct concepts.

Method

Participants and design. Two hundred and fifteen students (117 female; 98 male) attending the University of Michigan participated in this experiment in exchange for course credit. Participants were randomly assigned to one of eight conditions in a 2(action vs. inaction) x 2(approach vs. avoid) x 2(goal: health-consistent vs. health-inconsistent) between-subjects design.

Materials and procedure. Upon entering the lab participants were told that they would be asked to pilot two computer games that our lab was currently developing. The two computer "games" served to manipulate our three independent variables. The first game manipulated approach (versus avoidance) by having participants either move toward positive stimuli (approach) or move away from

negative stimuli (avoid). In addition, the first game manipulated action (vs. inaction) by having participants either play (action) or watch a video of (inaction) either the approach or avoidance game. In the second computer game, participants completed a Go/No-Go Association Task (GNAT) designed to link either approach healthy/avoid unhealthy (health consistent goal) or approach unhealthy/avoid healthy (health inconsistent goal). After completing the manipulations, participants completed scales rating perceived health and how appetizing the food stimuli was. In the context of the cover story, the food choice was labeled a reward for performing well on the second computer game (everyone was told they performed well enough to earn the prize).

Action vs. inaction and approach vs. avoid manipulations. *Action* vs. *inaction* was manipulated by having participants either play (action) or watch (inaction) the first computer game. Within the same task, the *approach* vs. *avoidance* variable was manipulated by the type of game that participants watched or played. Participants in the *approach* conditions were exposed to a game that was similar to Pac Man but did not contain any ghosts, so the focal task of the game was to collect as many dots as possible before two minutes had passed. Participants in the *avoidance* conditions were exposed to a game (Distopix) where the focal task was to avoid blocks that were falling from the sky by moving the computer character around on the screen (see Appendix B for screen shots of both computer games).

Health-consistent versus health-inconsistent goal manipulation. Participants then completed a second computer task, which served to prime either a health-consistent or health-inconsistent goal. We were particularly interested in the

impact of the action-inaction and approach-avoidance manipulations on participants in the health-consistent goal condition, as this is the more naturalistic pairing (e.g., approach healthy foods and avoid unhealthy foods). However, we also included the health-inconsistent goal manipulation to verify that the distinction between action-inaction goals and approach-avoidance motivation would hold regardless of whether the health goal reflected a naturalistic pairing. The goal manipulation task was a variation of the Go/No-Go Association Task (GNAT) (Nosek & Banaji, 2001) in which the stimuli were images of foods and beverages that were either healthy (e.g., apple, carrots, water, green tea) or unhealthy (e.g., donut, pizza, soda, hot chocolate). During this task participants were told to "Go" to all food stimuli and "No-Go" to all drink stimuli. The task differed from the traditional GNAT in that there were two possible "Go" responses. A stick figure was located in the center of the screen and the food and drink stimuli appeared either above or below the cursor (see Appendix C for screen shot of task). Participants were directed to either approach (move the stick figure towards) or avoid (move the stick figure away from) the food stimuli. Participants' correct "Go" responses varied depending on whether the food was healthy or unhealthy and their assigned goal condition. Participants in the *health-consistent goal* condition were told to approach all images of healthy foods and avoid all images of unhealthy foods. In contrast, participants in the *health-inconsistent goal* condition were told to approach all images of unhealthy foods and avoid all images of healthy foods. Participants completed a practice block of 50 trials with colored shapes as stimuli before completing four blocks of 100 trials with the food and beverage stimuli. The location (above or below the stick

figure) and order in which the stimuli were presented were counterbalanced and randomly assigned by the computer program. Before starting the task, participants were told that those finishing in the top 80% on the task, in terms of a combined measure of speed and accuracy, would receive a prize.

***Virtual food choice*.** Upon completion of the modified GNAT, the computer informed all participants that their score qualified them to receive a prize for finishing in the top 80% of participants thus far. Participants were then asked to choose from 7 available snacks for their prize. Three of the snacks (carrot snack pack, apple snack pack, and clementine) were coded as a healthy food choice while the other four (Milky Way, Snickers, Twix, and M&Ms) were coded as an unhealthy food choice. Included in the virtual prize redemption options were, "*I did not qualify for a prize*" (included only to maintain our cover story) and "*I qualified for but do not wish to receive a prize*".

Attitude measures. Next, participants were asked several questions about the tasks (e.g., *How enjoyable was this game*?) in an effort to maintain the cover story of piloting computer games. Embedded within the task-rating questions were questions aimed at assessing participants' post-manipulation attitudes towards healthy vs. unhealthy foods and drinks. To gain insight into the process involved in participants' food choice behavior, participants were asked to rate the perceived healthiness of each of the 20 food and drink stimuli presented in the modified GNAT (10 healthy, 10 unhealthy) with the question *How healthy does this item seem to you?* on 1 (*Not at all*) to 7 (*Extremely*) scales. We then computed composite scores of perceived healthiness for both healthy (α = .89, *M* = 6.26, *SD* = .75) and unhealthy (α

= .81, *M* = 1.69, *SD* = .52) foods. We also assessed perceptions of how appetizing stimuli were by asking *How appetizing is this item to you?* on 1 (*Not at all*) to 7 (*Extremely*) scales. We then computed composite scores of participants' attitudes of how appetizing healthy (α = .86, *M* = 4.38, *SD* = 1.14) and unhealthy (α = .84, *M* = 4.28, *SD* = 1.21) foods were.

Concern for dieting and current level of hunger. After completing the food attitude measures, participants were asked a series of questions about their concern for dieting and current level of hunger, as these measures may predict food choice independent of our manipulations (Lowenstein, 2005; Ruderman, 1986). Concern for dieting was assessed using the Concern for Dieting subscale of the Restraint Scale (van Strien, Breteler, & Ouwens, 2002). Participants were asked to report (a) *How often are you dieting*?, (b) *Would a weight fluctuation of 5 pounds affect the way you live your life*?, (c) *Do you give too much time or thought to food*?, (d) *Do you have feelings of guilt after overeating*?, and (e) *How conscious are you of what you are eating*? on scales from 1 (*Not at all*) to 5 (*Extremely*). A composite score of concern for dieting was created from these items (α = .78, *M* = 2.75, *SD* = .86). Finally, current level of hunger was measured by asking, *At this moment, how hungry are you?* on a scale from 1 (*Not at all*) to 7 (*Extremely*) (*M* = 3.35, *SD* = 1.82).

Actual food choice. Before being debriefed, all participants, including those who reported on the computer that they were not eligible or did not wish to choose, were allowed to pick a snack from the prize basket. Participants' food choice was again coded as healthy or unhealthy according to the same parameters as the virtual food choice. The four participants who reported on the computer they were not

eligible for a prize informed the experimenter that they were not eligible and as a result did not select a snack.

Results

Covariates. Two measures, concern for dieting and current level of hunger, were initially included as covariates in all models presented in this paper. Current level of hunger was not a significant covariate for any model and was therefore dropped from the analyses. Concern for dieting was a significant covariate and was included in the final models presented.

Food choice behavior. We first examined the hypothesis that action-inaction goals, approach-avoidance motivation, and health-consistent versus inconsistent goals would predict healthy vs. unhealthy food choice. Logistic regression was used because food choice was a binary outcome (0 = unhealthy; 1 = healthy). Participants who reported that they were not eligible for a prize (n=4) or were eligible but did not wish to choose a prize (n=25) were excluded, leaving 186 participants in the analysis. We first analyzed the results of the virtual food choice, which revealed a significant three-way interaction (B = -2.73, $Wald$ = 4.68, p = .03, $Exp(B)$ = .07, 95% CI [.01, .77]). The pattern of means suggest that in the health-consistent condition, participants were more likely to choose a healthier food option (a goal consistent behavior) in both the action-avoid and the inaction-approach conditions compared to the action-approach and inaction-avoid conditions (see Figure 2). In the health-inconsistent condition, participants were again more likely to choose their goal-consistent option (an unhealthy snack) in the action-avoid and

inaction-approach conditions. Neither the simple nor main effects were significant (*ps* > .05). Next, we checked the pattern with actual food choice data. Results revealed the identical pattern as with virtual food choice (*B* = -2.67, Wald = 4.05, *p* = .04, *Exp(B)* = .07, 95% CI [.01, .93]), which can be seen in Figure 3. Again, neither the simple nor main effects were significant (*ps* > .05).

Food attitudes. The food choice analyses provide initial support for Hypothesis 1, that the concepts of action-inaction and approach-avoidance are indeed orthogonal. To further explore the data we looked at participants' attitudes toward the food stimuli used in the modified GNAT.

Appetizing ratings. First, a repeated-measures analysis was run with appetizing ratings of healthy vs. unhealthy foods as the two-level within-subjects factor and our three manipulated variables of approach/avoidance, action/inaction, and health-consistent/inconsistent goal as the between-subjects factors. Results revealed a significant four-way interaction ($F_{1,206}$ = 5.30, *p* = .02, η_p^2 = .03). To better interpret the four-way interaction we created a difference score (healthy food appetizing – unhealthy food appetizing) representing the direction and extremity of participants' appetizing ratings. The patterns of means revealed that participants in both the action-avoid and inaction-approach conditions rated the healthy foods as more appetizing than the unhealthy foods (action-avoid: *M* = .27, *SD* = .25, 95% CI [-.23, .77]; inaction-approach: *M* = .24, *SD* = .27, 95% CI [-.28, .77]). On the other hand, participants in the inaction-avoid and action-approach conditions rated the healthy foods as *less* appetizing than the unhealthy foods (inaction-avoid: *M* = -.20, *SD* = .27, 95% CI [-.73, .33]; action-approach: *M* = -.27, *SD* = .25, 95% CI [-.77, .22]). Looking

within the health-inconsistent condition, the same pattern of results emerges but is flipped. Again, participants in the inaction-approach condition (M = -.22, SD = .35, 95% CI [-.91, .47]) were more goal consistent than those in the active-approach condition (M = -.55, SD = .33, 95% CI [-1.21, .15]) and those in active-avoidance (M = .23, SD = .34, 95% CI [-.45, .90]) were more goal consistent than those in the inactive-avoidance (M = -.22, SD = .35, 95% CI [-.92, .48]).

Healthy ratings. Next we ran the same set of analysis on participants' ratings of healthiness for the healthy and unhealthy food stimuli. Again, a significant four-way interaction emerged ($F_{1,206}$ = 4.83, p = .03, η_p^2 = .02). After computing a difference score (healthy food healthy – unhealthy food healthy) to represent the extremity of participants' healthiness ratings we further examined the interaction. Looking within the health-consistent condition, the main effects and interaction were not significant (ps > .10). Looking within the health-inconsistent condition, the two-way interaction between action-inaction and approach-avoidance was significant ($F_{1,101}$ = 5.96, p = .02, η_p^2 = .06). Probing the interaction further, the pattern of means revealed that there seems to be one condition driving the effect. Specifically, participants in the inaction-avoid condition (M = 5.05, SD = .19, 95% CI [4.71, 5.39]) reported a significantly larger discrepancy in healthiness ratings between the healthy and unhealthy foods than any other condition (inaction-approach: M = 4.48, SD = .17, 95% CI [4.15, 4.81]; action-avoid: M = 4.51, SD = .16, 95% CI [4.19, 4.84]; action-approach: M = 4.75, SD = .16, 95% CI [4.43, 5.07]). This larger discrepancy in healthiness ratings in inconsistent with the goal that participants in the health-inconsistent condition have, that is, to approach unhealthy

food and avoid healthy food.

Predicting food choice. Finally, we wanted to see whether participants' appetizing and healthiness ratings were mediating the relationship between our manipulated variables and food choice behavior. As such, we ran a binary logistic regression with appetizing and healthiness difference scores as the predictor variables and food choice as the predicted variable. Results indicate that differences in how appetizing healthy versus unhealthy foods were perceived significantly predicted food choice for both virtual (B = .64, Wald = 23.15, p < .001, *Exp(B)* = 1.90, 95% CI [1.46, 2.46]) and actual (B = .56, Wald = 15.76, p < .001, *Exp(B)* = 1.75, 95% CI [1.33, 2.31]) food choice. There was no influence of healthiness ratings on food choice for virtual or actual food choice (ps > .40). See Figure 4 for complete model. Finally, we followed the procedure outlined in Chapter 6.4 of Hayes (2008) for testing mediation models with multiple independent variables. Results revealed that although the effect of our three manipulated variables on virtual and actual food choice was weakened when appetizing ratings were included in the model, bootstrapped confidence intervals show that the appetizing difference scores did not significantly mediate the relationship between our IVs and food choice behavior (all 95% bootstrapped CIs contain 0).

Discussion

The results of Study 1 supported our hypothesis that action-inaction goals and approach-avoidance motivations are theoretically and practically distinct concepts. For participants primed with a health-consistent eating goal, those primed with the combinations of action-avoid and inaction-approach were more likely to

select a healthy snack than those primed with inaction-avoid or action-approach. This finding suggests the tendency to confound approach motivations with action goals and avoidance motivations with inaction goals does not allow for a complete picture.

It is important to note that the pattern of results flipped for participants in the health-inconsistent goal condition. In this case, participants in the action-avoid and inaction-approach conditions were *less* likely to select a healthy snack, consistent with their primed goal to approach unhealthy food and avoid healthy food. This finding suggests that the interaction of action-inaction goals and approach-avoidance motivations was not directly influencing food choice *per se*, but is instead affecting receptivity to an activated goal. It is not yet known, however, whether a specific activated goal is necessary for the interaction of action-inaction goals and approach-avoidance motivations to emerge. Study 2 addressed this question.

Study 2

The aim of Study 2 was to determine the generalizability of the results from Study 1. Namely, Study 2 examined whether a specific goal must be activated at the time of priming for an influence of the approach-avoidance manipulation on goal behavior to emerge. Previous research has well documented the ability of action and inaction goals to impact behavior at a general level, even when a specific goal has not been activated (Albarracín, 2008; Albarracín et al., 2009; Noguchi, Handley, & Albarracín, 2011). It is not known, however, whether priming individuals with

approach versus avoidance behavior will have an impact outside the context of a specific, activated goal. This boundary condition is especially important to consider, given the deleterious consequences of activating an action goal with a corresponding target behavior discussed earlier (e.g., increased caloric intake following action compared to inaction exercise messages; Albarracín et al., 2008).

Although research on chronic regulatory focus (Higgins, 1998) suggests that there are overarching differences in the extent to which individuals focus on approaching a positive goal end-state (success) or avoiding a negative goal end-state (failure), Study 2 was designed to distinguish the act of approaching a positive goal *stimulus* or avoiding a negative goal *stimulus.* Specifically, Study 2 tested to see whether the approach-avoidance prime from Study 1 would impact behavior when a healthy eating goal had not been primed.

Method

Participants and design. One hundred and seventy-four University of Michigan undergraduates (98 female; 74 male; 2 unknown) participated in this study in exchange for course credit. Participants were randomly assigned to one of four conditions in a 2 (action vs. inaction) x 2 (approach vs. avoid) between-subjects design.

Materials and procedure. The procedure for Study 2 was identical to Study 1 with slight modification. First, after demonstrating that the pattern of results flipped (as expected) for the health-inconsistent goal condition in Study 1, it was dropped this variable from Study 2. Instead, Study 2 focused on exploring the more

relevant health-consistent goal condition. Second, to examine whether the same pattern would emerge in the absence of the goal priming task from Study 1, the task into one was modified so that it would continue to provide a cover story for the food image ratings but would not activate a specific food-related goal.

Participants entered the lab and were told that they would be piloting several tasks for use in future studies; they were then exposed to the same action-inaction and approach-avoidance manipulation found in Study 1.

Non-goal inducing categorization task. Next, participants completed a categorization task designed to mimic the food categorization task of Study 1 without activating a specific food-related goal. The categorization task in Study 1 required participants to do two things: decide whether the food stimulus was healthy or unhealthy and then use that information to move their stick figure in accordance with the health-consistent or health-inconsistent goal they had been given. During the current categorization task participants were also shown images of foods and asked to categorize, as quickly as possible, whether the food on the screen was healthy or unhealthy but they were not given a goal that dictated their behavior towards the healthy and unhealthy food (see Appendix D for screen shot of task). The food images used were the same images from the GNAT in Study 1. By mimicking the categorization task from Study 1, the major difference between the two studies was the lack of a specific goal activation in Study 2. Furthermore, having participants complete a food categorization task provided a cover story for the food attitude measures they would later be asked.

Virtual food choice and food attitude measures. Participants responded to

the same virtual food choice task and food attitude questions found in Study 1.

Concern for dieting and current level of hunger. Finally, participants were asked the same current level of hunger question along with two of the five concern for dieting questions that were asked in Study 1. Participants were asked about how often they are dieting and how conscious they are about what they eat. The questions about weight fluctuation, time spent thinking about food, and feelings of guilt after overeating were inadvertently left off the follow up questionnaire. A composite score of concern for dieting was created from the two included items (r = .53, $p < .001$, $M = 3.03$, $SD = 1.06$).

Results

Eighteen participants were excluded from all analyses due to building construction disrupting their participation in the study. This left 156 participants in the remaining analyses.

Food choice behavior. Logistic regression was used to determine whether the action-inaction and approach-avoidance manipulations impacted food choice in the absence of an activated food-related goal. Participants who reported that they were not eligible for a prize (n=1) or were eligible but did not wish to choose a prize (n=22) were excluded, leaving 133 participants in the analysis. We first analyzed the results of the virtual food choice, which revealed a main effect of action-inaction on food choice ($B = .75$, Wald = 4.14, $p = .04$, $Exp(B) = 2.12$, 95% CI [1.03, 4.37]) such that participants primed with action ($M = .73$, $SD = .45$) were more likely to choose a healthy food than those primed with inaction ($M = .56$, $SD = .73$). There was no main

effect or interaction of the approach-avoidance manipulation on food choice behavior (*p*s >.40) Next, we checked the pattern with actual food choice data. Results revealed the same pattern as with virtual food choice but effects failed to reach significance (*p*s > .30).

Food attitudes. We then looked at participants' attitudes toward the food stimuli used in the categorization task.

Appetizing ratings. First, a repeated-measures analysis was run with appetizing ratings of healthy versus unhealthy foods as the within-subjects factor and the two manipulated variables as the between-subjects factors. Results revealed only a main effect of healthy versus unhealthy such that participants found the healthy foods (M = 4.99, SD = .08, 95% CI [4.84, 5.14]) to be significantly more appetizing than the unhealthy foods (M = 4.39, SD = .10, 95% CI [4.20, 4.58]) ($F_{1,152}$ = 20.46, p < .001, η_p^2 = .12).

Healthy ratings. Next, the same set of analyses were run on participants' ratings of healthiness for the healthy and unhealthy food stimuli. Again, results revealed only a main effect of healthy vs. unhealthy such that participants found the healthy foods (M = 6.36, SD = .04, 95% CI [6.28, 6.44]) to be significantly more healthy than the unhealthy foods (M = 1.55, SD = .04, 95% CI [1.47, 1.63]) ($F_{1,152}$ =5106.68, p < .001, η_p^2 = .97).

Predicting food choice. Although the manipulations of action-inaction goals and approach-avoidance motivation failed to influence ratings of appetitiveness and healthiness, likely due to the lack of an activated health-related goal, we next tested to see if appetizing and/or healthiness ratings would predict food choice. As such,

binary logistic regression was used with appetizing and healthiness difference scores as the predictor variables and food choice as the predicted variable. Results were identical to those in Study 1. Differences in how appetizing healthy versus unhealthy foods were perceived significantly predicted food choice for both virtual (B = .47, Wald = 10.66, p = .001, *Exp(B)* = 1.61, 95% CI [1.21, 2.14]) and actual (B = .55, Wald = 10.99, p = .001, *Exp(B)* = 1.74, 95% CI [1.25, 2.40]) food choice. Again, there was no influence of healthiness ratings on food choice for virtual or actual food choice (ps > .25), even when participants made categorical judgments highlighting the healthiness or unhealthiness of the foods.

Chapter III Discussion

Across two studies, primes of action-inaction goals and approach-avoidance motivations were shown to differentially influence participants' goal directed behavior. In Study 1, participants were primed with a randomly assigned combination of action-inaction goals and approach-avoidance motivations before completing a food categorization task designed to prime either a health-consistent or health-inconsistent eating goal. Following the priming of the health-related goal participants were given the opportunity to select a snack presented as a reward for performing so well on the goal-priming task. Analysis of whether participants chose a healthy or unhealthy snack option revealed a significant interaction of action-inaction goals and approach-avoidance motivations. The pattern of results was such that participants in the action-avoid and inaction-approach conditions were more likely to select a goal-consistent snack than participants in the inaction-avoid and

action-approach conditions.

Study 2 followed a similar procedure to Study 1 but replaced the goal-priming task with a different categorization task designed to highlight the healthiness dimension of the food items without priming a specific health-related goal. Previous research has demonstrated that action-inaction goals are general goals that can influence behavior across varying domains even when a specific goal has not been activated (Albarracín, 2008; Albarracín et al., 2009; Noguchi, Handley, & Albarracín, 2011). It is not known, however, whether the same can be said for approach-avoidance motivations. The goal of Study 2 was to determine whether the approach-avoidance manipulation used in Study 1 would influence behavior in the absence of an activated health-related goal. Results revealed that although activation of an action-inaction goal had the predicted impact on food choice behavior, the approach-avoidance manipulation failed to influence food choice behavior outside the context of a specific health-related goal.

The results of Studies 1 and 2 suggest that, despite their tendency to be confounded, action-inaction goals and approach-avoidance motivations are actually theoretically and practically distinct concepts. Results from Study 1 suggest that the two concepts can have differential influences on goal-related behavior. Results from Study 2 suggest that although action-inaction goals are general goals that can influence behavior in the absence of a specific goal, the same may not be true for approach-avoidance motivations.

Limitations

One limitation of the dependent measure in Studies 1 and 2 was the abstract nature of the food choice task. Although participants were selecting an actual snack that they were going to receive, there were two characteristics of the food choice task that made it fairly abstract. First, participants were making the choice on the computer, not in the presence of the actual food items. Second, participants were indicating their food choice during the middle of the study, knowing that they would not receive the snack until the study was complete. As such, participants were both psychologically and temporally distant from the decision, as they were making the decision on the computer and also choosing a food they would receive in the future. This limitation was addressed in Study 4 with the inclusion of a concrete food choice task.

A second limitation of the food choice task used in Studies 1 and 2 was the fact that all of the unhealthy options were sweet. Previous research suggests that stress can create a preference for sweet foods (Grunberg & Straub, 1992; Habhab, Sheldon & Loeb, 2009; Rutledge & Linden, 1998). Although there were also sweet healthy options (e.g., apple slices), participants desiring a non-sweet option were forced to select a healthy food. This limitation was addressed in Study 4 by offering participants one sweet and one salty/savory food for both the healthy and unhealthy food categorizes.

CHAPTER IV

APPLICATION TO HEALTH MESSAGING

Studies 1 and 2 used abstract computer games to manipulate the constructs of action-inaction goals and approach-avoidance motivations. In the second series of studies, we were interested in examining whether the two concepts could be primed using subtle differences in healthy eating messages and whether the pattern of results from Study 1 would replicate in this context. Studies 3A and 3B tested the ability of healthy eating messages to manipulate the two concepts of interest while Study 4 examined whether the food choice results from Study 1 would replicate when using this applied manipulation.

STUDY 3

The goal of Study 3 was to develop healthy eating messages that would serve as the manipulation of action-inaction and approach-avoidance in Study 4. Study 3 took place in two parts. Study 3A presented participants with nine sets of healthy eating messages and asked them to rate them on the dimensions of action-inaction and approach-avoidance. Study 3B took the seven sets of messages that best represented the four categories of interest (action-approach, action-avoid, inaction-approach, inaction-avoid) and used a measure of action-inaction previously used by

Albarracín and colleagues (2008, Experiment 4) to verify that the messages could successfully prime general action-inaction goals.

STUDY 3A

Method

Participants. One hundred forty-two individuals (61 men, 78 women, 1 transgender) completed an online survey advertised on Amazon's Mechanical Turk. Participants represented a wide range of ages (*Range:* 18-73; *M:* 36.4 years), ethnicities (76.8% White, 10.6% Black, 4.9% Asian, 3.5% Hispanic/Latino, 4.2% Other), socioeconomic statuses (Annual Family Income: 47.2% below $40,000, 19.7% $40,000-$59,999, 13.4% $60,000-$79,999, 7.7% $80,000-$99,999, 12% $100,000 and above), and education levels (20% high school, 27.5% some college, 11.3% 2-year degree, 35.9% 4-year degree, 13.4% graduate or professional degree).

Materials and procedure. Before beginning the survey participants were told that they would be asked to view a series of healthy eating messages and rate them on several dimensions. No cover story was needed and participants were told that their responses would be used to help us develop stimuli for future studies.

Healthy eating messages. Thirty-six messages encouraging healthy eating habits were developed for the purposes of this study (Appendix E). The messages consisted of nine sets of four messages, with the four messages in the set as identical as possible with the exception of varying on our two dimensions of interest (action-inaction and approach-avoidance). The approach messages encouraged healthy eating habits by promoting an increased consumption of healthy foods while the

avoidance messages promoted a decreased consumption of unhealthy foods. It is important to note that although inaction can be defined as a lack of behavior (e.g., don't eat sugar), because action-inaction is a continuous construct, inaction can also be defined as relatively less action (Albarracín et al., 2008; McCulloch, Li, Hong, Albarracín, 2012). Our health messages used verbs previously rated as more (action condition) or less (inaction condition) active (Experiment 1, McCulloch et al., 2012).

Action-inaction and approach-avoidance. Participants were exposed to one randomly selected message from each set, for a total of nine messages. While viewing each message they were asked to rate the messages on a scale of inaction to action and on the dichotomous variable of approach-avoidance motivation. Action-Inaction was measured by asking, *Imagine yourself performing this behavior. How much mental or physical action would this behavior require?* (1 = *Not at all (Inaction)*; 7 = *A great deal (Action)*). Approach-Avoidance was measured using the dichotomous measure of, *Is the goal of this behavior to approach a positive (desired) stimulus or avoid a negative (undesired) stimulus?*. Participants completed the survey by responding to demographic questions.

Results

Approach-avoidance. Given the dichotomous nature of the approach-avoidance variable, Chi-Square analysis was used to determine whether, within each set of messages, the messages about consuming more healthy food were more likely to be designated as approach messages and those about consuming less unhealthy food as avoidance messages. For all nine sets of messages the two approach

messages were significantly more likely to be identified as having a goal to approach a positive stimulus than the two avoid messages (Table 1). As a result of these findings, all nine sets of messages were validated as manipulating approach-avoidance.

Table 1. *Approach-Avoidance Chi-Square Results (Study 3A)*

Message Set	*df*	*N*	χ^2	*Phi*
A	1	142	72.53**	-.71
B	1	142	9.93*	-.26
C	1	142	84.53**	-.77
D	1	141	71.06**	-.71
E	1	141	79.62**	-.75
F	1	142	74.49**	-.72
G	1	142	69.68**	-.70
H	1	141	80.12**	-.75
I	1	142	77.05**	-.74

Note: *$p < .01$. **$p < .001$

Action-inaction. Although Study 3A was a repeated-measures design in that participants rated multiple messages on the same dimensions, because the nine messages each participant saw were independently and randomly selected from the four possible conditions it was not possible to assign participants' a within-subjects condition to run a repeated-measures analysis. Instead, to account for the within-subjects variance, participants' ratings were standardized so that each of their nine action-inaction ratings was represented by a Z-Score with zero representing their mean action-inaction rating across conditions, positive numbers indicating a more active rating, and negative numbers indicating a more inactive rating for that message. A separate ANOVA analysis was conducted for each set of messages with

type of message (action vs. inaction) as the independent variable and participants' action-inaction Z-scores as the dependent variable. Results indicate that the two action messages within sets B, C, G, H, and I were all rated as significantly more active than their corresponding inactive messages (*p*s < .05; see Table 2).

Table 2. *Action-Inaction ANOVA Results (Study 3A)*

Message	*df*	*error df*	$M_{Action\ Z\text{-}Score}$	$M_{Inction\ Z\text{-}Score}$	*F*	*p*	η_p^2
A	1	136	.36	.22	.65	.42	.01
B	1	136	.41	-.08	14.09	.00	.09
C	1	136	.07	-.19	3.05	.08	.02
D	1	135	-.14	-.27	.83	.36	.01
E	1	135	.35	.23	.41	.52	.00
F	1	135	.08	-.11	2.08	.15	.02
G	1	135	.51	.07	8.91	.00	.06
H	1	136	-.01	-.62	19.36	.00	.13
I	1	135	-.24	-.63	5.28	.02	.04

Discussion

Given that the action-inaction manipulation in sets A, D, E, and F did not provide a clean separation between categories, the next step was to decide whether to discard or modify these messages. To determine whether to discard or modify the messages in these four sets, we looked at the action-inaction ratings for all four conditions to determine if there were instances in which only one message in the set did not fit the desired action-inaction pattern. This was the case for sets A and F. In both sets A and F the active-approach message was rated as more active than the inactive messages, but the active-avoid message was not. In set A, the active-avoid message was changed from, "At the grocery store, steer away from unhealthy snacks" to "At the grocery store, actively avoid unhealthy snacks". In set F the

message was changed from, “Avoid unhealthy snacks at work” to “Steer clear of unhealthy snacks at work” (Appendix F). We hoped that by making these slight adjustments we could preserve the usability of the sets of messages. Message sets D and E, however, failed to fit the desired pattern of action-inaction ratings and as such sets D and E were dropped. Studies 3B and 4 continued with seven sets of messages.

Study 3B

The aim of Study 3B was to see if the seven sets of health messages that emerged from Study 3A could successfully manipulate general action versus inaction goals. Specifically, Study 3B examined if viewing the action (versus inaction) messages would increase cognitive processing of a written text. Experiment 4 from Albarracín et al. (2008) demonstrated that individuals successfully primed with action goals exhibit greater recall of a text passage than individuals primed with inaction goals. The procedure used in the current study was modified from Experiment 4 from Albarracín et al. (2008).

Method

Participants. Eighty-one individuals completed an online survey advertised on Amazon’s Mechanical Turk. Participants who completed Study 3A were not eligible to participate in Study 3B. Participants were randomly assigned to one condition in a 2 (action vs. inaction) x 2 (approach vs. avoidance) between-subjects design.

Materials and procedure. Participants were first primed with action-inaction and approach-avoidance using the health messages developed and pretested in Study 3A. Following this priming task, participants were asked to study a text passage. Immediately after the presentation of this passage, participants answered 15 open-ended questions about the passage. The coded correctness of the answers was used to determine the effects of our health messages on amount of recall, a previously established measure of activation of general action-inaction goals (Albarracín et al., 2008).

Priming task. Participants were shown the messages from each set corresponding to their randomly assigned condition (e.g., action-approach) for a total of seven messages. Each message was displayed in the center of the participant's computer screen for 10 seconds before auto-advancing to the next message. Participants were simply instructed to view each message for the full 10 seconds, as they would later be asked to answer questions about the messages. To avoid raising suspicion regarding the connection between the priming task and the dependent variables, after viewing all seven messages participants were asked, "Overall, how effective do you think these messages would be at encouraging individuals to adopt a healthier lifestyle?" (1 = *Not at all effective,* 7 = *Extremely effective).*

Passage presentation*.* We used a 226-word passage developed from Wikipedia facts on various species of birds and presented the facts as being about a fictional bird called the "lundagee" (Appendix G). We chose to create our own passage from facts about several species of birds and to present the passage as

being about a single fictional species of bird because to prevent participants from recognizing the facts as being about any one specific bird and to then search the internet during the text recall period. The passage was presented to participants sentence by sentence with a 12-second break between each.

Recall measures. A set of 12 open-ended questions was used to assess participants' recall of the material (Appendix H). Participants were asked very specific questions about the facts presented in the passage and as a result of the lack of ambiguity only one coder was used. For example, the passage mentioned that lundagees can live up to 57 years. One recall question asked, "Lundagees can live for how many years?". All answers that did not say 57 years exactly were coded as incorrect. The total number of correctly answered questions was computed for each participant, with a maximum recall score of 12.

Results

An ANOVA was performed with the two manipulated variables (action-inaction and approach-avoidance) as the independent variables and recall as the dependent variable. As predicted, there was a main effect of action-inaction such that participants who viewed the active healthy eating messages responded with more correct answers (M = 10.73, SD = .57; 95% CI [9.61, 11.86]) than did participants who viewed the inactive healthy eating messages (M = 8.98, SD = .56, 95% CI [7.86, 10.09]), ($F_{1,77}$ = 4.88, p = .03, η_p^2 = .06). These results replicate those found in Albarracín et al. (2008) when using a direct semantic prime of action versus inaction. There was no main effect of approach-avoidance (p = .13) or

significant two-way interaction (p = .57).

Discussion

Taken together, the results of Study 3A and 3B provide support for the use of the healthy eating messages as a manipulation of both approach-avoidance and action-inaction. The results of Study 3A show that the messages vary significantly in regards to whether the goal of the target behavior is to approach a positive stimulus or avoid a negative stimulus. Study 3B used a procedure adapted from Albarracín et al. (2008) to demonstrate that after being primed with the messages, participants displayed the expected change in recall associated with the activation of a general action or inaction goal.

Study 4

The goal of Study 4 was to replicate the findings from Study 1 in the context of healthy eating campaigns. Although an abstract manipulation of action-inaction goals and approach-avoidance motivation impacted food choice in the lab, we were also interested in determining whether the same effect on food choice would occur when the manipulation was embedded in healthy eating messages.

Study 4 followed a procedure similar to that of Study 1 with three adjustments. First, participants were primed with action-inaction and approach-avoidance using the health messages developed and pretested in Studies 3A and 3B instead of the computer games used in Studies 1 and 2. Second, half of the participants made their food choice on the computer (as was done in Studies 1 and

2) while the other half were shown a tray with all of the food options and given the opportunity to select a snack directly from the tray. Study 4 introduced this concrete food choice task for half of the participants to see if the influence of manipulating action-inaction and approach-avoidance would hold regardless of the level of abstraction of the food choice task. Finally, participants in Study 4 consumed their selected snack in the lab under the cover of a taste test. By having participants consume their snack in the lab we were able to examine actual calorie consumption data.

Method

Participants and design. Eighty-one participants (47 female, 33 male, 1 unknown) participated in this study in exchange for partial course credit. Participants were students currently enrolled in summer semester Psychology or Communications courses at the University of Michigan. Participants were randomly assigned to one of eight conditions in a 2(action vs. inaction) x 2(approach vs. avoid) x 2(abstract vs. concrete choice) between-subjects design.

Materials and procedure.

Action vs. inaction and approach vs. avoid manipulation. Participants were exposed to seven health messages in the same manner as Study 3B. The seven messages corresponding to their randomly selected condition (e.g., action-avoid) were presented one at a time for 10 seconds each. After viewing all seven messages participants were asked one question about how effective they believed the seven messages would be at encouraging individuals to adopt a healthier lifestyle. We

chose to use one general question to preserve the cover story that participants were piloting stimuli for use in several future studies without unduly influencing how much participants were processing the messages. By allowing participants to view the messages without focusing attention to the content via questions, this study preserves ecological validity and serves as a strong test of the potential efficacy of the messages to have an impact in the field.

Abstract vs. concrete food choice. After viewing the seven messages participants were told that we would like their help in pretesting snack options for a separate fall semester study. Our lab was advertised as a health communications lab in an attempt to minimize suspicion regarding the connection between the two tasks. At this point half of the participants were presented with four snack options (2 healthy, 2 unhealthy) on the computer in the same manner as Studies 1 and 2. Participants in this *abstract choice* condition were signed up for a two-part study and were told that they would be completing the taste test when they returned the following week for the second half of the study. After selecting their snack food on the computer they were excused from Part 1 and reminded to return for Part 2 during their timeslot the following week. Participants in the *concrete choice* condition were shown a food tray that held a bowl of each snack option and were told to select a snack for the tasting task. These participants completed the taste task immediately, making the food choice concrete both psychologically and temporally.

Tasting task. After making a food choice, all participants completed a computer-guided tasting task with their selected snack. For the participants in the

abstract choice condition the study resumed at this point between 5-10 days after completion of Part 1. Snack options for this study included Lays potato chips, plain M&Ms, roasted and salted almonds, and seedless green grapes. The snack options were designed to include both a salty and sweet snack in both the healthy and unhealthy categories. Participants were provided with a bowl of their selected snack food that had been measured to provide a specific weight of food down to the gram. During the tasting task participants were asked to answer several questions about their chosen snack food (e.g., how sweet do they taste?; see Appendix I for full taste test questionnaire) on a scale from 1 (*not at all*) to 7 (*extremely*).

Three Factor Eating Questionnaire. Participants then completed the Three Factor Eating Questionnaire - Revised 18 (TFEQ-R18; Karlsson, Persson, Sjostrom, & Sullivan (2000); Appendix J. The TFEQ-R18 is an 18-item questionnaire that measures three aspects of eating behavior: cognitive restraint (CR), uncontrolled eating (UE), and emotional eating (EE). The TFEQ-R18 is able to distinguish among different eating patterns in both general and obsese populations (de Lauzon, et al. (2004); Karlsson, Persson, Sjostrom, & Sullivan (2000)). Cognitive restraint is positively associated with healthy food consumption while unrestrained eating is positively associated with unhealthy and calorie-dense food consumption. Finally, emotional eating is associated with greater calorie consumption overall, regardless of the healthiness of the food in question.

English fluency. After completing the TFEQ-R18 participants completed a demographic questionnaire. Given that our action-inaction and approach-avoidance manipulations were embedded in written health messages we included a measure

of English fluency in our demographic questionnaire. Participants were first asked whether or not they were a native English speaker. Those who indicated that they were not native English speakers (n = 13) were then presented with a 1 (*not at all fluent*) to 5 (*extremely fluent*) scale on which to rate their English fluency.

Food consumption. After participants left the lab, their bowl of snack food was taken from their station and re-measured. Participant's snack consumption was measured by taking the difference between the starting weight of the snack bowl and the ending weight of the snack bowl in grams. Participants' percentage of snack consumed was calculated by dividing the total number of grams provided by the number of grams consumed. Finally, following the procedure used by Albarracín, Wang, & Leeper (2009), participants' total caloric consumption was computed by multiplying the number of grams consumed by the caloric content per gram of that particular snack as indicated on the packaging.

Results

Because the study involved message comprehension as the only manipulation of the constructs of interest, eight participants who reported an English fluency rating of less than 5 were excluded, leaving seventy-three participants in the final analyses.

Message effectiveness. We were first interested in examining how effective participants perceived the health messages. To examine effectiveness, a one-way ANOVA was run with message effectiveness as the dependent variable and the two message characteristics (action vs. inaction, approach vs. avoidance) as the

independent variables. The delay variable was not included in this analysis, as it had not yet been introduced to the study when participants rated message effectiveness. This analysis revealed a significant main effect of approach vs. avoidance ($F_{1,69}$ = 5.49, p = .02, η_p^2 = .07) such that participants believed the avoidance messages (M = 4.14, SD = .21, 95% CI [3.72, 4.56]) would be more effective at encouraging individuals to eat healthier than the approach messages (M = 3.46, SD = .20, 95% CI [3.05, 3.86]). There was no main effect of action-inaction (p = .31) or interaction between approach-avoidance and action-inaction (p = .94).

Food choice. To determine whether the health messages influenced food choice, participants' choice of snack was coded as healthy (almonds and grapes) or unhealthy (M&Ms and potato chips). Next, binary logistic regression was performed with our three manipulated variables (action vs. inaction, approach vs. avoidance, abstract vs. concrete choice) as predictor variables. Results revealed no significant predictors of food choice behavior (ps > .18). We next added the three factors from the TFEQ-R18 as covariates in the model. Again, results revealed no significant predictors of food choice behavior (ps > .22).

Food consumption. To determine whether the health messages impacted actual food consumption, a one-way ANOVA was conducted with percentage of snack consumed as the dependent variable and our three manipulated variables (action vs. inaction, approach vs. avoidance, and abstract vs. concrete choice) as the independent variables. Results from this analysis revealed a significant 2-way action-inaction x approach-avoidance interaction ($F_{1,65}$ = 4.94, p = .03, η_p^2 = .07). The pattern of means was identical to that of Study 1 with participants in the action-

avoid (*M* = 20.38%, *SD* = 7.52%, 95% CI [5.36%, 35.41%]) and inaction-approach (*M* = 33.14%, *SD* = 6.77%, 95% CI [19.63%, 46.65%]) conditions eating a lower percentage of the snack than participants in the inaction-avoid (*M* = 41.07%, *SD* = 7.30%, 95% CI [26.49%, 55.65%]) and action-approach (*M* = 44.95%, *SD* = 7.63, 95% CI [29.71%, 60.19%]) conditions. Although choice level (abstract vs. concrete) did not interact with any of our message variables (*p*s > .45), there was a main effect of choice level on percentage of snack consumed ($F_{1,65}$ = 9.94, *p* = .002, η_p^2 = .13). Participants in the abstract choice condition consumed significantly more of their selected snack (*M* = 46.41%, *SD* = 5.31%, 95% CI [35.81%, 57.01%]) than participants in the concrete choice condition (*M* = 23.36%, *SD* = 5.03%, 95% CI [13.31%, 33.41%]). One possibility is that the main effect of choice condition is due to the fact that participants in the concrete choice condition completed the taste task immediately following the presentation of the health messages while participants in the abstract choice condition completed the task 5-10 days later, and as such, may have had health goals more activated at the time of consumption.

We next examined if there were any differences in total calories consumed across conditions by running a one-way ANOVA with calories consumed as the dependent variable and the three manipulated variables (action vs. inaction, approach vs. avoidance, and abstract vs. concrete choice) as the independent variables. Results from this analysis again revealed a significant 2-way action-inaction x approach-avoidance interaction ($F_{1,65}$ = 5.46, *p* = .02, η_p^2 = .08). The pattern of means was again identical to that of Study 1 with participants in the action-avoid (*M* = 22.10, *SD* = 6.86, 95% CI [8.40, 35.80]) and inaction-approach (*M*

= 33.21, *SD* = 6.17, 95% CI [20.89, 45.53]) conditions consuming fewer calories than participants in the inaction-avoid (*M* = 43.64, *SD* = 6.66, 95% CI [30.35, 56.93]) and action-approach (*M* = 42.82, *SD* = 6.96, 95% CI [28.93, 56.72]) conditions. Furthermore, choice level (abstract vs. concrete) did not interact with any of our message variables (*p*s > .55) but there was a main effect of choice level on percentage of snack consumed ($F_{1,65} = 14.79$, $p < .001$, $\eta_p^2 = .19$). Participants in the abstract choice condition consumed significantly more calories (*M* = 48.27, *SD* = 4.84, 95% CI [38.60, 57.93]) than participants in the concrete choice condition (*M* = 22.62, *SD* = 4.59, 95% CI [13.46, 31.78]).

The results of both sets of food consumption analyses were not moderated by gender, minority status, or any of the three factors from the TFEQ-R18. Additionally, the levels of significance and patterns of results are identical whether or not any of these variables are included in the model as covariates.

Discussion

Study 4 expanded on the significant results found in Study 1 by embedding the action-inaction and approach-avoidance manipulations in health messages and measuring actual food consumption in the lab. Despite participants only being exposed to the health messages for a total of 70 seconds, there was a significant influence of the messages on both percentage of snack consumed and overall calorie consumption. Consistent with Study 1, participants exposed to the action-avoid and inaction-approach messages exhibited more goal consistent behavior than those exposed to the action-approach and inaction-avoid messages. Interestingly, the

results were consistent across several variables that are known to influence food consumption such as gender, minority status, cognitive food restraint, emotional eating, and unrestrained eating.

Although one may have predicted that the food choice data would also replicate the pattern found in Study 1, it is important to note that because the action-inaction and approach-avoidance manipulation in Study 4 was embedded in health messages, there were likely significant impression concerns. All participants selected their food for the tasting task immediately after being presented with messages encouraging healthy eating behavior. This theory is supported by the fact that, although 53.2% of participants who selected a snack in Study 1 chose an unhealthy option, this number dropped to 23.5% for Study 4. Thus, with fewer participants selecting an unhealthy snack, there is less variability in the food choice measure to account for with the variables on interest.

CHAPTER V

GENERAL DISCUSSION

Across five studies, we sought to examine the interaction between action-inaction goals and approach-avoidance motivations in the context of goal-driven behavior. We first manipulated these two motivational constructs using abstract computer games before embedding the manipulations in messages designed to encourage healthy eating habits.

Implications for Theory

From a theoretical perspective, this dissertation draws attention to the need for a distinction between action-inaction goals and approach-avoidance motivations. The studies presented here demonstrate that, although these two concepts are often confounded, they should be treated as separate constructs with their own unique impact on attitudes and behavior. In Studies 1 and 4, participants primed with the combinations of action-avoid and inaction-approach report attitudes and engage in behavior more conducive to a primed goal than participants primed with inaction-avoid and action-approach. Interestingly, the two conditions in which participants demonstrate the least goal-congruent behavior are the most likely to be found in current health messaging campaigns. This effect was seen for both food choice behavior (Study 1) and actual food consumption (Study 4).

Furthermore, the same pattern of results emerged whether the two concepts were manipulated using an abstract computer game (Study 1) or using subtle changes in the wording of healthy eating messages (Study 4). A boundary condition for the interaction of these two motivational constructs also emerged. When a specific health goal was activated (Studies 1 and 4), the interaction of action-inaction goals and approach-avoidance motivations emerged. Without the activation of a specific goal, however, only a main effect of action-inaction goals was detected, with no discernable influence of approach-avoidance motivations (Study 2).

In the context of a specific activated goal, awareness that the influence of action-inaction goals is dependent on whether one is dealing with an approach or avoidance motivation has important implications for the generalizability of research on action-inaction goals. For example, Albarracín, Wang, & Leeper (2009) found that participants primed with action consumed more calories than those primed with inaction. As in our Study 2, participants in the Albarracín study were not primed with a specific food-related goal and, as a result, a main effect of general action goals emerged. We now know, however, that it is not possible to generalize this finding to all situations. In fact, we found that when a specific avoidance goal is activated, participants primed with action consumed *fewer* calories than those primed with inaction.

Although this research provides support for the hypothesis that action-inaction goals and approach-avoidance motivations are theoretically and practically distinct concepts, future research is needed to establish the mechanism through which these concepts interact to influence goal pursuit. One possibility is that,

because the pairings of action-avoid and inaction-approach are relatively novel in applied settings, participants are paying increased attention to those messages. Recent research in social and cognitive psychology has demonstrated that individuals pay greater attention to unexpected stimuli (Petty, 1997; Vachon, Hughes, & Jones, 2012). If pairing action with avoid and inaction with approach violates participants' expectancy, this may cause participants to pay increased attention to the messages where those pairings exist, resulting in greater message effectiveness. Although the studies in this dissertation do not include a measure of message attention as message exposure was held constant, participants' ratings of the health messages in Study 3A suggest that this may not be the case. In Study 3A participants rated how easy the health messages were to understand. If the combinations of action-avoid and inaction-approach were viewed as more novel, one might expect participants to rate them as more difficult to understand. The results of Study 3B show that message set F was the only message set for which a significant interaction emerged for participants' rating of how easy the messages were to understand ($p = .03$). Action-inaction goals and approach-avoidance motivations did not significantly interact to influence ease of understanding for any other message set ($ps > .28$). As a result, we believe it is unlikely that the observed behavioral effect is solely a result of an expectancy violation.

Another possible mechanism through which action-inaction goals and approach-avoidance motivations may interact to influence goal pursuit is by affecting psychological distance and, as a result, construal level. If approach-avoidance motivations influences the direction of behavior and action-inaction goals

influences the volume of behavior, the interaction of the two concepts may influence an individual's psychological distance from goal-relevant stimuli with action goals promoting a greater change in psychological distance than inaction goals (see Figure 5). In the context of an approach motivation, this would mean that individuals are more psychologically distant from positive goal stimuli under inaction goals than action goals. In the context of an avoidance motivation however, the reverse is true; individuals are more psychologically distant from negative goal stimuli under action goals than inaction goals.

Linking this supposition about the influence of action-inaction goals and approach-avoidance motivations on psychological distance with existing research on construal level theory (CLT; Liberman & Trope, 1998; Trope & Liberman, 2003), it is possible that individuals in the inaction-approach and action-avoid conditions are exhibiting greater goal consistent behavior because they are viewing the goal stimuli from a greater psychological distance. Viewing both healthy and unhealthy food from a greater psychological distance may be beneficial for multiple reasons. First, research has shown that psychological distance is associated with greater self-control, such that high-level construals promote negative evaluations of temptations, which leads to increased self-control in delay of gratification paradigms (Fujita & Han, 2009). Furthermore, psychological distance leads individuals to focus on more abstract, global features of a stimulus (for a review see Trope & Liberman, 2010). Given that the distinction between healthy and unhealthy food is a relatively abstract feature, it is possible that being psychologically distant from food stimuli promotes more fluent categorization of foods as healthy or

unhealthy, which may, in turn increase the likelihood of healthy (versus unhealthy) food choice. Based on this premise, individuals may be more likely to choose a healthy food option when they are psychologically distant from food stimuli, regardless of whether the food is healthy or unhealthy. This leads to the hypothesis that the pairings of action-avoidance and inaction-approach are facilitating goal consistent behavior through psychological distance.

Implications for Practice

Chapter IV was aimed at examining the practical implications of independently manipulating action-inaction goals and approach-avoidance motivations. Studies 3A and 3B provide evidence that action-inaction goals and approach-avoidance motivations can be simultaneously primed using subtle differences in the wording of messages designed to encourage healthy eating habits. This is important for two reasons. First, the fact that such subtle differences in message wording significantly influenced behavior highlights the need for those designing public health campaigns to be cognizant of the possibility of unintentionally priming an action-inaction goal or approach-avoidance motivation. Furthermore, this finding also suggests that it may be possible to adapt existing public health campaigns to take advantage of the influence of action-inaction goals and/or approach-avoidance motivations without significantly changing the message of the campaign.

The results of Study 4 provide initial evidence that actual food consumption can be influenced using manipulations embedded in healthy eating messages.

Interestingly, Studies 1 and 4 both suggest that the frequently used combinations of action-approach and inaction-avoid may be the least effective in encouraging goal consistent behavior. This finding is consistent with existing data on the ineffectiveness of inactive-avoidance health campaigns such as abstinence-only sex education and the "Just Say No" anti-drug campaign (Kirby, 2001; Manlove, Romano-Papillo, Ikramullah, 2004; Rearman, Sussman, & Flay, 2009). Given the increasing evidence that inactive-avoidance health campaigns are often ineffective, public health researchers may wish to focus on developing health campaigns that promote a more active method of avoiding unwanted behaviors. In our case, participants who saw a health message advising them to "steer clear of unhealthy snacks at work" consumed fewer calories than participants who saw a similar health message with the recommendation to "skip unhealthy snacks at work".

Future Directions & Limitations

Turning to the limitations of the current research, one important limitation is the lack of a non-college student participant sample. Undergraduate college students differ from representative community samples in several key domains that are likely relevant to the current research (Schultz, 1969; Smart, 1966; Wintre, North, & Sugar, 2001). For example, undergraduates at the University of Michigan likely have a significantly lower body mass index (BMI) and higher socioeconomic status (SES) than a more representative sample (Graham, 1992). Regardless of the sample, future studies should also be sure to obtain a measure of participants' body mass index (BMI) as BMI has been shown to be related to eating habits (Haveman-

Nies, de Groot, & van Staveren, 1998).

A second limitation of the current research is the reliance on foods that are more extreme in their healthiness or unhealthiness than most foods. Given that the theoretical interaction between action-inaction and approach-avoidance had never been studied, we chose foods that would give the highest probability of detecting an effect. However, because the effects may not generalize with less clear-cut food options, future studies would do well to examine the impact of these concepts in situations allowing for a more representative selection of snacks. Finally, all of the present studies allowed participants to select a healthy snack in the food choice task, allowing them to actively pursue their goal. However, diet-conscious individuals may not always have the option of a healthy alternative, and must often instead choose between an unhealthy food or no food at all. Future studies are needed to examine the impact of action-inaction and approach-avoidance in situations where one is prohibited from actively pursuing their goal, leaving them with the option to pursue their general action goal by eating the unhealthy food or to pursue their healthy-eating goal by avoiding the healthy food (an inaction).

A final limitation of the existing research is the fact that participants in the current studies were drawn from a Western and predominantly Christian population. Cultures and religions are known to have significant influences on individuals' thoughts and feelings regarding action by providing general frames of reference (Tsai, Miao, & Seppala, 2007; Koole et al., 2010). Previous research has demonstrated that both Christian beliefs and Western cultures are associated with a larger preference for action over inaction (McCulloch et al., 2012; Tsai, Louie, Chen,

& Uchida, 2007). Future research is needed to examine whether the behavioral effects found in this dissertation are universal or result from culturally constructed beliefs regarding action-inaction and approach-avoidance.

In sum, this research increases our understanding of the interaction of two motivational concepts that are often confounded both in research and in applied settings. The work reported here suggests a more complicated story of the impact of action-inaction and approach-avoidance than is depicted when the two are studied separately.

FIGURES

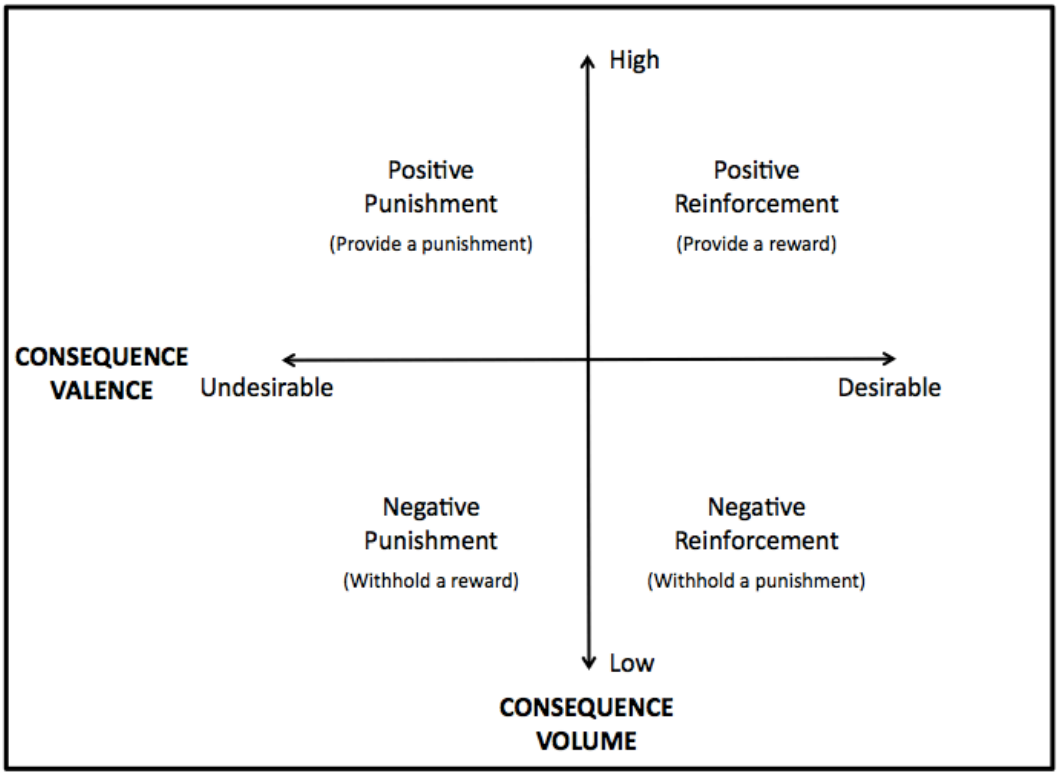


Figure 1A. Skinner's two-dimensional model of operant conditioning.

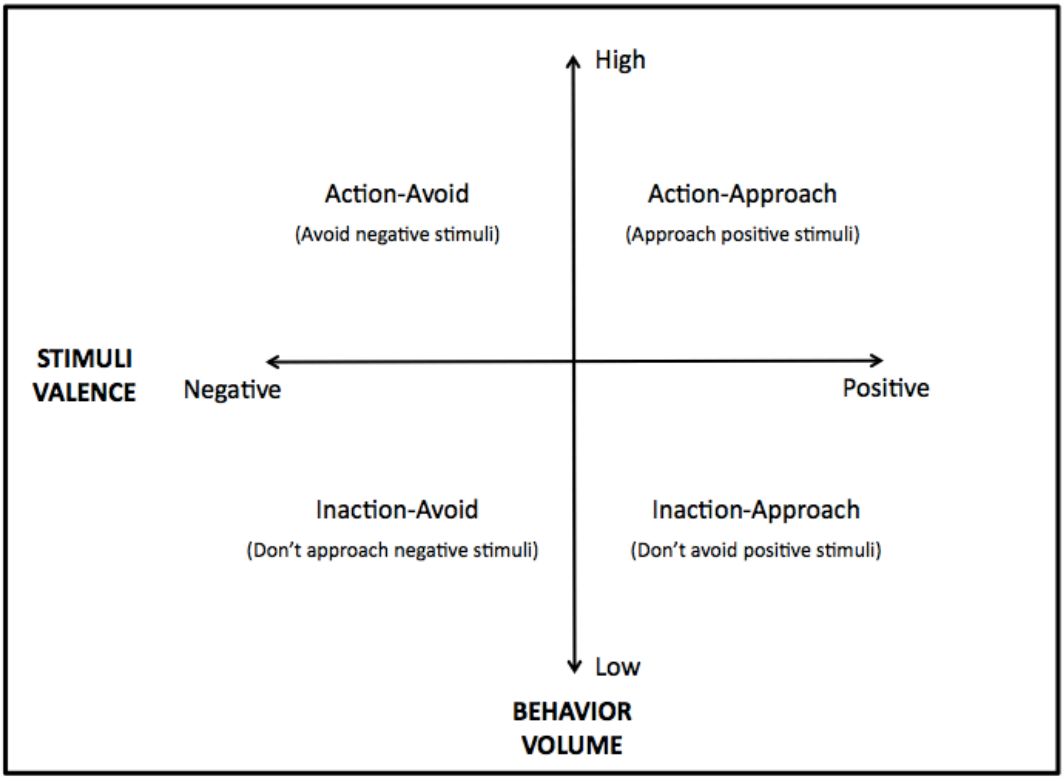


Figure 1B. Proposed Two-Dimensional Model of Goal-Driven Behavior.

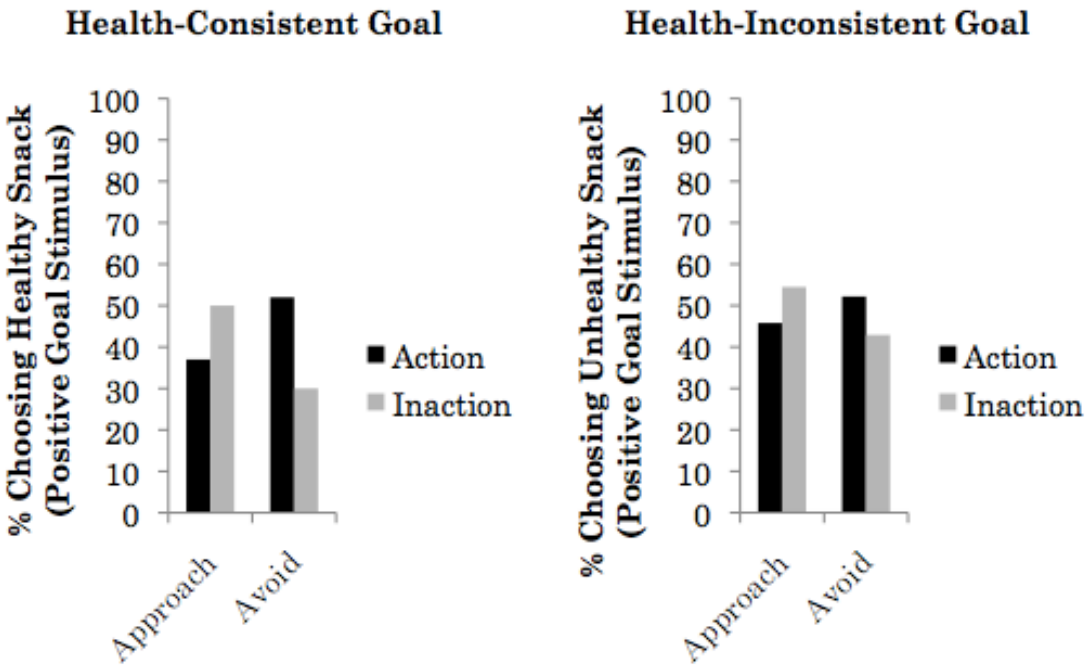


Figure 2. Virtual food choice behavior as a function of action versus inaction goals, approach versus avoid motivations, and health-consistent versus health-inconsistent goal (Study 1).

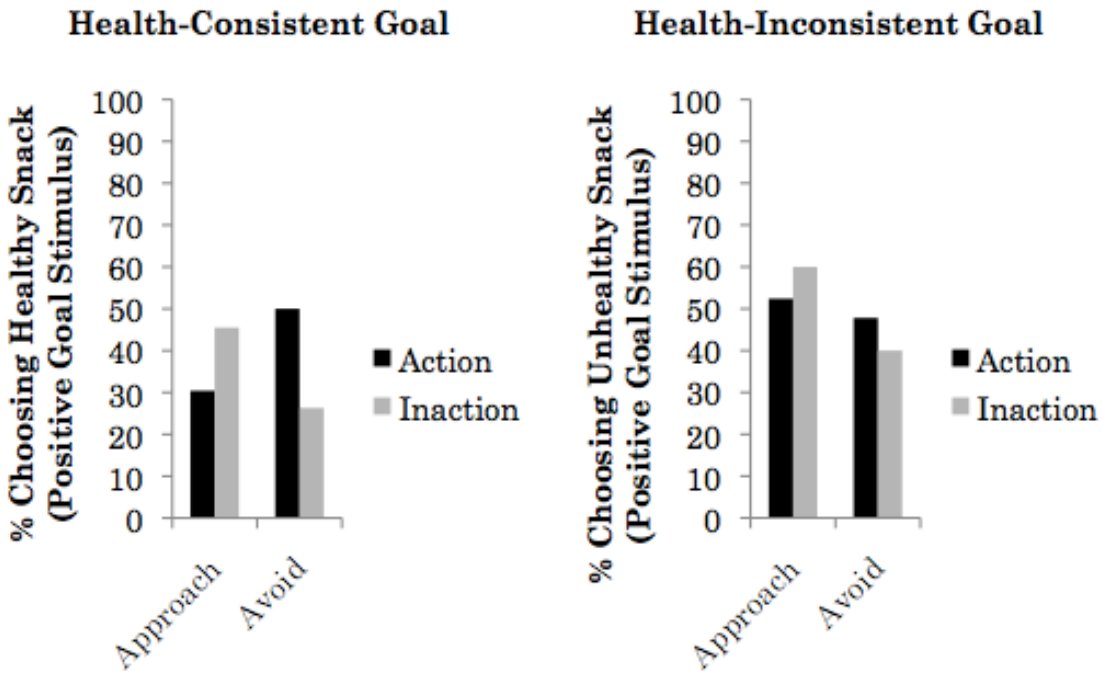


Figure 3. Actual food choice behavior as a function of action versus inaction goals, approach versus avoid motivations, and health-consistent versus health-inconsistent goal (Study 1).

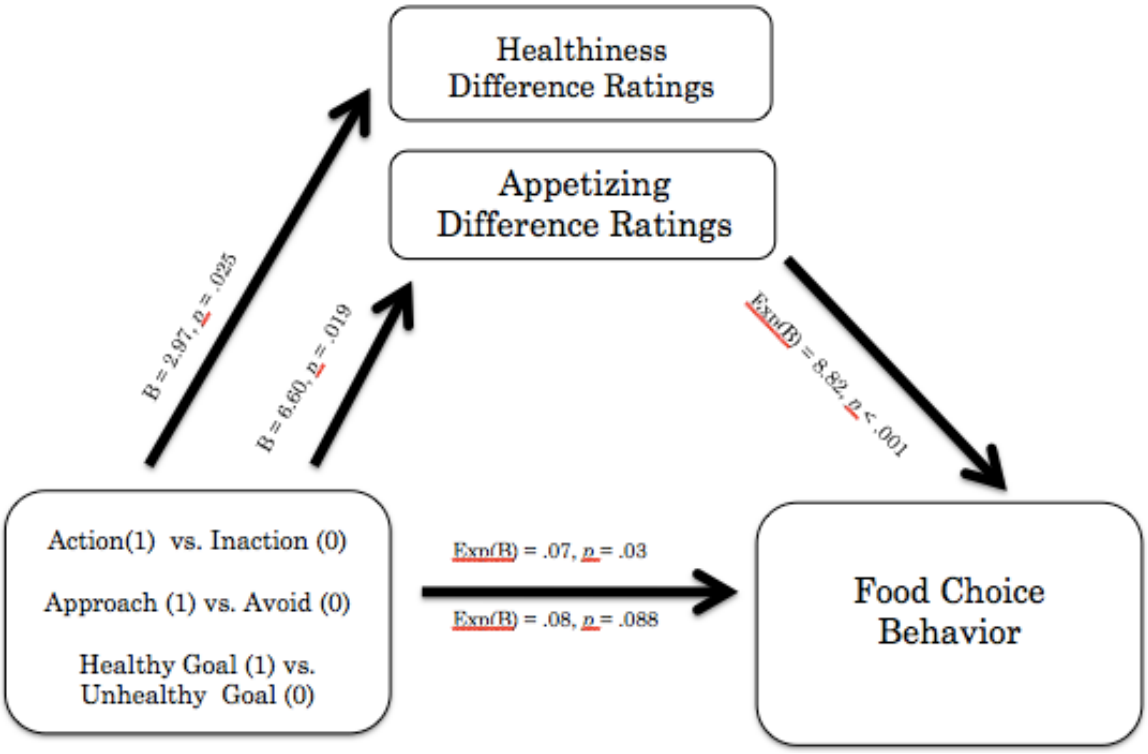


Figure 4. Model of significant Study 1 effects.

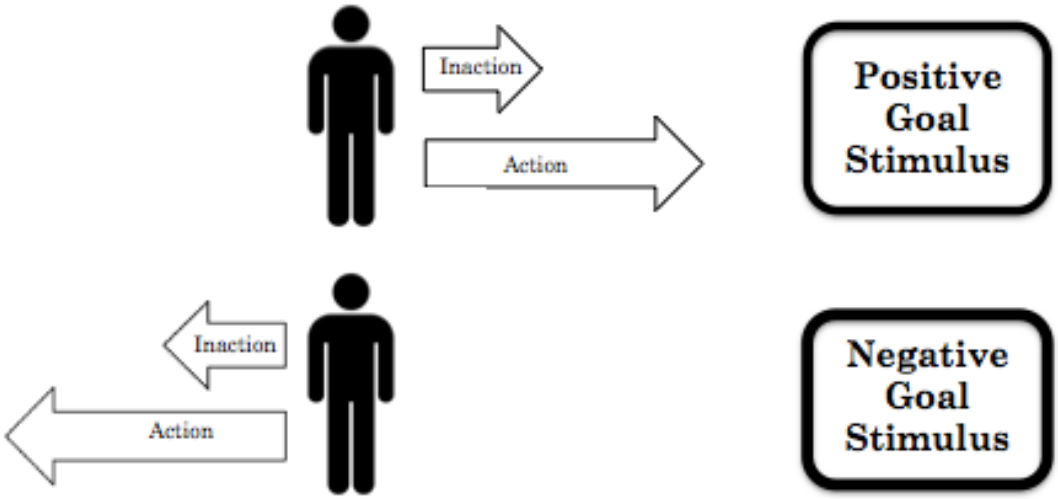


Figure 5. Action-inaction goals, approach-avoidance motivation, and psychological distance.

APPENDICES

APPENDIX A

EXAMPLE PUBLIC HEALTH CAMPAIGN MATERIALS

National Five-a-Day for Better Health!

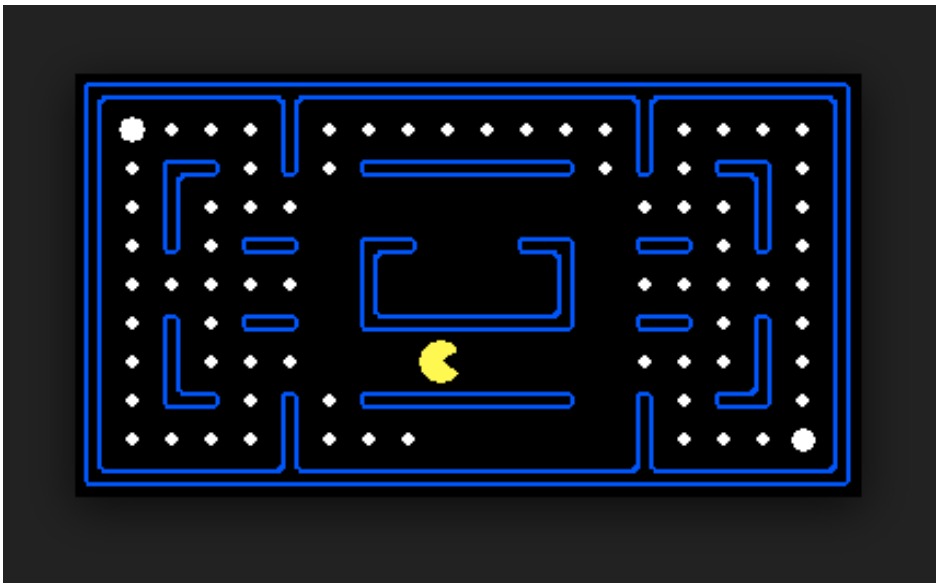
NYC Calorie Awareness

Strong4Life

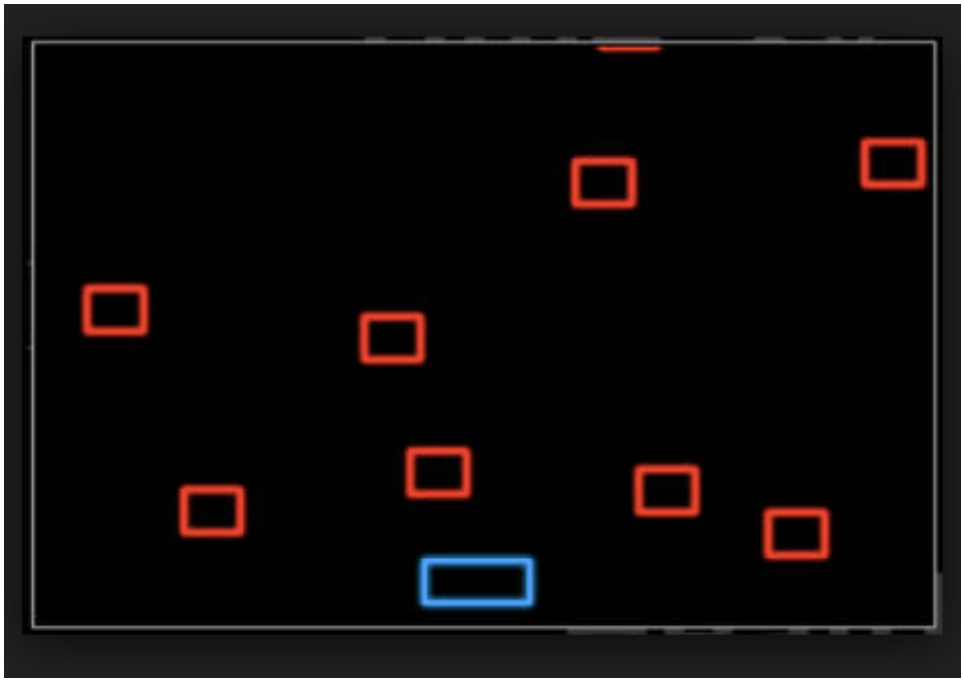
APPENDIX B

SCREEN SHOT OF APPROACH-AVOIDANCE X ACTION-INACTION GAME (STUDIES 1 & 2)

Pacman Without Ghosts (Approach Conditions)

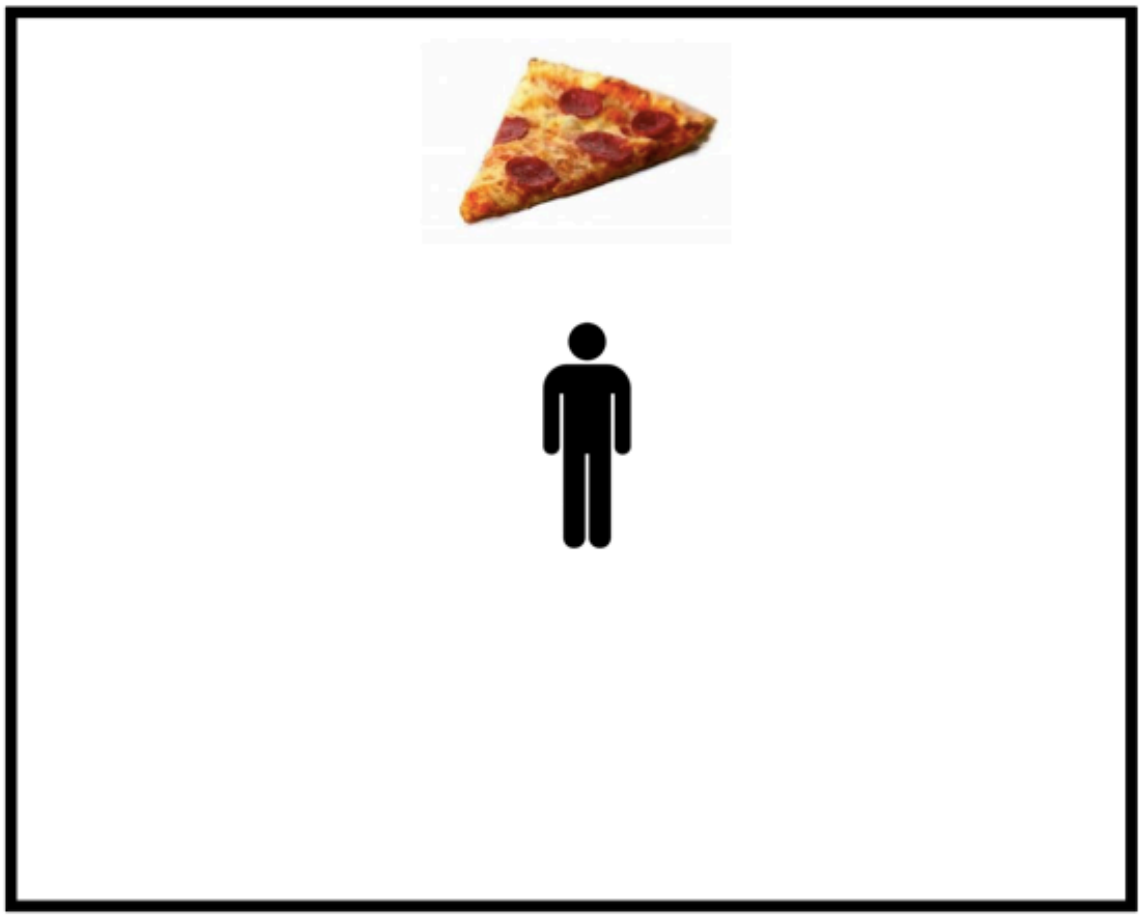


Distopix (Avoidance Conditions)



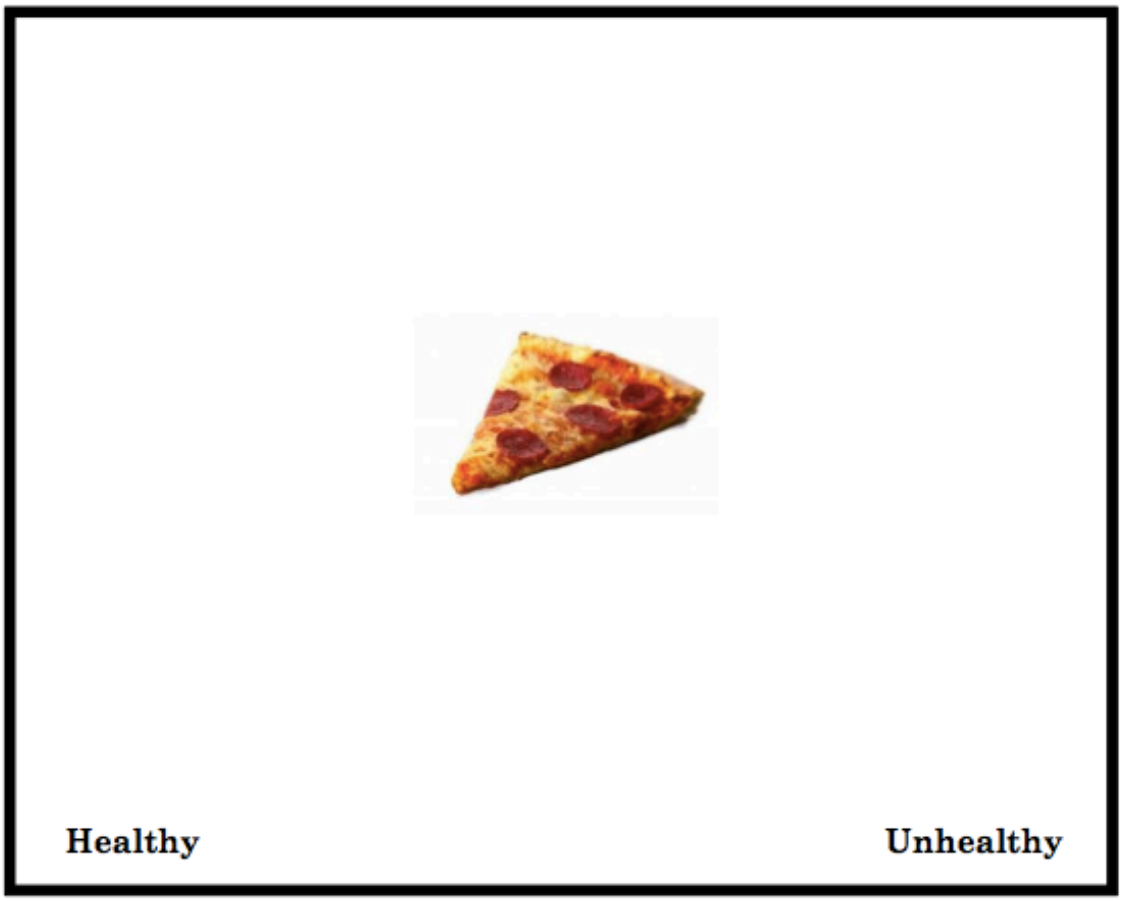
APPENDIX C

SCREEN SHOT OF GOAL MANIPULATION TASK (STUDY 1)



APPENDIX D

SCREEN SHOT OF CATEGORIZATION TASK (STUDY 2)



APPENDIX E

HEALTH MESSAGES (STUDY 3A)

Message Set A

Action-Approach

Inaction-Approach

Action-Avoid*
Modified for
Studies 3B and 4

Inaction-Avoid

Message Set B

Action-Approach

Inaction-Approach

Action-Avoid

Inaction-Avoid

Message Set C

Action-Approach

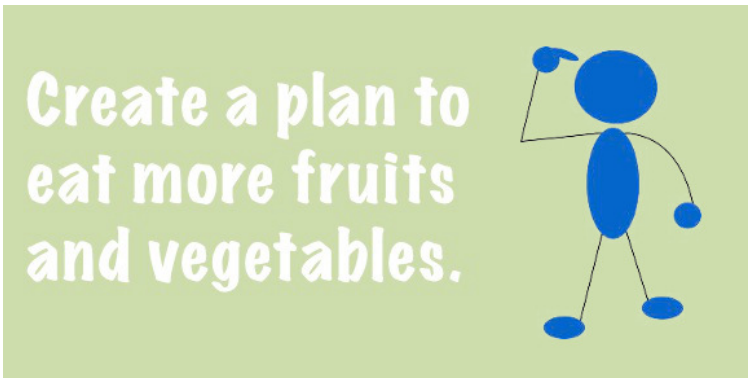
Inaction-Approach

Action-Avoid

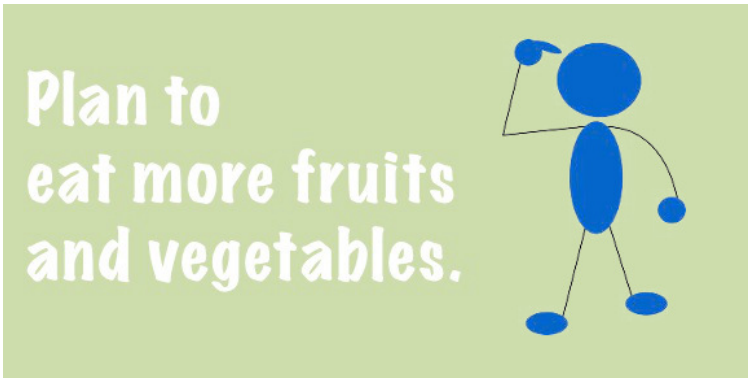
Inaction-Avoid

Message Set D (Removed from Studies 3B and 4)

Action-Approach



Inaction-Approach



Action-Avoid

Inaction-Avoid

Message Set E (Removed from Studies 3B and 4)

Action-Approach

Inaction-Approach

Action-Avoid

Inaction-Avoid

Message Set F

Action-Approach

Inaction-Approach

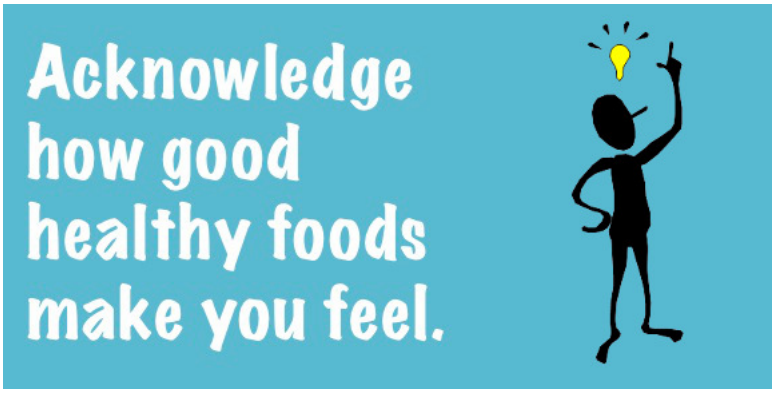
Action-Avoid*
Modified for Studies 3B and 4

Inaction-Avoid

Message Set G

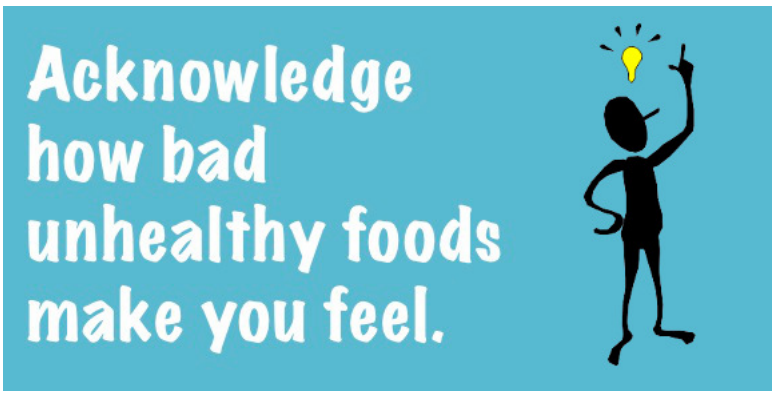
Action-Approach

Inaction-Approach



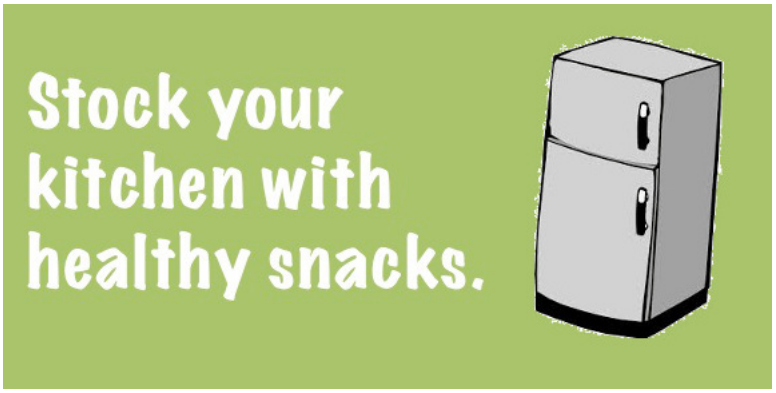
Action-Avoid

Inaction-Avoid



Message Set H

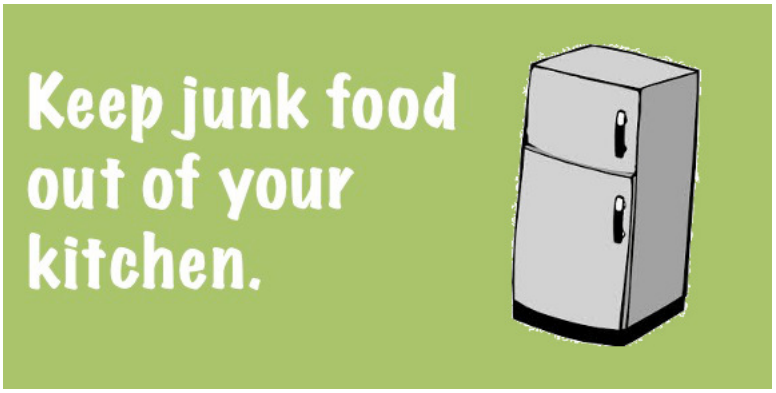
Action-Approach



Inaction-Approach

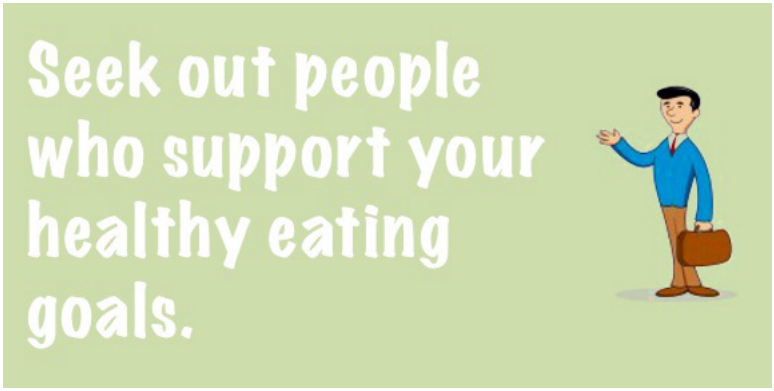
Action-Avoid

Inaction-Avoid



Message Set I

Action-Approach



Inaction-Approach

Action-Avoid

Inaction-Avoid

APPENDIX F

Health Messages Modified Between Studies 3A and 3B

Message Set A: Action-Avoid

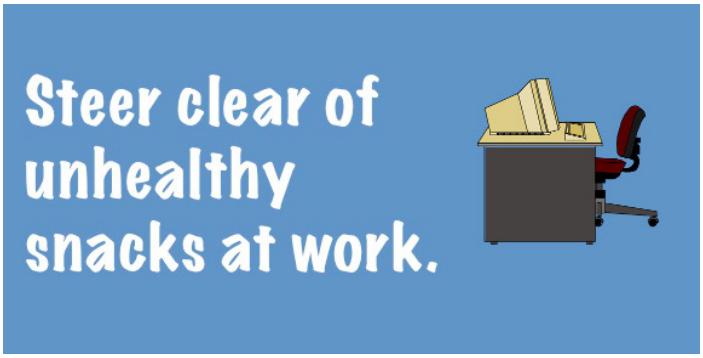
Original (Study 3A)

Modified (Studies 3B & 4)

Message Set F: Action-Avoid

Original (Study 3A)

Modified (Studies 3B & 4)



APPENDIX G

LUNDAGEE PASSAGE (STUDY 3B)

The lundagee is a species of flightless bird that is native to Asia. The lundagee can run at up to 33mph and maintain a steady speed of 25mph. Like all birds, the lundagee has hollow bones. The lundagee has the slowest wing speed of all animals; only able to flap it's wings once per second. The lundagee is the 3rd largest living species of bird and lays the 2nd largest eggs. Each lundagee egg weighs as much as a dozen chicken eggs. The lundagee's diet consists mainly of plant matter, though it also eats invertebrates. When threatened, the lundagee's primary defense strategy is puking up its last meal to disgust the predator. If this strategy fails, lundagees will kick the predator with their incredibly strong legs. During the winter months, the lundagee usually lives alone or in pairs. During the warmer months, lundagees live in nomadic groups of 5-50 birds. In every group there is a single dominant hen (female lundagee). All hens in the group lay their eggs in a communal nest, with the center spot reserved for the group's dominant hen. The feathers of adult male lundagees are mostly black, while females are brown. The lundagee was once shot by the thousands so it's feathers could be used for women's hats. Lundagees are one of the longest-living bird species, living up to 57 years.

APPENDIX H

TEXT RECALL QUESTIONS AND ANSWERS (STUDY 3B)

1. Where is the lundagee native to? (Asia)
2. The lundagee can maintain a steady pace of how many miles per hour? (25)
3. What is the maximum speed a lundagee can achieve? (33mph)
4. How does the lundagee usually live during the winter months? (alone or in a pairs; ½ point given for providing 'alone' or 'in pairs')
5. What do lundagees eat in addition to plant matter? (invertebrates)
6. How does the size of the lundagee compare to other species of bird? (3rd largest)
7. What color are the feathers of adult female lundagees? (brown)
8. What color are the feathers of adult male lundagees? (mostly black; black)
9. How fast can a lundagee fly? (It cannot fly; 0mph)
10. Lundagees can live for how long? (57 years)

APPENDIX I

TASTE TEST QUESTIONNAIRE (STUDY 4)

Instructions: We will now ask you to rate the [almonds/grapes/M&Ms/potato chips] in the bowl provided on several dimensions.

Please taste the specific [almonds/grapes/M&Ms/potato chips] provided and try not to answer the questions based on your previous experiences consuming [almonds/grapes/M&Ms/potato chips].

1- - - - - - - - 2 - - - - - - - - 3 - - - - - - - - 4 - - - - - - - - 5 - - - - - - - - 6 - - - - - - 7
Not at all Extremely

1. How salty do they taste?

2. How sweet do they taste?

3. How sour do they taste?

4. How bitter do they taste?

5. How stale do they taste?

6. How crunchy is the texture?

7. How smooth is the texture?

8. How gritty is the texture?

1- - - - - - - - 2 - - - - - - - - 3 - - - - - - - - 4 - - - - - - - - 5 - - - - - - - - 6 - - - - - - 7
Extremely Bad Extremely Good

9. Overall flavor.

10. Overall texture.

1- - - - - - - - 2 - - - - - - - - 3 - - - - - - - - 4 - - - - - - - - 5 - - - - - - - - 6 - - - - - - 7
Not at all enjoyable Extremely enjoyable

11. How enjoyable is the overall experience of eating these?

APPENDIX J

THREE FACTOR EATING QUESTIONNAIRE - REVISED 18

Instructions: Please answer the following questions about your eating habits.

1. When I smell a delicious food I find it very difficult to keep from eating, even if I have just finished a meal (UE)

Definitely False Mostly False Mostly True Definitely True

2. I deliberately take small helpings of food as a means of controlling my weight (CR)

Definitely False Mostly False Mostly True Definitely True

3. When I feel anxious, I find myself eating (EE)

Definitely False Mostly False Mostly True Definitely True

4. Sometimes when I start eating, I just can't seem to stop (UE)

Definitely False Mostly False Mostly True Definitely True

5. Being with someone who is eating often makes me hungry enough to eat also (UE)

Definitely False Mostly False Mostly True Definitely True

6. When I feel blue, I often overeat (EE)

Definitely False Mostly False Mostly True Definitely True

7. When I see a real delicacy, I often get so hungry that I have to eat right away (UE)

Definitely False Mostly False Mostly True Definitely True

8. I get so hungry that my stomach often seems like a bottomless pit (UE)

Definitely False Mostly False Mostly True Definitely True

9. I am always hungry so it is hard for me to stop eating before I finish the food on my plate (UE)

Definitely False Mostly False Mostly True Definitely True

10. When I feel lonely, I console myself by eating (EE)

Definitely False Mostly False Mostly True Definitely True

11. I consciously hold back at meals in order not to gain weight (CR)

Definitely False Mostly False Mostly True Definitely True

12. I do not eat some foods because they make me fat (CR)

Definitely False Mostly False Mostly True Definitely True

13. I am always hungry enough to eat at any time (UE)

Definitely False Mostly False Mostly True Definitely True

14. How often do you feel hungry? (UE)

Only at meal times	Sometimes between meals	Often between meals	Almost always

15. How frequently do you avoid “stocking up” on tempting foods? (CR)

Almost never Seldom Usually Almost always

16. How likely are you to consciously eat less than you want? (CR)

Unlikely Slightly Likely Moderately Likely Very Likely

1. Do you go on binges even though you are not hungry? (UE)

Never Rarely Sometimes At least once a week

18. On a scale of 1 to 4, where 1 means no restraint in eating (eating whatever you want, whenever you want it) and 4 means total restraint (constantly limiting food intake and never “giving in”), what number would you give yourself? (CR)

1 2 3 4

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