GET ACTIVE (BUT GET SNACKING): UNDESIRABLE EFFECTS OF ACTION GOALS ON DIET AND EXERCISE

By

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A THESIS PRESENTED TO THE GRADUATE SCHOOL
OF THE UNIVERSITY OF FLORIDA IN PARTIAL FULFILLMENT
OF THE REQUIREMENTS FOR THE DEGREE OF
MASTER OF SCIENCE

UNIVERSITY OF FLORIDA

2007

To my friends and family

ACKNOWLEDGMENTS

I thank Dr. Dolores Albarracin for her patience and commitment to my project. I would like thank my fellow grad students for their advice and feedback on my presentations. I also thank the research assistants in the Albarracin lab for keeping our computer lab running smoothly and ensuring that data collection is on track.

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December 2007

Chair: Dolores Albarracin
Major: Psychology

Recent experiments have revealed that exposure to general action goal primes increases the expression of a variety of subsequent behaviors, including folding paper, studying a passage and clicking a mouse (Albarracin et al., 2006). The effect of general action goals on both diet and exercise behaviors were investigated in three studies. Experiment 1 used a word-completion-priming paradigm followed by an opportunity to consume food and exercise. There was a main effect of prime on both eating and exercising.

In Experiment 2, goals were primed subliminally, and there was a marginal effect of prime on the second exercise in the pair. In Experiment 3, specific primes to exercise or indulge were presented alone or with action goals. Data suggest that specific primes are effective on their own, because they increased eating and exercising relative to controls, yet when added to general action goals, were not at all effective at increasing the target behaviors.

CHAPTER 1
GET ACTIVE (BUT GET SNACKING): UNDESIRABLE EFFECTS OF ACTION GOALS ON DIET AND EXERCISE

Introduction

Levels of activity vary across cultures, individuals, and situations. Industrialized nations--especially the U. S.--have seen vast increases in levels of activity in the past century, as reflected in internet use, working hours, athletic performance, and caffeine consumption (Costa, 2000; Gleick, 2000; OECD, 2005; International Olympic Committee, n.d.). Such increases may lead to a larger desire to be active which may spill over into other activities. For example, a stock broker accustomed to a fast pace of working may have difficulty slowing down or relaxing after arriving home from work. The lingering, general goal to be active could manifest itself in a variety of positive ways, from taking the dog for a walk to cleaning the garage. However, the general goal to be active could also manifest itself in undesirable ways, from compulsively checking e-mail to raiding the pantry.

To understand these potential effects, one could think of the general motivation to perform an effortful, energy-demanding goal-directed event as a general action goal (Albarracin et al.., 2006). General action goals have the end state of action and may stimulate the initiation or continuation of a variety of behaviors. They are necessary to perform desired behaviors, such as doing homework, volunteering in the community, or mowing the lawn. However, such general action goals--not being attached to any single activity--may also stimulate trivial behaviors, such as fidgeting and tapping one's foot. Even worse, they may also yield detrimental behaviors, such as honking at other cars in traffic, shopping online excessively or losing sleep.

The present thesis examined whether activating general action goals jointly influences beneficial behaviors--exercise in this case--and detrimental behaviors, such as overeating. An intervention designed to increase physical activity may promote the goal of "being active." Of

course, one can expect that a general action goal instilled by this program will increase exercise which will ultimately lead to health benefits, including weight loss and improved cardiovascular health. However, “being active” may be too general a goal. Overeating, for example, is another activity likely to satisfy a general goal to “be active.” Hence, unless one can prevent the goal from affecting eating habits, such a goal could end up sabotaging an attempt to lose weight.

This thesis addressed one potentially detrimental effect of general action goals: unwanted generalization of general action goals to irrelevant or maladaptive behaviors. It also addressed the potential effects of simultaneously priming a specific behavioral goal in addition to a general action goal. According to the first hypothesis, setting general action goals can lead to increased exercise and increased eating. Second, the combination of specific behavioral goal with a general action goal could have three potential effects: a specific goal may limit the application of the general action goal to specific behaviors, a specific goal could overpower the general action goal and conversely, the general action goal could overpower the specific goal.

Briefly, in the first study, we tested whether general action goals generalize to either exercise or eating by exposing participants to action goal primes and allowing them to eat and exercise. In the second study, we tested the effects of subliminal general action goal primes on the same behavioral dependent variables. In the third study, subliminal action goal primes were presented in combination with more specific goal primes related to eating or to exercise.

General Action Goals

General action goals, like other goals, can be primed through exposure to words--such as “action,” “go,” “start” and “doing”--presented as part a word completion or subliminal word presentation task (Albarracin et al., 2006). There is evidence to suggest that these general goals affect almost any behavior. In a study by Albarracin et al. (2006), participants presented with general action goal primes were more likely to choose to fold a paper airplane or doodle on scrap

paper than sit quietly. By contrast, participants presented with a set of neutral words (hereafter referred to as a control prime) were more likely to choose to rest than either fold or doodle on a piece of paper. Thus, general action goal priming yielded a relatively trivial motor behavior instead of motor rest. In other studies, priming general action goals stimulated engagement of various cognitive behaviors. In Albarracin and colleagues' (2006) Experiment 2, participants were primed with either action, inaction, or a neutral-word control using a word completion paradigm. Then participants watched a video of a male student performing mundane activities in his dorm, such as sipping a drink and checking e-mail. Participants were asked to press the spacebar each time the student in the video engaged in a meaningful event (a paradigm developed by Lassiter, Geers, & Apple, 2002). The spacebar-pressing behavior measured in Experiment 2 has been shown to increase in previous studies when participants exert cognitive effort. In the action prime study, the action primes stimulated higher counts than the neutral-control primes. Thus, the results may imply more cognitive activity in the action prime conditions than in the neutral condition.

In another test of the cognitive effects of general action goals using a subliminal priming procedure (Experiment 4), participants were asked to read and think about a written passage. After reading about evolutionary perspectives on food-sharing, they were then asked open- and closed-ended questions to assess how accurately they recalled the material. Recall is a measure of memory encoding (e.g., semantic or phonemic), and depends on how effortfully people process what they read (Craik & Tulving, 1975). As predicted, recipients of general action goal primes recalled the material more accurately and gave more elaborated answers than recipients of control primes.

There has also been a study confirming that the effects of general action primes on various measures are due to the activation of these goals (Albarracín et al., 2006: Experiment 5). As in the other studies, participants performed a word completion task that primed them with action, inaction (e.g., “freeze,” “pause,” “relax”), or neutral words. After this task, half of the participants were allowed to freely satisfy their action goals by completing a series of math and verbal problems or by doing nothing. These participants then completed a lexical decision task, which included both action and neutral words. The other half of the participants completed the same lexical decision task without a prior opportunity to satisfy their action goals. Consistent with past research on goal satisfaction (Zeigarnik, 1927), when there was no opportunity to satisfy the general action goal, the LDT revealed greater activation of action words than of inaction words. In contrast, participants who were given an opportunity to satisfy their general action goal did not respond faster to action words than inaction words. These findings suggest that satisfying the general action goal deactivates the corresponding semantic mental representation that is associated with the goal (Forster, Liberman, & Higgins, 2005).

In sum, past research on general action goals suggested that these goals can increase the likelihood or intensity of both physical and cognitive behaviors. This past research, however, only investigated these effects on mildly desirable or trivial behaviors such as reading for comprehension or folding a paper plane. Although not addressed directly in the past, the generalizability of general action goals suggests that the effects of these goals are not limited to increases in positive or innocuous behavior; the expression of negative behaviors may be increased as well. The primary goal of this thesis was to determine whether general action goals can lead to the increased expression of both positive and negative behaviors in the same context (exercising and snacking, respectively). The secondary goal of this thesis was to test whether the

addition of a second goal limits the effects of the general action goal to either positive or negative target behaviors (exercising or snacking), or whether the general action goal is overpowered by the specific goal or vice versa.

Negative Effects of General Action Goals

In the United States, weight loss has become an important goal. Americans spend over $50 billion on diet-related products each year (Maine, 2000). Year after year, Americans cite weight loss as their number one New Year's resolution (Norcross, Mrykalo, & Blagys, 2002). Despite the intention and effort to lose weight, 95% of dieters regain their lost weight in 1-5 years (Grodstein, 1996). To lose weight, dieters must increase energy expenditure relative to caloric intake, either through dieting or greater physical activity (Blair et al., 1989). Due to the difficulty of dieting and the desire not to discourage the sedentary and obese, many weight-loss and general health-promoting campaigns focus simply on increasing activity level (Critser, 2003). These programs, however, are framed in ways that may instill general action goals rather than exclusively exercise goals. For example, the President's Council on Physical Fitness has been promoting the "Keep America Moving" campaign for 50 years. This program encourages "all Americans to make being active part of their everyday lives" (President's Challenge Physical Activity and Fitness Rewards Program, n.d.). Encouraging activity in the most general sense, an excerpt from the program reads: "No matter what your activity and fitness level, the President's Challenge can help motivate you to improve."

Importantly, the potential irony of the "Keep America Moving" approach is that telling people to "be active" may be counteracting attempts to lose weight. There are at least two reasons for this prediction. First, such an appeal may not instill a specific enough goal to exercise because the goal is too general. For example, woodcutters sent into the forest after receiving a specific and challenging goal (cutting down more trees than can be cut down through the normal

amount of effort) exhibited higher productivity than those given specific, modest goals, as well as vague, challenging goals (e.g., “do your best”) (Latham & Yukl, 1975). This relative increase in performance is attributed to an increase in woodcutters’ self-efficacy as a result of clearer standards of progress against which to regulate behavior (Locke & Latham, 1990). If the “Keep America Moving” types of appeals instill vague action goals, these goals may be satisfied with little activity because of the lack of precise standards (e.g., how much to move, what to do, etc.). Spending 10 minutes performing warm-up exercises may satisfy such a vague action goal, but it should not satisfy a specific goal to get 30 minutes of cardiovascular exercise.

Second, based on past research on general action goals, these appeals may have unintended deleterious effects. If a general action goal can be satisfied by folding a piece of paper, counting behaviors in a video, or deeply processing a written passage, this same goal could likely be satisfied by eating chocolates or spending money at the mall. These predictions follow the principle that a goal can be satisfied through a variety of means (i.e., equifinality; Kruglanski, 1996). A general action goal has a very large set of satisfaction means, including going swimming, baking cookies, or organizing one’s sock drawer. Although general action goals are often adopted as a means to lose weight, the process of changing into gym clothes, hunting for one’s car keys and filling a bottle of water may be enough to satisfy the general action goal without actually going to the gym.

Both of these lines of research converge on the prediction that general goals should be less effective than specific goals at initiating a specific target behavior. However, this is only the case when adopting a specific goal to exercise *instead of* adopting a general action goal to obtain the same means (i.e. being physically fit). This is in contrast to simultaneously adopting both goals, although that may also occur. For example, a person may glance across a rack of fitness

magazines and activate both the goal to exercise and the general goal to increase one's level of activity. Also, for individuals who have chronically activated general action goals--manic individuals for example--a specific goal to be active would often be activated simultaneously with the general goal to be active. Therefore, it is necessary to investigate the simultaneous effect of general and specific goals to be active.

Simultaneous Activation of Specific and General Action Goals

Like general action goals, more specific action goals, such as the goal to go for a run, can be satisfied by multiple means (Kruglanski, 1996). One may go jogging, run on the treadmill at the gym, or play soccer. Nonetheless, the range of means to satisfy a specific goal is much narrower than that of a general action goal. For example, the goal to run should exclude such means as ordering a pizza, snacking on readily accessible foods, or sitting on the couch to watch television. Likewise, a goal to run for 90 minutes should exclude taking a 15-minute run. By establishing specific goals, specific goals can be targeted without worry of spillover into completely unrelated domains.

As suggested by research on goal specificity (Locke & Latham, 1990; Latham & Yukl 1975), specific action goals, such as the goal to play a game of basketball, should not be prematurely satisfied by a lesser activity (e.g., dribbling a basketball). Research on goal specificity in the domain of physical performance suggests that specific long- and short-term goals are more effective than general "do your best" goals, even when participants given specific goals also adopt the general "do your best goal" (Mento, Steel, & Karren, 1987; Weinberg, Bruya & Jackson, 1985). Therefore, it is likely that a specific goal is more effective than a general action goal at achieving a specific endpoint, even when the two are adopted simultaneously.

There are instances in which a subordinate goal can override a superordinate goal. For example, the goal to eat a slice of cake may overpower the desire to restrain eating (Carver & Scheier, 1996). However, in the ideal case, the activation of a superordinate goal leads to the increased activation of specific goals that are subsumed under such a goal. In the case of general action goal activation, this should energize goals related to exercising and any other activity an individual construes as "active". Thus activating a general action goal should be a potent means of energizing a variety of specific goals that are related to physical activity.

The Present Research. Three studies were conducted to assess the consequences of general action goals in the domain of diet and exercise. In the first study, participants received an action goal prime or a set of neutral words as part of a word completion task. In the word completion task, participants were presented with an incomplete word and were instructed to try to determine the missing letters. For example "B_HAV_" would be properly completed as "BEHAVE." Then participants were presented with an ostensible marketing questionnaire for the purpose of evaluating two products. One product was a container designed to keep food fresh, and participants are led to believe that a sample of grapes they are given was previously stored in such a container. The other product was described as an exercise video, from which participants were presented an excerpt of the script describing how to perform the exercises. The grapes and exercise instructions were presented in counterbalanced order so that either eating or exercising will come first. The amount of grapes eaten and the time spent practicing the exercises were the indices of activity. The second study was a replication of the first, testing the effectiveness of general action goal prime words presented subliminally in increasing food consumption and exercise. In the goal priming task, participants completed an ostensible hand-eye coordination

task, during which they were exposed subliminally to the prime words, followed by a chance either to eat chocolate chip cookies or practice two exercises.

In the third study, participants received either an action goal prime or a control prime in combination with exercise goal primes, indulge goal primes or control primes. This allows a 2 X 3 factorial design to test the effects of the specific goal primes by themselves and in combination with general action goals. The priming task paradigm was the same as in Experiment 2. Consistent with the two previous studies, participants then completed the ostensible marketing questionnaire, having the opportunity to eat yogurt raisins which had been kept in a special container and practice two exercises. The yogurt raisins and exercise instructions were presented in counterbalanced order so that either eating or exercising came first. The amount of yogurt raisins eaten and the time spent practicing the exercises were the indices of activity. After exposure to the primes, snacks and exercise, participants completed a series of scale questions about the target stimuli in order to maintain the cover story (Appendix C).

Consistent with previous research on the effects of general action goals (Albarracín et al., 2006), we hypothesized that those who received neutral words in the priming task will exercise less and eat less than those who receive action prime words (Hypothesis 1). In line with research on goal specificity (Locke & Latham 1990), we hypothesized that specific goal primes alone (exercise vs. indulge) would be more effective than general action goals at increasing the corresponding target behaviors (Hypothesis 2). Based on the properties of goal hierarchies (Carver & Scheier, 1996), we hypothesized that simultaneous priming of general action goals and specific goals (exercise vs. indulge) could have three potential outcomes: Combining specific goal primes with general action goal primes could restrict the effects of the general action goal prime, preventing it from overgeneralizing (Hypothesis 3), but it could also render

the specific goal useless because general action goals are difficult to override by a subordinate goal (Hypothesis 4). Conversely, there is also a chance that the subordinate goal will overpower the general action goal, and that the simultaneous presentation of general and specific goal primes will have the same results as merely presenting the specific goal prime (Hypothesis 5).

CHAPTER 2
EXPERIMENT 1

Method

Overview

The purpose of Experiment 1 was to test whether action goals increase the amount of exercise performed and the number of grapes eaten. The first task was a word completion task, described as a measure of verbal ability, which presented a set of words one word at a time. One or two letters were missing from each presented word (e.g., U _ B R _ L L A). There were two sets of words, either containing the action goal prime words or control prime words (Appendix A), one of which was selected randomly by Medialab. Then, participants were given a chance to practice a seated exercise based on a set of written instructions and sample some grapes delivered to their computer station. Following that, participants completed a series of questionnaires related to their diet and exercise attitudes and behaviors.

Participants and Design

We recruited 30 undergraduate students at the University of Florida to participate in the study in exchange for credits in an introductory psychology course. A 2 (prime: action vs. neutral) x 2 (task order: exercise first vs. eat first) between-subjects design was employed.

Procedure

Participants in this study arrived in the lab and sat down at an empty computer station as indicated by the research assistant. Then the research assistant started the experiment using Medialab. Medialab prompted participants to open the manila folder next to the computer monitor and to read and sign the enclosed informed consent sheet. After signing the informed consent sheet and clicking continue, participants received the instructions for the first task. Initially, participants completed a word completion task determining the letters missing from a

partial word (e.g., "_ E T W _ E N"). The instructions read: "First, to both familiarize you with the computer program you will be using and to collect some information that may be used for future studies, you will be asked to complete a series of words." Participants were then presented with 24 total words, either10 general action goal prime words and 14 neutral words (action prime condition), or 24 neutral words (control prime condition).

Next, participants were presented with one of the two behavioral tasks in counterbalanced random order. In keeping with the cover story, participants were presented with the following description of the grape stimulus: "This new type of microfiber plastic container is designed to keep food fresher for longer. You will get the opportunity to taste a food sample which has been kept fresh in this container." The computer then prompted the participant to raise his or her hand to alert the research assistant, who then presented the participant with a Styrofoam bowl containing 15 red grapes.

The other target stimulus was described as follows: "You will be exposed to a typed excerpt from an exercise video which can be performed while sitting. These exercises were originally designed for people with mobility difficulties (e.g., pregnant women, the elderly). Recently, however, they have been gaining popularity among those who sit at a desk for long periods of time" (Appendix B). Before being given specific instructions for exercises, participants were presented with the following: "To gain feedback on the exercises, you will be practicing and rating two techniques. Sit back in your chair, take a deep breath and click continue when you are ready."

Participants were instructed to either practice the exercise described on their screen for up to 5 minutes or to taste as many grapes as they chose. If the first stimulus was the bowl of grapes, the second was the exercise video passage. If the first stimulus was the exercise video passage,

the second was the bowl of grapes. Then, in keeping with the cover story, participants responded to five-point scale items related to their experiences. These items included “I thought the exercise was easy” and “How fresh was the product that you sampled?” (Appendix C).

The first dependent measure in this study was the total amount of time spent practicing the exercises, which was recorded by Medialab and operationalized as the total amount of time spent on the exercise description screen. The second dependent measure in this study was the number of grapes eaten, which was obtained by asking participants at the very end of the experiment, before the debriefing, “How many grapes are left in your bowl?” Research assistants also counted the number of grapes remaining at the end of the session to verify participants’ responses.

Materials and Measures

Priming task. The priming task was introduced as a quick measure of verbal ability. Participants were be instructed to complete 24 words with missing letters (either 24 neutral words, or 12 neutral-control words and 10 action prime words; Appendix A). The instructions for each word were as follows: “Please complete the word below. Simply type the completed word into the box once you have solved it. Press ENTER afterwards.” Depending on random assignment, half of the participants received 24 incomplete neutral words unrelated to activity, such as “tooth,” “ethnic” or “square”. The other half of the participants received 12 neutral words and 10 action-related words that could be completed as “motivation,” “doing,” “behavior,” “engage,” “action,” “make,” “start,” “go,” and “active.” These words have high associations with “action” in the empirically derived Computerized Edinburgh Associative Thesaurus (Kiss, Armstrong, Milroy, & Piper, 1973). They have been used successfully by Albarracin et al. (2006).

Description of exercise task. The exercise task is described as follows:

> You will be exposed to a typed excerpt from an exercise video which can be performed while sitting. These exercises were originally designed for people with mobility difficulties (e.g., pregnant women, the elderly). Recently, however, they have been gaining popularity among those who sit at a desk for long periods of time. These exercises stretch and strengthen legs, abs, and lower back. To gain feedback on the exercises, you will be practicing and rating 2 techniques. Sit back in your chair, take a deep breath and click continue when you are ready.

Following these instructions, participants received the specific exercise instructions. The first set of instructions read: ‘“Remaining fully seated with your back against the back of the chair, slowly extend your legs until they are fully straight, and parallel to the floor." (If you need to move your chair back, go ahead.) "Hold this position for 10 seconds, and let your legs slowly relax until your feet touch the floor. Repeat for 5 minutes.”’ Participants then performed the exercise for as long as he or she decided, with a ceiling of 5 minutes. Medialab automatically moved to the next screen if the participant did not click “continue” after 5 minutes on the instruction screen. Next, participants responded to five-point scale items (with endpoints “not at all” and “extremely”) referring to the exercise they performed, including “I enjoyed performing the exercise” and “I thought the exercise was easy” (Appendix C).

Next, participants were presented with instructions for the second exercise: “Remaining fully seated with your back against the back of the chair, place your feet on the floor. Lift your toes off of the ground, and keeping your heels on the ground, lean back in your seat until the two front legs of the chair are off the ground. Hold this position for 10 seconds (you should feel tension in your calves and shins). Let your legs slowly relax until your feet touch the floor. Repeat for 5 minutes.” After clicking “continue,” participants completed the same set of questions as after the first exercise.

Description of eating task. In keeping with the cover story, participants read the following instructions before receiving a sample of grapes: “FRESH SEAL CONTAINER: This new type of microfiber plastic container is designed to keep food fresher for longer. You will get

the opportunity to taste a food sample which has been kept fresh in this container." Then participants were instructed to "taste the sample, and pay attention to its taste, consistency and freshness. You may eat as much of the sample as you wish." After participants click "continue," they are presented with five-point scale items about the sample (with endpoints "not at all" and "extremely"), including "I enjoyed the consistency of the sample" and "How fresh was the product that you sampled?"

Data analysis. All tests of significance were performed using SPSS. All *p*-values below .05 were considered significant, and all *p*-values ranging from .05-.08 were considered marginal.

Results

To measure the effects of a general action goal prime on eating a 2 (action goal vs. control) x 2 (snack before exercise vs. exercise before snack) ANOVA was used. There was a main effect of general action goal primes on the number of grapes eaten: Those who received the general action goal prime ate more grapes than those who received the control prime (*M*s = 11.6 and 9.2, respectively), F (1, 29) = 5.04, $p < .05$. There was also a main effect of order, by which participants who exercised first ate more grapes (M = 11.9, SD = 4.3) than those who got to eat first (M = 8.9, SD = 6.0), F (1, 29) = 7.00, $p < .05$. However, these main effects were qualified by a prime x order interaction, F (1, 29) = 5.45, $p < .05$.

Investigating the interaction, there are two potentially meaningful simple effects. First, for the control group only, there is a significant effect of order, F (1, 27) = 4.89, $p < .05$, indicating that unprimed participants ate more grapes if they exercised first (M = 12.0, SD = 4.58) than if they ate first (M = 2.67, SD = 1.53). There was also a marginally significant simple effect of prime type [F (1, 27) = 3.13, p = .088] by which participants who ate before exercising ate more when exposed to the general action goal primes (M = 11.25, SD = 5.26) than when exposed to the control primes (M = 2.67, SD = 1.53). Participants in the action prime condition who

exercised first ate a mean 11.83 grapes (*SD* = 4.37). This suggests that under normal circumstances, people may eat more after exercising than before exercising. This also suggests that a general action goal prime is more effective at increasing appetitive behavior when the prime immediately precedes it.

Participants who received a general action goal prime did not enjoy the exercise task more or less than those who received a control prime (*M*s = 5.0 and 5.2 respectively), F (1, 29) = .072, $p > .05$. Therefore, exercise enjoyment was used as a covariate in each analysis of exercise. An ANOVA investigating total exercise time as a function of prime and task order found a main effect of prime type (F (1, 24) = 3.67, $p < .05$). The mean exercise time for those in the action prime condition was 210.81 seconds (*SD* = 180.77), and for those in the control prime condition, the mean exercise time was 114.1 seconds (*SD* = 54.54). There was no main effect of task order on total exercise time (F (1, 25) = 0.47, $p > .05$), and the interaction term was not significant (F (1, 25) = 0.87, $p > .05$).

Discussion

The data suggest that eating behaviors were increased by a general action goal, supporting Hypothesis 1. Further, the data suggest that participants who are given an action prime increase the number of grapes they choose to eat, but only when the eating task immediately follows the prime. This may be due to a satisfaction of the general action goal state through exercising. This effect was marginally significant and should therefore be interpreted cautiously. There was also a simple effect of order, by which control participants ate more grapes when they were given the opportunity to eat after exercising than before exercising. Participants were unaware of the second task while completing the first; therefore this cannot be the result of deliberately monitoring caloric consumption. Although some researchers have found evidence that suggests humans increase their intake of calories after increasing energy expenditure (Stubbs, et al.,

2002), a review by Blundell and King (1999) suggests that this effect is generally weak to nonexistent

As additional support for Hypothesis 1, participants who received a general action goal prime spent more time performing the exercise task than those who were primed with control words, suggesting that exercise is susceptible to general goals to become active. It is possible that since exercise is more physically laborious than eating, it is more effective at satisfying the general action goal. However, exercising may satisfy the general action goal on its own, and therefore when exercise precedes eating, the general action goal is ineffective at increasing eating.

Although no participants reported an awareness of the true nature of the study, there is still a chance that participants became aware of a theme in the words presented in the supraliminal word completion task. Therefore, in Experiment 2, subliminal primes were used, disguised as part of a hand-eye coordination reaction time task. Also, despite success with grapes as a food stimulus, they are not necessarily the best representation of the temptations that befall a dieter trying to lose weight by adopting a general action goal. Instead, Experiment 2 used small chocolate chip cookies.

CHAPTER 3
EXPERIMENT 2

Method

Overview

In Experiment 2, an attempt was made to address three issues remaining from Experiment 1. First, subliminal primes were used instead of a word completion task, in order to negate potential experimenter expectancy effects that could result from becoming aware of the prime. The words presented in the subliminal priming task were identical to the words presented in the word completion task. Second, a less healthy food stimulus was used (small chocolate chip cookies instead of grapes) to test whether general action goals increase the consumption of foods detrimental to weight loss goals. Third, to minimize potential carryover effects, participants only completed one task, either exercising or eating as part of the product evaluation task

Participants and Design

We recruited 50 undergraduate students at the University of Florida to participate in the study in exchange for credits in an introductory psychology course. A 2-factor (prime: action vs. neutral) between-subjects design was employed.

Procedure

Participants in this study arrived in the lab and sit at an empty computer station as indicated by the research assistant. Then the research assistants began the experiment by opening the appropriate file and entering the condition in Medialab. After reading and signing the enclosed informed consent sheet, participants received the instructions for the first task. Initially, participants completed an ostensible hand-eye coordination task, in which they were presented with eight action words (Appendix A) and eight neutral words presented in random order. To ensure that the words were presented subliminally, they were presented for 15 milliseconds each,

preceded by a flash of symbols (forward masking). Following the presentation of each word, a string of X's was flashed onscreen to prevent the word from being visible as an afterimage (back masking). The string of X's remained onscreen until participants pressed the space bar, and after 100 ms, the next word randomly chosen word was presented.

Next, participants were presented with one of the two behavioral tasks, as determined by random assignment. To maintain the cover story, participants read the following description of the cookie stimulus: "This new type of microfiber plastic container is designed to keep food fresher for longer. You will get the opportunity to taste a food sample which has been kept fresh in this container." The computer then prompted participants to raise their hand to alert the research assistant, who delivered a Styrofoam bowl containing 25 small chocolate chip cookies to the participant's computer station.

The exercise video task was described as follows: "You will be exposed to a typed excerpt from an exercise video which can be performed while sitting. These exercises were originally designed for people with mobility difficulties (e.g., pregnant women, the elderly). Recently, however, they have been gaining popularity among those who sit at a desk for long periods of time" (Appendix B). Following this explanation, participants then read a description of a seated exercise, and they were told to practice the exercise as long as they wanted. In keeping with the cover story, participants responded to five-point scale items related to the exercise, and performed a second, very similar exercise.

This study had two main dependent measures: First, the amount of time spent practicing the exercises--operationalized as the total amount of time spent on the exercise description screen was recorded to the millisecond by Medialab. The second dependent measure was the number of cookies eaten, which was obtained by directly asking participants, before the

debriefing, “How many cookies are left in your bowl?” Honesty of responding was verified by research assistants.

Results

First, an independent samples *t*-test was used to test, among participants who were randomly assigned to the eating condition, whether there was an effect of a general action goal prime on the number of cookies eaten. However, there was no difference between the groups; both groups ate an average of 13.6 cookies [t (42) = - .004, $p > .05$].

There was no overall effect of action goals on total exercise [t (48) = 1.504, $p > .05$], although the mean number of total seconds spent exercising for participants who received an action goal prime versus a control prime was 96.92 s (*SD* = 81.05) and 67.22 s (*SD* = 56.41), respectively.

A *t*-test comparing an action goal prime to a control prime for just the first exercise found no difference between the groups, t (48) = .915, $p > .05$. A t-test comparing the second exercise of those who received an action goal prime and those who received a control prime found a marginally significant difference between the groups, t (48) = 1.816, $p = .076$.

Discussion

There was no effect of prime on cookie consumption. This could be that subliminal primes are slightly weaker than subtle supraliminal primes. It is also possible that cookies are clearly less healthy, and therefore participants are simply less willing to eat them. This is supported by the proportions of food eaten: In Experiment 1, participants in all conditions ate an average of 10.8 grapes out a given 15, whereas in Experiment 2, the grand mean was 13.6 out of a possible 25. If participants would not eat cookies as freely as grapes, it is possible that a more subtly healthy food would be more sensitive than an obviously unhealthy food.

In terms of exercise, although the means of exercise time follow a trend that supports the hypothesis that general action goals increase exercise, only the second exercise shows an effect of prime, and the effect is marginal. This is likely due to the large variance in exercise times within both the action and control group. Power may need to be greater for the effects of these subliminal primes to be detectable.

CHAPTER 4
EXPERIMENT 3

Method

Overview

The third experiment was aimed to test three hypotheses. Hypothesis 2 predicted that specific goals alone would be more effective than general action goals at increasing target behaviors. Also, the simultaneous presentation of specific and general action goal primes could either restrict the effects of the general action goal to target domains (Hypothesis 3) or could result in the general action goal overriding the specific goal (Hypothesis 4). The procedure and materials used in Experiment 3 were similar to those used in Experiments 1 and 2. However, the subliminal priming task contained a second set of words (exercise prime words, such as "aerobic," "exercise" and "sweat" vs. indulge prime words, such as "feast," "indulge" and "snack") which were inserted into the priming task (Appendix A).

As in Experiment 2, participants began with the subliminal priming task described as a measure of hand-eye coordination. In this task, there were four possible sets of prime words grouped into two categories; action vs. control, and exercise vs. indulge vs. control. These categories were crossed to create 6 different combinations of general and specific prime word. Participants were randomly assigned to one of these 6 combinations of prime words, and within each combination, the words were combined in random order as a single subliminal word presentation task (ostensibly measuring reaction time). Participants were then given a chance to practice an exercise and sample some yogurt raisins from a bowl at their computer station, in random counterbalanced order. Following that, participants completed a brief questionnaire related to the eating and exercise tasks.

Participants and Design

We recruited 165 undergraduate students at the University of Florida to participate in the study in exchange for credits in an introductory psychology course. A 2 (general goal prime: action vs. control) x 3 (specific goal prime: diet vs. indulge vs. control) between-subjects design was employed.

Snacking Stimulus

Yogurt raisins were used to measure food consumption. Sun-Maid yogurt raisins, although containing fiber and protein, are made with palm kernel oil, and are therefore high in saturated fat (4 grams per serving; 21% of one's daily RDA). Using a less obviously unhealthy stimulus as measure of eating is likely to be more successful as a measure of snacking behavior, as participants should not resist the temptation of yogurt raisins quite as much as chocolate chip cookies.

Procedure

After being checked in by a research assistant and being seated at an available computer, participants were given onscreen prompts to sign the informed consent sheet, followed by a description of the ostensible hand-eye coordination reaction time task. Following the disguised priming task, participants read a description of one of the two target stimuli, either a sample of yogurt raisins, ostensibly intended to assess the effectiveness of a particular storage container, or two exercises ostensibly testing the effectiveness of a new exercise video. Participants were instructed either to practice the exercise on the screen or to taste the cookies (counterbalanced randomly by Medialab), and were then presented with some scale questions about their opinions of the products. Following these, the second stimulus was presented. If the first stimulus was the passage from the exercise video, the second was the sample of yogurt raisins, and vice versa.

The first dependent measure in this experiment was the amount of time spent performing the two exercises, for up to 5 minutes each; participants were given the opportunity to click "continue," ending the exercise trial, whenever they choose. The second dependent measure was the self-reported number of yogurt raisins remaining in the bowl, ranging from zero to 15. Consistent with the previous two studies, this number was verified by a research assistant. Participants then signed the debriefing form and were thanked for their participation.

Results

An ANOVA was used to test for main effects of action prime [F (1, 153) = 1.289, $p > .05$.] or specific prime [F (1, 153) = 0.424, $p > .05$.] on snack consumption (Table 4-1).

A test of planned comparisons revealed some significant differences between participants in the six conditions of the study. Participants who received an exercise/control prime set ate fewer yogurt raisins (M = 5.79) than participants who received an indulge/control prime set (M = 8.6); t (159) = -1.19, $p < .05$. There was also a marginal difference between the control/control group and the indulge/control group: Indulge/control participants ate more yogurt raisins (M = 8.6) than control/control participants (M = 6.03), t (159) = -1.764, p = .08.

The most critical comparison looked at the difference between a specific goal by itself (indulge/control) and in combination with a general action goal (indulge/action). A planned comparison revealed that participants who received the indulge/control prime set ate more yogurt raisins (M = 8.6) than participants who received the indulge/action prime set (M = 5.21); t (159) = 2.29, $p < .05$. This lends support to Hypothesis 4, to the detriment of Hypotheses 3 and 5. No other comparisons were significant.

Investigating the effects of the two sets of primes on exercise, ANOVA was used. There were no main effects of action prime [F (1, 149) = 0.006, $p > .05$] or of specific prime [F (1, 149) = 2.033, $p > .05$] on total exercise time (Table 4-2). However, a test of planned comparisons

revealed two marginally significant differences. First, in support of Hypothesis 2, participants who received an exercise/control prime set spent longer exercising than participants who received a control/control prime set [*M*s = 184.3 s and 121.16 s respectively; t (149) = -1.937, $p < .06$]. As further support of the disruptive effect of a general action goal being added to a specific goal (Hypothesis 4), participants in the exercise/control condition (M = 184.3 s) exercised longer than participants in the exercise/action condition (M = 123.23 s); t (149) = -1.907, $p < .06$.

Discussion

Although there were no main effects of general action goal primes or specific primes, the patterns of results, including the significant simple main effect, suggest that specific goal primes are better than general action goal primes at increasing the targeted behavior (Hypothesis 2). However, when general action goal primes were presented simultaneously with the specific goal primes, the specific goal primes were no longer effective, supporting Hypothesis 4. There was no support for Hypothesis 3, which predicted that specific goals combined with action goals would be as effective (or more effective) than specific goals on their own.

CHAPTER 5
GENERAL DISCUSSION

General action goals can lead to the expression of a number of behaviors, but they do so indiscriminately. Although a subliminal, specific goal to exercise or eat modifies these behaviors effectively, a general action goal does not limit the effects of the general action goal to the target domain.

These results suggest that action goals should not be adopted for the purpose of reaching a specific goal, such as losing weight. Health interventions should promote specific goals for weight loss and exercise and not just encourage overall increases in activity, because these increases may be in the wrong domains. Additionally, individuals who chronically have action goals activated (either because of a naturally manic disposition or because of an adjustment to a fast-moving social environment) should beware of the potentially disruptive effects of such goals. Based on our previous findings about the effects of inaction goals, adopting goals to relax or meditate could diminish the disruptive effects of chronically activated general action goals.

Limitations and future directions. The main limitation of these studies is the noisy nature of the behavioral dependent variables. Although most of the means were ranked exactly as predicted, the error variances for exercise task time and amount of snacks eaten was quite large. In the future, a different measure of exercise may improve upon this limitation. For example, a minimum amount of exercise a participant is required to perform would prevent any extremely low exercise times. Also, effort was operationalized as the amount of time spent on the exercise task, but there is a chance that some individuals exerted a great deal of effort in the exercises over a short period and quickly became tired. Others may have calmly and evenly performed the exercises for a longer period. Such individual differences would be influenced by beliefs about how exercise should be performed, and by past experiences with exercise. Temporal construal

also varies between individuals; some people perceive time differently, and despite exerting equal effort, do so for different times. For these reasons, a more precise and direct measure of physical effort, such as a hang-grip sensor, may be more sensitive to the effects of a general action goal prime.

The measure of eating may also be sensitive to individual differences in task performance. Perhaps some participants ate fewer grapes but spent a great deal of effort determining how juicy or fresh they were. Since the cover story maintained that the exposure to exercise and snacks was part of a product evaluation task, one participant may have felt that eating a single grape was enough to evaluate the quality of the container, whereas another needed to eat 10 grapes to satisfy the same goal. More generally, cognitively evaluating the products may have led to the satisfaction of the general action goal before the opportunity to eat or exercise even began. In the future, this could be addressed by giving participants a snack as a reward for completion of a bogus task, and then measuring the amount of the snack that is eaten.

In order to apply these findings to health interventions, it would be necessary to study longitudinally whether the adoption of general action goals is more or less effective than specific goals at predicting exercise. Such studies could measure whether people naturally adopt general action goals in order to lose weight, and if recommending general action goals leads to increases in undesired behavior unrelated to exercise.

Table 4-1. Food consumption as a function of prime: Number of yogurt raisins eaten across general prime and specific prime

	Indulge	Exercise	Control
Action	5.04	5.35	6.58
Control	8.33	5.56	6.12

Table 4-2. Exercise performance as a function of prime: Number of seconds spent exercising, crossing general prime and specific prime

	Indulge	Exercise	Control
Action	170.01	151.25	123.23
Control	134.77	184.3	121.16

APPENDIX A
PRIME WORD LISTS

Action goal prime words:

1. MOTIVATION

2. DOING

3. BEHAVIOR

4. GO

5. ACTIVE

6. MAKE

7. ENGAGE

8. ACTION

Exercise goal prime words:

1. EXERCISE

2. SWEAT

3. GYM

4. RUN

5. AEROBIC

6. FITNESS

7. MUSCLE

8. SPORTS

Indulge goal prime words:

1. INDUGLE

2. FEAST

3. SNACK

4. TASTE

5. SPLURGE

6. ENJOY

7. OVEREAT

8. TREAT

Neutral goal prime words:

1. UMBRELLA

2. RING

3. ELEVATOR

4. ANT

5. JEANS

6. TANK

7. GAUGE

8. PENGUIN

APPENDIX B
SCRIPTS FOR EXERCISES

"Now you will be sampling two products. The first product is EXERCISE TAPE #1.

You will be exposed to a typed excerpt from an exercise video which can be performed while sitting. These exercises were originally designed for people with mobility difficulties (e.g., pregnant women, the elderly). Recently, however, they have been gaining popularity among those who sit at a desk for long periods of time. These exercises stretch and strengthen legs, abs, and lower back.

To gain feedback on the exercises, you will be practicing and rating 2 techniques. Sit back in your chair, take a deep breath, and click continue when you are ready."

"Exercise A: 'Remaining fully seated with your back against the back of the chair, slowly extend your legs until they are fully straight, and parallel to the floor.' (If you need to move your chair back, go ahead.)

'Hold this position for 10 seconds, and let your legs slowly relax until your feet touch the floor. Repeat for 5 minutes.'

Please practice this exercise. Once you are finished, click continue to begin answering questions about your experience."

"Exercise B: 'Remaining fully seated with your back against the back of the chair, place your feet on the floor. Lift your toes off of the ground, and keeping your heels on the ground, lean back in your seat until the two front legs of the chair are off the ground.

Hold this position for 10 seconds (you should feel tension in your calves and shins). Let your legs slowly relax until your feet touch the floor. Repeat for 5 minutes.'

"Please practice this exercise. Once you are finished, click continue to begin answering questions about your experience."

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