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Regulating food consumption: Action messages can help or hurt

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ABSTRACT

Objective: Previous research suggests that messages promoting active behavior change may inadvertently increase food consumption by promoting a general goal to act. We suggest that this is only the case for active-approach behaviors and that messages promoting active-avoidance behaviors may be used to effectively decrease food consumption.
Methods: Participants were presented with healthy eating messages pretested to vary on the dimensions of direction (approach vs. avoid) and amount (action vs. inaction) of behavior. After viewing the messages, participants selected and consumed a healthy or unhealthy snack during a taste test.
Results: There were no differences in snack selection (healthy vs. unhealthy) across message conditions. For messages promoting more active behavior, however, there was a significant difference in snack consumption such that participants viewing active-approach messages consumed significantly more food than participants viewing active-avoidance messages. This happened regardless of whether participants selected a healthy or unhealthy snack. For messages promoting less active behavior there was no difference in consumption between approach and avoidance based messages.
Conclusions: These findings suggest that when viewing health messages that promote active behavior change, individuals are sensitive to the direction of action advocated by the message (approach vs. avoidance) and modulate consumption accordingly.

1. 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 recent evidence suggesting that two-thirds of adults are now overweight or obese (Wang, Beydoun, Liang, Caballero, & Kumanyika, 2008). In response to this public health crisis, myriad campaigns aimed at decreasing obesity rates by promoting healthier dietary choices have been designed. The money spent on such campaigns, however, is clearly not translating to healthier decisions in the general population as rates of obesity have remained unchanged since 2003 (Flegal, Carroll, Kit, & Ogden, 2012).

Existing research suggests that one reason current campaigns may be ineffective is that campaigns promoting active behavior change may produce a generalized desire for motor output that is then indiscriminately applied to any available target, causing unintended and even counterproductive effects (Albarracín, Wang, & Leeper, 2009). Across two studies, Albarracín et al. (2009) demonstrated that individuals consumed a greater quantity of food after viewing messages promoting exercise than after similar, non-active, control messages. Although active messages may lead to increased exercise, these messages may also inadvertently increase all available active behavior, including food consumption.

However, the previous study considered the amount of activity advocated by the message (action vs. inaction), but not the direction of that activity (approaching a positive stimulus vs. avoiding a negative stimulus). In this case, action versus inaction describes how active or effortful a desired endstate is (Albarracín et al., 2008). In contrast, approach versus avoidance describes the direction of action in relation to an object, such as moving toward or away from a target (Elliot, 2006). The same can be said of existing healthy eating campaigns, which largely focus on actively approaching healthy food (e.g., "Need a snack? Grab an apple from the caf!"; *Eat Healthy Save Money Campaign*) or passively avoiding unhealthy food (e.g., "2000 calories a day is all most adults should eat"; The *NYC Calorie Awareness* campaign; www.nyc.gov). In other words, campaigns focused on approaching positive stimuli (e.g., healthy food) often promote specific, active behaviors (e.g., *grab* an apple)

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whereas campaigns focused on avoiding negative stimuli (e.g., unhealthy food) instead encourage individuals not to act (e.g., don't eat sugar). In this way, the *direction* of action in relation to the food (approach vs. avoid) is confounded with the *amount* of action recommended by the message (action vs. inaction). By disentangling these two concepts, however, healthy eating messages may be able to harness the power of action goals to *decrease* food consumption by introducing an avoidance component in conjunction with directed actions. That is, in line with earlier work demonstrating that action goals (vs. inaction) can exacerbate the effects of both affect and attitudes on behavior (Albarracín & Handley, 2011; Albarracín & Hart, 2011), approach versus avoidance motivation may operate in a similar fashion. Namely, action goals may facilitate either approach or avoidance, depending on which direction is linked to the target behavior. Differential expression of approach versus avoidance under action (but not inaction) suggests action-based health messages could increase or decrease food consumption as a function of whether approach or avoidance is paired with the action goal.

The present research was designed to explore the effects of health messages whose prescribed behaviors varied in terms of both amount (action vs. inaction) and direction (approach vs. avoid) of action. We posit that these two concepts are independent and the effects of action versus inaction messages on food consumption cannot be completely understood without also considering the direction of prescribed action. The current study presented participants with a set of healthy eating messages pretested to vary on both amount and direction of action. After viewing the messages, individuals were given the opportunity to select and consume a healthy or unhealthy snack food during a taste test. Replicating the work of Albarracín et al. (2009) we expect that after viewing messages promoting active-approach behaviors, participants will consume a greater quantity of food. When active behavior is paired with an avoidance message, however, we expect decreased food consumption. Finally, when messages promote relatively inactive behavior, the direction of prescribed behavior should be less influential, in line with previous work on affect and attitudes (Albarracín & Handley, 2011; Albarracín & Hart, 2011). In addition to manipulating amount and direction of prescribed behavior, a third manipulated variable-delay- was introduced to examine the impact of the health messages over time.

2. Materials and methods

One hundred and forty-seven participants (62% female) were recruited from the University of Michigan to participate in this study. The study was approved by the University of Michigan Health Science and Behavioral Sciences IRB and written informed consent was obtained from all participants. Participants were randomly assigned to one of eight conditions in a 2 (action vs. inaction) x 2 (approach vs. avoid) x 2 (immediate vs. delay) between-subjects design. Participants were debriefed regarding the study purpose at the end of the session.

Prior to this experiment, thirty-six messages encouraging healthy eating habits were developed and pretested for the purposes of this study. The messages consisted of nine sets of four messages, with the four messages in each set as identical as possible with the exception of varying on our two dimensions of interest (action-inaction and approach-avoidance). The approach messages promoted increased consumption of healthy foods whereas the avoidance messages promoted 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 amount of action is a continuous construct, inaction can also be defined as relatively less action (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). Two pretest studies were conducted to determine which message sets effectively manipulated both direction (approach vs. avoidance) and amount (action vs. inaction) of action. As a result of the two pretest studies, seven message sets were shown to effectively manipulate our two constructs and were selected for use in the current study. See Fig. 1 for an example of one message set or the supplemental materials to view all messages along with information on the two studies used to pretest the messages.

Participants were exposed to the seven messages corresponding to their randomly selected message condition (e.g., action-avoid) one at a time for 10 s each (70 s total). 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 in the field.

After viewing the seven messages, participants were told that we would like their help in pretesting snack options for a separate future 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 participants were presented with four snack options (2 healthy, 2 unhealthy) and asked to select a snack for the tasting task. 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 in the *delay* 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 they were excused from Part 1 and reminded to return for Part 2 during their timeslot the following week. Participants in the *immediate* condition completed the tasting task immediately following snack selection.

During the tasting task participants were asked to rate their chosen snack food on several dimensions (e.g., how sweet do they taste?; see supplemental materials for full taste test questionnaire). After participants left the lab, snack consumption was measured by taking the difference between the starting weight of the snack bowl

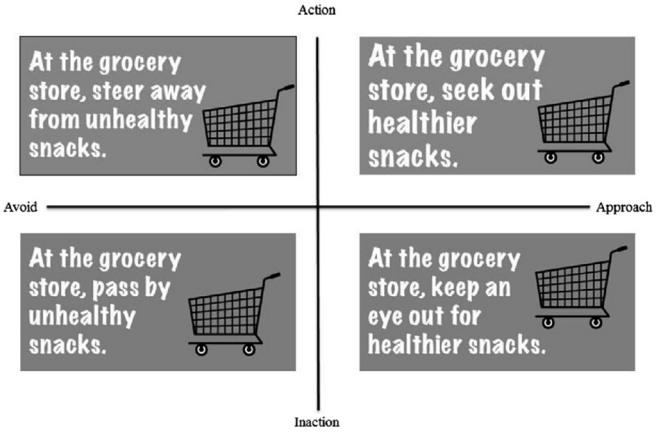

Fig. 1. Sample set of messages.

and the ending weight of the snack bowl in grams. Two measures of consumption were then computed. First, portion of snack consumed was calculated by taking the weight of snack consumed and dividing by the total weight of snack given to the participant. Second, following the procedure used by Albarracín et al. (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. Computing these two measures of snack consumption provided us with a measure of consumption that was either (a) independent of or (b) included the caloric density of the chosen snack (portion of snack consumed and caloric consumption, respectively).

3. Results

Because the study involved message comprehension as the only manipulation of the constructs of interest, three participants who reported an English fluency rating of less than 4 (on a 5-point scale ranging from 1 *Not at all fluent* to 5 *Extremely fluent*) were excluded, leaving 144 participants in the final analyses.

To determine whether the health messages impacted food consumption, a Univariate Analysis of Variance (ANOVA) was conducted with portion of snack consumed as the dependent variable and our three manipulated variables (action vs. inaction, approach vs. avoidance, immediate vs. delay) as the independent variables. Results from this analysis revealed a significant 2-way action-inaction x approach-avoidance interaction ($F_{1,136} = 4.72$, $p = 0.03$, $\eta_p^2 = 0.03$; see Fig. 2). Further analysis revealed that for messages promoting less active behaviors (inaction messages), there was no significant difference in portion of snack consumed between approach ($M = 34.12$) and avoidance ($M = 36.55$) messages ($F_{1,136} = 0.11$, $p = 0.75$, $d = 0.06$). For messages promoting more active behaviors (action messages), however, there was a significant difference in amount of snack consumed such that participants viewing active-approach messages consumed significantly more of their snack ($M = 48.92$) than participants viewing active-avoidance messages ($M = 27.28$; $F_{1,136} = 6.99$, $p = 0.009$, $d = 0.45$). Results also revealed a main effect of delay ($F_{1,136} = 5.41$, $p = 0.02$, $d = 0.40$) such that participants in the delay condition ($M = 43.16$) consumed significantly more of their snack than participants in the immediate condition ($M = 30.28$). However, delay did not interact with any of the other variables of interest (all $ps > 0.10$), suggesting that the delay impacted consumption equally across message conditions.

In addition, we used ANOVA with our three manipulated variables (action vs. inaction, approach vs. avoidance, immediate vs. delay) predicting caloric consumption. Results replicated the 2-way action-inaction x approach-avoidance interaction ($F_{1,136} = 4.64$, $p = 0.03$, $\eta_p^2 = 0.03$; see Fig. 3). Again, for inaction messages, there was no significant difference in calories consumed between approach ($M = 39.00$) and avoidance ($M = 47.90$) messages ($F_{1,136} = 0.95$, $p = 0.33$, $d = 0.17$). For action messages, however, there was a significant difference in amount of calories consumed such that participants viewing active-approach messages ($M = 47.03$) consumed significantly more calories than participants viewing active-avoidance ($M = 26.75$) messages ($F_{1,136} = 4.11$, $p = 0.045$, $d = 0.35$). Results also revealed a main effect of delay ($F_{1,136} = 5.63$, $p = 0.02$, $d = 0.41$) such that participants in the delay condition ($M = 48.20$) consumed significantly more calories than participants in the immediate condition ($M = 32.14$). Yet, delay did not interact with either of the other variables of interest (all $ps > 0.28$), suggesting that the delay impacted consumption equally across message conditions.

Finally, to determine whether the health messages impacted the type of snack participants selected for consumption, a binary logistic regression was conducted with snack choice (healthy vs. unhealthy) as the dependent variable and our two message variables (action vs. inaction, approach vs. avoidance) as predictor variables. Results revealed no differences in snack selection between messages conditions ($ps > 0.40$). In other words, the four sets of health messages were equally effective in influencing participant food choice. In addition, including snack choice as a covariate in the model did not alter the interactive effect of action versus inaction and approach versus avoidance on either portion of snack consumed ($F_{1,135} = 4.97$, $p = 0.03$, $\eta_p^2 = 0.04$) or calories consumed ($F_{1,135} = 5.07$, $p = 0.03$, $\eta_p^2 = 0.04$).

However, snack choice independently impacted both portion of snack consumed ($F_{1,140} = 9.56$, $p < 0.001$, $\eta_p^2 = 0.17$) and calories consumed ($F_{1,140} = 5.53$, $p = 0.001$, $\eta_p^2 = 0.11$). In particular, participants selecting grapes and potato chips consumed a greater proportion of the snack than participants selecting almonds and M&Ms ($M_{M\&Ms} = 22.14$; $M_{Chips} = 51.49$; $M_{Almonds} = 16.76$; $M_{Grapes} = 46.56$). In contrast, participants choosing M&Ms and potato chips consumed more calories than participants choosing almonds and grapes ($M_{M\&Ms} = 62.12$; $M_{Chips} = 59.47$; $M_{Almonds} = 34.51$; $M_{Grapes} = 30.84$). Additional means broken down by the variables of interest across snack types are presented in the supplemental materials for interested readers.

4. Discussion

The purpose of the present study was to independently test the influence of amount (action vs. inaction) and direction (approach vs. avoid) of prescribed behavior in healthy eating messages. Using message sets pretested to vary on the dimensions of interest we found that messages promoting active behaviors to increase

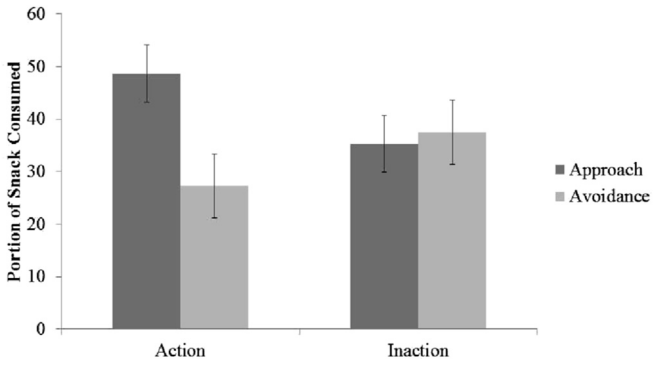

Fig. 2. Portion of available snack consumed during taste test.

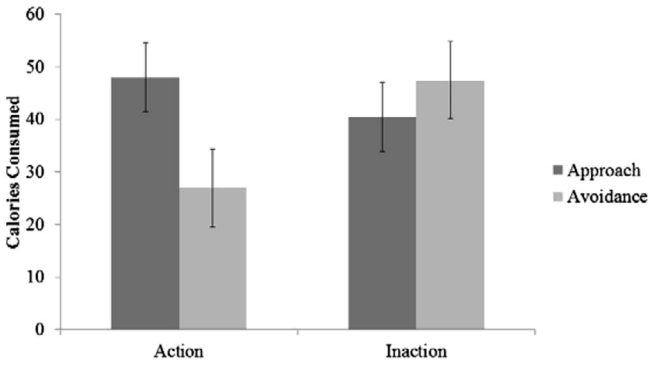

Fig. 3. Calories consumed during taste test.

healthy food consumption (active-approach messages) increased consumption of all foods, even unhealthy foods like potato chips and M&Ms. This finding is consistent with the work of Albarracín et al. (2009) who found that health messages promoting active behavior produced a generalized desire to engage in activity, which resulted in increased food consumption after viewing messages designed to increase exercise behavior. Although this was originally believed to be a consequence of promoting active behavior in general, the current study found that this was only the case when the behavior being promoted with both active and approach-oriented. Messages promoting active, avoidance-oriented behaviors, on the other hand, were found to *decrease* food consumption. There were no differences in consumption for messages promoting less active behavior.

Thus, one implication of these findings is that campaigns promoting specific, active behaviors would be more effective than those promoting a lack of behavior. This conclusion is consistent with work on self-perception, goal commitment, and powerlessness. First, Bem (1965) theory of self-perception postulates that observing one's own overt behavior is a major source of inference about one's attitudes and beliefs. Although inactions should also be useful in the self-inference process, individuals have a bias towards action when making inferences about their own and others' goals and attitudes (Fazio, Sherman, & Herr, 1982). For instance, 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). Thus, actions increase feelings of commitment to a goal. Second, inaction activates feelings of helplessness. Elevated power, whether situational or general, is associated with increased rewards and freedom, whereas 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 whereas disinhibited behavior (action) actives feelings of power (Albarracín, Helper, & Tannenbaum, 2011). As such, promoting inactive goal behaviors may perpetuate feelings of helplessness. Thus, pairing inaction with avoidance 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.

In addition to the action versus inaction and approach versus avoidance dimensions previously discussed, the present study also included a delay component. In particular, half of participants completed the consumption task immediately after message exposure, whereas the other half of participants completed the consumption task approximately one week after message exposure. In this study, there was a main effect of delay, but no interaction of delay with the other constructs of interest. There are two possible interpretations of this pattern of findings. On the one hand, perhaps the efficacy of the messages decayed equally over time, such that the impact of any of the messages on behavior decreased as a function of distance from exposure to the message. On the other hand, the delay could have served as an interruption of an intention to consume food during the tasting task. This interpretation rests on the assumption that participants were intending to complete a consumption task, and that when the delay was introduced, it served to strengthen the intention to consume. This explanation is consistent with prior work on intention interruption, which would postulate that the delay would serve to strengthen the impact of the consumption intention on behavior over time, also resulting in increased consumption following a delay (Goschke & Kuhl, 1996).

This work may also be brought to bear on a discrepancy in the literature between Albarracín et al. (2008) and van Kleef et al. (2011). On the one hand, Albarracín et al. (2008) reported that exposure to exercise messages increased food consumption. On the other hand, van Kleef et al. (2011) reported that exposure to exercise commercials decreased food consumption. Perhaps these disparate results can be accounted for by the inclusion of approach versus avoidance as a relevant dimension. For instance, one possibility is that the stimuli materials used by prior work may inadvertently activate either approach or avoidance motivation in addition to action-inaction goals. Future work could be designed to test this more clearly, as well as whether action versus inaction and approach versus avoidance may be activated independently of one another.

The current study was conducted in a laboratory setting, which allowed for a precise measurement of message exposure as well as food choice and consumption. However, this environment is unlike the conditions under which people typically select and consume food. Consequently, the results of this research may not be representative of what occurs in natural eating environments. In addition, participants were asked to select a food in the presence of an experimenter. Because participants had just finished viewing healthy eating messages it is possible that the high rate of healthy food selection (71%) reflects a demand effect that would not exist otherwise. Future studies should examine food choice behavior in a setting with less demand. Finally, the present study was limited to undergraduate students. Therefore, it is possible that the effects would not generalize beyond this population. Future work should address the influence of active versus inactive and approach versus avoidance behaviors in more naturalistic settings to test generalizability. Finally, because the present report includes one study highlighting the interactive effects of approach versus avoidance and action versus inaction, future work should be done to replicate and extend this work beyond a single sample in a single domain.

The present study demonstrated that health messages promoting specific, active behaviors resulted in a general increase (approach messages) or decrease (avoidance messages) in food consumption, without consideration of the type of food being consumed. The results suggest that messages promoting active behaviors to increase healthy food consumption may inadvertently be increasing consumption of both healthy and unhealthy food. Similarly, messages promoting active behaviors to decrease unhealthy food consumption may decrease consumption of both unhealthy and healthy foods. These findings may present a conundrum to health interventionists: how can we design health messages that promote increased healthy behavior and decreased unhealthy behavior simultaneously? One possibility is that because action goals are broad-level goals, perhaps framing health behaviors in terms of broader mindset goals (e.g., be healthy) may be more effective than specific behavioral recommendations (e.g., don't eat junk food). In addition, because action goals have been shown to increase the impact of attitudes on behavior (Albarracín & Handley, 2011), perhaps interventions designed to highlight attitudes about health behavior could be more effective in conjunction with action messages. Future research may disentangle these issues. Taken together, these findings contribute to our understanding of how health message characteristics influence people's eating behavior and having implications for designing interventions aimed at changing health behaviors.

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