Motivating Healthy Diet Behaviors: The Self-as-Doer Identity

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Motivating Healthy Diet Behaviors: The Self-as-Doer Identity

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We investigated whether the experimental manipulation of a self-as-doer identity predicted improved healthy food consumption immediately and one month post-intervention. Women (N = 124), 18–53 years old (M = 22.1, SD = 5.8) were randomly assigned to one of three conditions (i.e., control, education, or education and self-as-doer activity) and recorded their diets over six weeks. Repeated measures ANCOVAs were performed to determine if the self-as-doer intervention created change in healthy food consumption. Self-as-doer participants ate more healthy foods one month post-intervention than did other participants. Self-as-doer participants maintained overall healthy eating behaviors while education and control participants decreased these behaviors over the six-week period. Findings demonstrate initial evidence of an intervention effect on healthy food consumption and we discuss ways to advance research on the self-as-doer identity construct.

Keywords: Self-As-Doer; Diet; Self-Identity; Motivation; Nutrition.

Self-regulation and identity play a vital role in the promotion of health behavior (Kwan, Caldwell-Hooper, Magnan, & Bryan, 2011; Shadel & Cervone, 2011). In a special edition of Self and Identity, Shepperd, Rothman, and Klein (2011) summarized the current state of research on self /identity-regulation and health and made several recommendations for future research. One such recommendation was to explore the connections between self and identity theories and traditional models of health behavior (e.g., Theory of Planned Behavior, Social-Cognitive Theory, Health Belief Model, etc.) in simple environmental interventions, particularly for behaviors that have been implicated in the prevention and self-management of chronic disease. They argued, and we concur, that researchers should consider the role that identity has within the context of other salient health behavior change theories. As such, we aim to explore how the manipulation of a motivational...
identity construct, the self-as-doer identity (Houser-Marko & Sheldon, 2006), can lead to healthy eating behavioral changes.

Major health organizations suggest decreasing energy-dense, high calorie foods and drinks, and increasing consumption of fruits, vegetables, and whole grains to address the growing number of overweight and obese individuals (c.f., American Public Health Association, 2012; World Health Organization [WHO], 2012). Yet a small percentage of people comply with such guidelines (Kimmons, Gillespie, Seymour, Serdula, & Blanck, 2009; Kirkpatrick, Dodd, Reedy, & Krebs-Smith, 2012; United States Department of Agriculture [USDA], 2010). Interventions rooted in health behavior change theories (e.g., Theory of Planned Behavior, Social Cognitive Theory) have demonstrated some success in dietary change, especially for fruit and vegetable consumption (Guillaumie, Godin, & Vezina-Im, 2010; Rise, Sheeran, & Hukkelberg, 2010; Strachan & Brawley, 2008, 2009), but these interventions only accounted for a small percentage of the variance in intention and healthy eating behaviors (Dowd & Burke, 2013).

Self-identity or “the salient part of the actor’s self which relates to a particular behavior” (Armitage & Conner, 1999, p. 73) has been proposed as a variable that could improve our ability to predict healthy eating motivations and behaviors (Allom & Mullan, 2012; Blake, Bell, Freedman, Colabianchi, & Liese, 2013; Rise et al., 2010; Sparks & Guthrie, 1998). Indeed, in cross-sectional studies, self-identity independently predicted healthy eating behaviors for fruit and vegetable consumption (Blake et al., 2013; Strachan & Brawley, 2009; Rise et al., 2010; Yun & Silk, 2011), low fat diets (Armitage & Conner, 1999; Sparks & Guthrie, 1998), and intentions to purchase organic foods (Dean, Raats, & Shepherd, 2012).

The concept of the self-as-doer is rooted in identity theory and suggests a link between identity and behavior (Houser-Marko & Sheldon, 2006). Specifically, the more one identifies with a particular role, the more likely one is to participate in role-related behaviors. For example, a woman may have a goal of eating more healthy foods and may therefore be more inclined to see herself as a “healthy eater” (i.e., the doer of the behavior) and henceforth be more likely to eat more healthy foods. It stands to reason that the very process of conceptualizing the self as a “healthy eater” brings about greater identification with this role. Consequently, the process of developing goals related to healthy eating behaviors and transforming those goals into self-as-doer identity statements would then influence self-identity related to healthy eating behaviors.

Experimental research specifically focusing on developing self-identity as a result of behavioral goals in healthy diet behaviors is limited (Guillaumie et al., 2010). Therefore, the purpose of the present study was to pilot an intervention to determine whether an experimental manipulation of a healthy eater doer identity affects healthy eating behaviors. Because nutrition education has been commonly used as a standard comparison in nutrition interventions (Allicock et al., 2010; Baker et al., 2010), the effects of a self-as-doer identity intervention will be compared to standard nutrition education. The hypotheses are as follows:

1. There will be a main effect of condition on overall and food group-specific healthy food consumption such that SELF-AS-DOER participants will demonstrate the most improvements in healthy eating, followed by EDUCATION and CONTROL participants.
2. There will be a significant interaction between time and condition, such that there will be greater change in overall and food group-specific healthy food consumption over the course of the study for SELF-AS-DOER participants and lesser change over time for the EDUCATION and CONTROL participants. Furthermore, SELF-AS-DOER participates will have higher overall and food group-specific healthy food consumption than will EDUCATION and CONTROL participants over the course of the study.
Methods

Participants

Participants were 124 women ages 18–53 years old (M = 22.1, SD = 5.8) from two Midwestern Universities (one urban, one rural). Most women reported being Caucasian (83.1%), 4.8% were African American, 4.8% Asian or Pacific Islander, and 7.3% of women indicated other ethnicities. Participants were evenly distributed with respect to year in college (i.e., 27.4% first year, 21.8% second year, 19.4% third year, 31.5% fourth year or beyond). At baseline, the average Body Mass Index (BMI) was 25.47 (SD = 6.46), 24.8% reported eating at a fast food or sit-down restaurants at least one time per day. The majority of participants (88.9%) prepared 1–3 meals at home each day, which included meal plans offered at the university cafeteria.

Procedure

Given gendered differences in food consumption choices and dieting behaviors (Wardle et al., 2004) and in order to control for motivational differences among participants, only women who were dieting or were considering changing their diets were recruited. After securing university IRB approval, potential participants were recruited via flyers distributed across two Midwestern public university campuses (one large urban and one small rural campus) inviting women to participate in a “diet study.” Potential participants were then screened over the phone for inclusion in the study. Inclusion criteria included being a woman over the age of 18 who has been thinking about changing her diet or who is currently dieting. Participants were excluded from the study if they are unable to participate for the entire six weeks the study took place (n = 1), if they were not motivated for dietary change (n = 11), if they demonstrated patterns of disordered eating (n = 9), or if they had high levels of healthy food consumption (n = 10). Eligible participants were then randomly assigned to one of three conditions (i.e., control [CONTROL], education only [EDUCATION], or education with a self-as-doer activity [SELF-AS-DOER]) and invited to the research lab for the first session. The study was approximately 50 days (or six weeks) in length. Four interviewers were trained to deliver the intervention conditions and collect research data. However, the first author completed the majority (78.2%) of interviews.

This study contained three discrete time periods. At Time 1, participants came to the research lab where they consented to participate and baseline measures were collected. The baseline survey included demographic questions and patterns of restrained eating, physical activity habits, and smoking behaviors. Participants’ weight and height were then measured in order to compute BMI.

Food consumption was measured using a food diary (available upon request). At Time 1, participants received instructions to complete a 4-day food diary. Participants were asked to identify one weekend day (i.e., Saturday or Sunday) and three weekdays (i.e., Monday – Friday) during which time they would record all foods and beverages consumed immediately after consumption each day. Participants then received a food diary which included instructions for completing a food diary, serving size references, an accurately and inaccurately completed food diary, and four blank food diaries with each tracking day identified at the top of each blank food diary page. Food diary instructions were provided and included a demonstration highlighting the differences in serving size variables (i.e., 1/2 cup vs. 1 cup; 12 ounces vs 16 ounces) with actual food and completing a practice food diary with the researcher. After the researcher confirmed that participants
understood how to measure food and beverage intake and record their intake on the food diary, participants scheduled two appointments to return to the lab in one week and in five weeks.

At Time 2 (approximately 1 week after Time 1), participants returned to the lab where researchers inquired about concerns relating to the food diaries. Participants then received payment for their first week of participation. CONTROL participants were weighed and then received the same set of food diary instructions as they did at the Time 1 visit. A review of serving sizes was offered to any participant who reported confusion about them. Participants were asked to complete food diaries on the same days of the following week as they did at Time 1. The researcher then reviewed food diary instructions with the participant as was done at Time 1. Throughout the interview with the CONTROL participants, researchers asked non-study related questions (i.e., How are classes going?) in order to ensure that contact with the interviewer was similar across all three intervention groups (i.e., approximately 30–40 min).

The same protocol was followed for the EDUCATION group with the following exception. Participants were asked to read the USDA’s “Let’s eat for the health of it” brochure as well as two tip sheets highlighting healthy eating options (i.e., Choose MyPlate and Build a Healthy Meal; available at http://www.choosemyplate.gov/healthy-eating-tips/ten-tips.html). The materials highlighted dietary guidelines and behavior recommendations established and promoted by the USDA (2010). To ensure that participants read the information, the interviewer asked, “What information did you learn that you did not know before reading this material?” and “Of the information that you already knew before reading the material, what is something you would like to include in your diet?” After answering questions, the web address where participants could access the same information was provided.

The same protocol as the EDUCATION group was followed for the SELF-AS-DOER group with the following exception. After participants read the nutritional educational material, SELF-AS-DOER participants were asked to complete the self-as-doer worksheet (Houser-Marko & Sheldon, 2006). Specifically, participants were asked to construct six goals related to healthy eating behaviors. From these goals the participants then created special “doer” phrases using the “–er” suffix and the verb and noun of each goal. For example, if the participant stated that her goal was to “eat more fruit,” the doer phrase became “fruit eater”. After participants generated self-as-doer phrases they were then asked to rate how well each phrase described themselves on a Likert scale ranging from 1 (does not describe to at all) to 5 (describes me well). Then, the researcher selected a doer phrase related to a dependent variable (e.g., vegetable, fruit, whole grains, etc.) and asked participants to envision themselves as the doer of the “–er” phrase which they constructed. For example, “picture yourself being a veggie eater. What would that look like?” After participants verbally described what the doer phrase looked like to them, the researcher noted how the participants rated each particular phrase and then asked participants what it would take to get them to see themselves as that doer phrase to a greater degree in future weeks. For example, “I see that you rated yourself as a ”veggie eater“ as a 2. What would it take in this next week and beyond this next week to see yourself as a veggie eater to a greater degree, say a 4 or a 5?” This process was repeated for 3–4 of the generated doer phrases specifically related to the dependent variables. A summary of the task was then verbally provided to the participants and participants were encouraged to think about their goals and generated phrases as they made diet choices in the next week and beyond. A copy of the doer phrases was made and given to the participants.

In the final phase of the study (i.e., Time 3; approximately 4 weeks after Time 2), participants were invited back to the lab. Participants received payment for their second
week of participation and researchers inquired about concerns or confusions related to the food diaries. Participants in all conditions were weighed, received instructions to keep a 4-day food diary just as they had done at Time 1 and 2, and were reminded about serving sizes. Instructions and food diaries were identical to those given at Time 1 and Time 2. Participants then scheduled a final appointment for at least one week after Time 3 and after the completion of their final food diary to submit their food diary and receive their final payment. At this visit, participants were also debriefed on the purpose of the study, the design, expected outcomes, and the group to which they were randomized. Participants were also given a chance to review their food consumption data with the researcher, ask questions about the study, and provide feedback about their experiences. As a form of reimbursement for participating, participants were given raffle opportunities for attending appointments and completing food diaries to win one of 10, $50 gift cards to Amazon.com.

Measures and Other Materials

Demographics
Participants were asked to report their age, year in school, relationship status, ethnicity, and physical activity level. Additionally, participants were asked to indicate if they are a smoker and if so, how many cigarettes they smoke a day. Participants were also asked to report whether they were on a special diet and if so, to describe what sort of special diet they were following.

Screening Measures
Disordered eating was measured at the time of screening using the SCOFF (Hill, Reid, Morgan, & Lacey, 2010; Perry et al., 2002). Participants were asked to indicate yes or no to five questions concerning eating behaviors (e.g., “Do you make yourself sick because you feel uncomfortably full?”). Participants are considered “quite likely” to have disordered eating habits if they answer yes to two or more questions and were therefore excluded from participation. Motivation for dietary change was measured by asking participants if they are currently dieting or thinking about dieting. Those who answered no to both questions were excluded from the study. Finally, healthy eating was measured by asking participants eight questions from an author-derived scale inquiring how often participants would eat certain types of food on a 1 (Never) to 5 (All the time) Likert-typed scale. Five of the eight questions included healthy food items (e.g., “3 servings a fruit per day,” “eat low-fat dairy per day,” “4 servings of vegetables a day,” “eat pasta, cereal or crackers that are made from whole grains,” “eat seafood or lean meat per day”) as defined by the USDA (2010). Participants who scored 21 or more out of 25 on the five healthy eating items were considered healthy eaters and were excluded from the study. Cronbach α for this author-derived scale was .38.

Restrained Eating
Restrained eating behaviors were measured to test for group differences in eating behaviors at baseline using the 10-item Revised Restrain Scale (Herman, Polivy, Pliner, Threlkeld, & Munic, 1978). The scale includes items such as “How often are you dieting?” Four response options are available for six of the items, ranging from “not at all” to “very much” and “never” to “always.” The remaining four items ask for weight gain or loss and have five numeric response options (i.e., “0 to 1” to “21+,” “0 to 1” to “5.1 +,” and “0 to 4” to “20 +”). Average scores were computed with higher scores indicating greater restrained eating behaviors. Herman and colleagues (1978) have demonstrated adequate validity in a population of dieting adult women. Cronbach α for this study was .74.
Food Diary
Participants recorded the date and time in which food was consumed, location where it was consumed, and the type and amount of food consumed on four days. A serving size guide which compares various serving sizes with common items (i.e., 1 cup = fist; 2 tablespoons = ping pong ball) was provided in the instructions of each food diary. An example of a correctly and incorrectly completed food diary was also available for participants’ review. Food diary data were calculated using serving size measurements established by the USDA (2010). One exception was that starchy foods categorized as vegetables (e.g., French fries, baked potatoes, etc.) were not considered as servings of vegetables for the current study. Each food item was transformed into respective serving sizes (e.g., cups or ounces) using the USDA nutrition calculator found on the USDA super tracker website (i.e., www.choosemyplate.gov/SuperTracker/). Healthy food servings were totaled for each day and averaged across the four diary tracking days.

Overall and Food Group-Specific Healthy Food Consumption
For the purposes of the present study, healthy food consumption was defined according to the recommended food patterns for fruits, vegetables, grains, dairy, and sugar-sweetened beverages as defined by the USDA (2010). To that end, improved overall and food group-specific healthy food consumption was operationalized as increases in servings of overall healthy food group consumption and increases in servings of specific food-group consumption (i.e., fruits, vegetables, whole grains, and low-fat dairy and decreases in sugar-sweetened beverages), respectively, at Time 2 and 3 compared to baseline measures. Food-group specific healthy food consumption was calculated by averaging the intake of each identified healthy food over the four tracking days, and a sum score of total healthy food consumption was calculated to generate a measure of overall healthy food consumption.

Participant Feedback Related to Intervention Impact
At the completion of the study, participants were given the opportunity to provide feedback about the intervention. Notable participant experiences will be reported.

Data Analysis
In order to most accurately measure participants’ diets, complete food consumption data was operationalized as participants completing at least three of the four food diaries (Bingham & Nelson, 1991; Willett, 1998). For participants who failed to complete at least three food diaries at baseline, the mean of the condition they were randomized to (i.e., CONTROL, EDUCATION, SELF-AS-DOER) was entered for their food consumption data. After establishing baseline according to dietary analysis recommendations (Bingham & Nelson, 1991; Willett, 1998), “intent to treat” (ITT) methods (Fergusson, Aaron, Guyatt, & Herbert, 2002) were then used for participants who dropped out of the study by carrying forward the most recently completed data for all subsequent missing data.

Descriptive analyses for all conditions and time point measures were computed. BMI rates were calculated by dividing the participant’s weight in pounds by two times their height. This value was then multiplied by 703 (CDC, 2011). Chi-squared tests, independent-t tests, and one-way ANOVAs were computed to determine if there were differences among experimental conditions at baseline and between those who completed the study and who did not complete the study in relation to age, ethnicity, school status, relationship status, smoking status, physical activity levels, BMIs, special diet status, healthy eating consumption, and restrictive eating behaviors at Time 1.
A 3(time)×3(condition) between-subjects, repeated measured ANCOVA was computed to determine if there were significant changes in the outcome measures (i.e., overall healthy food consumption, fruit, vegetable, whole grain, low fat dairy, and sugar sweetened beverage consumption) over time, if there were significant differences among the conditions on all outcome measures, and if the difference in outcome measures across time differed depending on condition status. Covariates were determined based on any descriptive differences in the experimental groups at baseline. Assumptions of sphericity were also tested for each repeated measures ANCOVA computed, no violations were found. When significant main effects and interactions for time and condition occurred, follow-up analyses were conducted to determine if there were significant differences in outcome measures for time and condition variables. Bonferroni corrections were performed for all follow-up analyses to control for type I errors. Given that we designed the present study as a pilot study, we set significance criteria at \( p = .10 \).

Results

Self-as-Doer Phrase Generation

Most participants \((n = 29; 76\%)\) created at least two or three phrases directly related to the study’s dependent variables (18% created between four and six phrases) and only two participants (5.3%) did not create any phrases related to the study’s dependent variables. The majority of participants created self-as-doer statements related to vegetable \((n = 32; 84\%)\) and fruit \((n = 26; 68\%)\) consumption (e.g., “veggie eater,” “fruit includer,” and “1/2 plate fruit and veggie eater”). Approximately 44% \((n = 17)\) of participants created phrases related to whole grains (e.g., “whole grain product eater”), 39% \((n = 15)\) created phrases for low fat dairy (e.g., “skim milk drinker” and “fat free milk switcher”), and 21% \((n = 8)\) of participants created phrases related to reducing sugar-sweetened beverages (e.g., “less soda drinker” “water instead of pop drinker”). Only, four of the 228 phrases created were not specific to food. However, these phrases did represent healthy behaviors (e.g., physical activity and adequate sleep habits). Other doer phrases commonly created represented identities related to eating more lean meats, controlling portion size, drinking more water, adhering to specific diet plans, trying new foods, and using different cooking and eating techniques (e.g., “small plate user,” “slower eater,” and “homemade meal maker”). The majority of phrases \((n = 200, 88\%)\) were approach-oriented phrases with identities related to changing specific eating behaviors or adding certain foods to one’s diet (e.g., “fruit includer,” “smaller portion eater”). Only 12% \((n = 28)\) of the phrases created were avoidance-oriented phrases (e.g., “extra fat avoider”) with the majority of phrases aimed at reducing certain foods in one’s diet such as sodium and sugar (e.g., “Less sodium consumer,” “less butter consumer”).

Demographic and Outcome Measure Differences among Conditions at Baseline and Between Intervention Completers and Non-Completers

There were no significant differences between participants who completed the study and participants who dropped out of the study at baseline for age, relationship status, year in college, whether or not they were on a special diet, restrained eating behaviors, and healthy food consumption. There was, however, a significant difference in ethnicity, \(\chi^2(N = 124) = 9.72, p = .05\). Analysis of adjusted residuals indicates that more Caucasian women completed the study than expected and more African American women dropped out of the study than expected. Results demonstrated no significant
differences between any of the intervention conditions on all measures at baseline except for smoking status, $\chi^2(N = 119) = 6.62, p = .04$. There were significantly more smokers in the SELF-AS-DOER condition ($n = 5$) than in the other two intervention conditions. Therefore, given this difference and that smoking is sometimes used as an appetite suppressant, we used smoking status as a covariate in all subsequent analyses.

**Condition and Interaction Effects on Healthy Food Consumption**

**Overall healthy food consumption**

There was a significant main effect for time, $(F[2,228] = 5.51, p = .005, \eta^2 = .05)$, but there was not a significant main effect for condition with respect to overall healthy food consumption. Results did, however, demonstrate a significant interaction effect, $F(4,228) = 3.27, p = .01, \eta^2 = .05$. Means and standard errors at each time point for overall and specific healthy food consumption behaviors can be found on Table 1, correlations among healthy eating behaviors at baseline can be found on Table 2. Follow-up tests for time effects were contrary to the hypothesis: SELF-AS-DOER participants maintained, rather than increased, overall healthy food consumption over the course of the study. In contrast, there was a significant decrease in overall healthy food consumption for CONTROL and EDUCATION participants. CONTROL participants had a significant decrease in the total amount of healthy food consumed from Time 1 to 2 and from Time 1 to 3. EDUCATION participants had a significant decrease in the overall healthy food consumed from Time 1 to 3 and from Time 2 to 3. Simple effect statistics can be found on Table 1.

Follow-up tests for condition differences partially supported the hypothesis. There were significant condition differences at Time 2 $(F[2,114] = 3.07, p = .05, \eta^2 = .05)$ and Time 3 $(F[2,114] = 3.76, p = .03, \eta^2 = .06$; see Figure 1). SELF-AS-DOER participants had higher healthy food consumption than did CONTROL participants at Time 2, $(t[116] = 2.35, p = .06)$. At Time 3, SELF-AS-DOER participants had significantly higher healthy food consumption compared to CONTROL participants, $(t[116] = 2.53, p = .04)$, and EDUCATION participants, $(t[116] = 2.19, p = .09)$.

**Fruit Consumption**

There was a significant main effect for time, $(F[2,230] = 3.45, p = .03, \eta^2 = .03)$, but there was not a significant main effect for condition or time $\times$ condition interaction effect.

**Vegetable Consumption**

There was a significant main effect for time, $(F[2,230] = 4.36, p = .01, \eta^2 = .04)$, but there was not a significant main effect for condition or an interaction effect. When comparing time differences for each group there was, however, a significant decrease in vegetable consumption for EDUCATION and CONTROL participants. CONTROL participants had a significant decrease in the total amount of vegetables consumed from Time 1 to 3 and EDUCATION participants had a significant decrease in vegetables consumed from Time 2 to 3. SELF-AS-DOER participants had no change in vegetable consumption across time points.

**Whole Grain Consumption**

There was neither a significant main effect for condition nor a significant condition $\times$ time interaction effect. There was, however, a significant difference between conditions at Time 2, $(F([2,115] = 5.75, p = .004, \eta^2 = .09)$. SELF-AS-DOER participants had significantly higher levels of whole grain consumption than did CONTROL participants,
### TABLE 1  Means, Standard Errors, and Simple Time Effect Tests for Overall and Food Group-Specific Healthy Food Consumption

<table>
<thead>
<tr>
<th>Variable</th>
<th>Control</th>
<th>Simple time effects</th>
<th>Education</th>
<th>Simple time effects</th>
<th>Self-as-doer</th>
<th>Simple time effects</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>T1</td>
<td>T2</td>
<td>T3</td>
<td>F</td>
<td>( \eta^2 )</td>
<td>T1</td>
</tr>
<tr>
<td>Overall healthy food consumption, servings</td>
<td>4.22 (.35)</td>
<td>3.53 (.34)</td>
<td>3.34 (.34)</td>
<td>4.61** (.08)</td>
<td>4.41 (.32)</td>
<td>4.41 (.32)</td>
</tr>
<tr>
<td>Low-Fat dairy, cups</td>
<td>.77 (.14)</td>
<td>.72 (.11)</td>
<td>.62 (.14)</td>
<td>.75 (.01)</td>
<td>.94 (.13)</td>
<td>.77 (.10)</td>
</tr>
<tr>
<td>Fruits, cups</td>
<td>1.12 (.12)</td>
<td>.94 (.10)</td>
<td>.89 (.11)</td>
<td>2.77 (.05)</td>
<td>1.10 (.11)</td>
<td>1.01 (.09)</td>
</tr>
<tr>
<td>Vegetables, cups</td>
<td>1.27* (.14)</td>
<td>1.04( ^a,b ) (.15)</td>
<td>.95( ^b ) (.11)</td>
<td>3.77( ^* ) (.06)</td>
<td>1.19( ^a,c ) (.13)</td>
<td>1.37( ^a,b ) (.14)</td>
</tr>
<tr>
<td>Whole grains, ounces</td>
<td>1.06 (.17)</td>
<td>.84 (.19)</td>
<td>.88 (.19)</td>
<td>1.10 (.02)</td>
<td>1.18 (.16)</td>
<td>1.30 (.17)</td>
</tr>
<tr>
<td>Sugar-sweetened beverages, ounces</td>
<td>4.62( ^a,b ) (1.00)</td>
<td>4.16( ^a ) (.82)</td>
<td>6.24( ^b ) (1.01)</td>
<td>3.45( ^* ) (.06)</td>
<td>4.43 (.93)</td>
<td>4.93 (.76)</td>
</tr>
</tbody>
</table>

**Notes:** Mean scores reported; standard errors appear in parentheses. For all variables with the exception of sugar-sweetened beverages, higher scores represent better consumption patterns. \( ^* p \leq .1 \); \( ^* = p \leq .05 \); \( ** = p \leq .01 \); \( *** = p \leq .001 \). Means with differing subscripts within each row and each condition are significantly different at the \( p \leq .10 \) based on Bonferroni post-hoc comparison tests.
Likewise, there was a significant increase in whole grain consumption for SELF-AS-DOER participants. After Bonferroni corrections, SELF-AS-DOER participants had a significant increase in whole grain consumption between Time 1 and 2, ($t(116) = 2.30, p = .07$) and a significant decrease in whole grain consumption between Time 2 and 3, ($t(116) = 2.34, p = .06$).

**Low Fat Dairy Consumption**

There was no significant main effect for condition, but there was a significant interaction effect, $F(4,228) = 4.68, p = .001, \eta^2 = .08$. EDUCATION participants had a significant decrease in low fat dairy consumption from Time 1 to 3 and from Time 2 to 3. SELF-AS-DOER participants had significant increases in low-fat dairy consumption from Time 2 to 3, ($t(116) = .26, p = .08$). There were also significant group differences at Time 3, $F(2,115) = 3.74, p = .03, \eta^2 = .06$. SELF-AS-DOER participants had significantly

### TABLE 2 Correlation Coefficients for Healthy Eating Food Groups at Baseline

<table>
<thead>
<tr>
<th>Variables</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Low Fat Dairy</td>
<td></td>
<td>.26**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Fruit</td>
<td></td>
<td></td>
<td>.26**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Vegetables</td>
<td></td>
<td>.20*</td>
<td>.26**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Whole Grains</td>
<td></td>
<td>.07</td>
<td>.29***</td>
<td>.20*</td>
<td></td>
</tr>
<tr>
<td>5. Sugar-sweetened Beverages</td>
<td></td>
<td>-.10</td>
<td>-.21*</td>
<td>-.24**</td>
<td>-.20*</td>
</tr>
<tr>
<td>6. Overall Healthy Eating Behaviors</td>
<td>.56***</td>
<td>.65***</td>
<td>.68***</td>
<td>.65***</td>
<td>-.31***</td>
</tr>
</tbody>
</table>

*Note. *$p \leq .05$; **$p \leq .01$; ***$p \leq .001$.  

$r(116) = 3.40, p = 003$). Likewise, there was a significant increase in whole grain consumption for SELF-AS-DOER participants. After Bonferroni corrections, SELF-AS-DOER participants had a significant increase in whole grain consumption between Time 1 and 2, ($t(116) = 2.30, p = .07$) and a significant decrease in whole grain consumption between Time 2 and 3, ($t(116) = 2.34, p = .06$).

**FIGURE 1** Changes across time and differences among groups for overall and food group-specific healthy food consumption.
higher low fat dairy consumption than did EDUCATION participants at Time 3, $t(116) = 2.62, p = .03$.

**Sugar Sweetened Beverage Consumption**

There was no significant main effect for condition, but there was a significant interaction effect, $F(4,230) = 2.26, p = .06, \eta^2 = .04$. CONTROL participants had a significant increase in their sugar-sweetened beverage consumption, specifically from Time 2 to 3. There were also significant group differences at Time 3, $F(2,115) = 3.45, p = .04, \eta^2 = .06$. SELF-AS-DOER participants had significantly lower sugar sweetened beverage consumption than did CONTROL participants at Time 3, $t(116) = 2.63, p = .03$.

**Participant Feedback Related to Intervention Impact**

Participant feedback about the self-as-doer condition, in particular, lends insight into the most salient components of the intervention for participants. First, they reported how the exercise of thinking of themselves as “doers” motivated them to make different health behavior choices. For example, one woman described how she began to make her habitual choice of a sugary beverage, but in accordance with the doer phrases she had created, she thought, “No, I am a ‘less-sugar drinker’ and should choose a diet beverage.” Consequently, she selected a diet drink. Thinking about one’s identity related to healthy eating also encouraged behavior change in situations where the imagined healthy choice was not preferred. For example, one participant asked how many servings of vegetables were in a vegetarian burger. When it was explained that vegetarian burgers contained the equivalent of about one-quarter cup of vegetables, she exclaimed, “You mean I choked down that veggie burger instead of a hot dog for only a quarter cup of veggies?” Some participants demonstrated an integration of the identity phrases created during the self-as-doer task. One participant, without prompting, wrote the self-as-doer phrases she created throughout the diary tracking at both Time 2 and 3. For example, when she ate carrots and celery, she wrote the phrase “veggie grabber” next to these foods to identify the healthy eater identity she was incorporating into her behavior. Another participant, in an unsolicited email following the intervention, mentioned how excited she was to become a “leafy vegetable eater,” a doer-identity phrase she had created the day before.

**Discussion**

The purpose of the present study was to test whether a motivational (i.e., self-as-doer) identity could be induced through a targeted healthy eater identity intervention. Findings for the causal effects of the self-as-doer intervention on healthy food consumption were supported for overall healthy food consumption and were mixed for specific healthy food groups. Overall, findings provide initial evidence for the effect of the self-as-doer on healthy eating behavior maintenance, although not for the hypothesized effect of increased food consumption. Results supported hypotheses that women in the self-as-doer group would experience greater healthy food consumption overall when compared with women randomly assigned to the education and control groups. Women in the latter groups ate fewer healthy foods over the course of the study whereas women in the self-as-doer group maintained their healthy food consumption across all time points in the study. Furthermore, the amount of overall healthy foods consumed at the final point of the study was significantly higher for participants in the self-as-doer group than it was for women in the control and education groups. In addition to statistical significance, results were also clinically significant (i.e., those in the self-as-doer group consumed an entire serving more of healthy foods on average each day than did those in the education and control groups),
which suggests that women in the self-as-doer group had meaningfully higher rates of overall healthy food consumption.

We were surprised to see that women in the control and education groups demonstrated a decrease in total healthy food consumption over the course of the intervention. There are a few possible explanations. On one hand, the mindfulness required with dietary tracking or the act of being monitored may have had a direct effect on how much food participants consumed or the degree to which they reported their food consumption at baseline (Streit, Stevens, Stevens, & Rossner, 1991; Zepeda & Deal, 2008). However, the novelty of the task might have become less salient and over time, they might have regressed back to their normal eating habits as was measured post-intervention and at the one month follow-up. On the other hand, these findings suggest that the interview protocol (i.e., encouraging honest reporting without feedback or judgment) appropriately diminished the presence of a Hawthorne effect within these groups. The finding that self-as-doer participants maintained overall healthy food consumption during the course of the intervention, in contrast, suggests the possibility that developing doer identities related to healthy eating behaviors can help maintain overall healthy diet choices. That is, the degree to which women in the self-as-doer group were able to maintain healthy eating behaviors might have been a direct result of the process of developing healthy eater phrases (i.e., becoming a “whole grain consumer”).

Self-as-Doer Identity and Specific Food Group Behaviors

Although the intervention had an effect for overall healthy food consumption, the hypotheses that there would be an increase in healthy food consumption across time and that those increases would be greater for women in the self-as-doer group as measured in food group-specific consumption were partially supported. For fruit and vegetable consumption there was no evidence to suggest that the experimental manipulation of self-as-doer had the intended effect, but there was demonstrated change for sugar-sweetened beverages, whole grains, and low fat dairy consumption.

For whole grain consumption, women in the self-as-doer group increased their consumption from baseline to post-intervention whereas women in the control group decreased their consumption during these same time points, thereby creating a significant difference between these two groups after the intervention. Women in the education group demonstrated no change at all but their change scores were not significantly different from self-as-doer or control group change scores. Self-as-doer participants also had a significant decrease in whole grains from the post-intervention to the one-month follow-up, a return to baseline measures. With respect to the low-fat dairy group, women in the education group decreased their low fat dairy consumption from baseline to follow-up and there was no change over time in low fat dairy consumption for the control group. Women in the self-as-doer group significantly increased their low-fat dairy consumption from post-intervention to follow-up. This change resulted in the self-as-doer group having significantly higher low-fat dairy consumption compared to women in the education group.

Despite the fact that the intervention resulted in higher overall healthy eating behaviors compared to those who did not complete the intervention, inconsistencies in behavior change for specific food groups might have occurred because participants focused their behavior change efforts on one or two behaviors rather than on multiple behaviors at a time. Furthermore, participants may not have demonstrated change in every specific food group measured because they had the liberty to freely develop goals and self-as-doer statements for the intervention. As such, some participants may have chosen to focus only on certain healthy eating behaviors or behaviors not directly related to the outcome measures, thereby limiting our ability to demonstrate effectiveness for each food group-specific set of behaviors measured.
One final consideration as to the effectiveness of the self-as-doer intervention for specific food groups is the degree to which approach (e.g., “veggie eater”) versus avoidant (e.g., “less soda drinker”) goal generation and corresponding self-as-doer statements may have influenced behavioral change. Previous research suggests that resource availability may influence the adoption of approach versus avoidance goals and consequently affect behavioral change wherein avoidance goals are often more effective when resources are limited (Ebner, Freund, & Baltes, 2006; Schnelle, Brandstätter, & Knöpfel, 2010). Perhaps there were differential effects for the self-as-doer intervention especially when resources were limited and approach goals were created (e.g., vegetable and fruit consumption). Researchers might further explore the differences between these goal orientations and the self-as-doer identity intervention.

Within the context of our study, we must also consider structural barriers, such as access to healthy food choices. University cafeterias do not always offer a wide selection of fruits and vegetables and when they are available, healthy foods can be prohibitively expensive. Furthermore, we collected some data around Spring Break, which might have had a negative effect on healthy diet decision-making (Rolnick et al., 2009). Finally, it could be that participants lacked sufficient nutrition knowledge to engage in healthy food selection and consumption to an identifiable degree. Even though participants in the intervention group received nutritional education and resources to explore the nutrition information further, some participants may not have been educated well enough to demonstrate actual behavior change. For example, one participant made self-as-doer goals related to whole grain and fruit consumption. In her subsequent food diaries she made food choices such as drinking fruit drinks and eating granola bars because she presumed that any fruit juice was made from whole fruits (the juice she chose was only 10% fruit juice) and that because the advertising on the box indicated that the granola bars were made from whole grains this would be a sufficient source. However, the measurable amount of whole grains in each bar was very small, only .25 ounces. As such, these women may have conceptualized their attempts at behavior change as successful, but the nutritional outcomes and data analysis do not represent successful behavior change. Had the educational materials included information about such common misconceptions or inadequate food labeling, participants may have demonstrated a more sophisticated knowledge and better behavioral choices. Despite the inconsistent findings with specific food groups, it is important to note that as women in the education and control groups were decreasing their consumption of healthy foods, women in the self-as-doer group were maintaining the amount of healthy foods they ate.

Our findings contribute to the extant literature by demonstrating a relationship between identity, specifically the motivational identity self-as-doer, and maintenance in health eating behaviors through a simple environmental intervention (Brouwer & Mosack, 2012; Houser-Marko & Sheldon, 2006; Rise et al., 2010; Stryker & Burke, 2000). Although not all food-group specific healthy eating behaviors were changed over the course of the intervention, given that overall healthy eating behaviors were significantly improved compared to control and education groups suggests that focusing on healthy eater identities could influence general healthy diet choices. People have different food preferences and in some cases food restrictions (e.g., lactose intolerance, gluten sensitivity) so this type of intervention might be particularly relevant in clinical settings and for certain population at risk of disease (e.g., obesity, hypertension, diabetes, etc.).

Limitations and Future Research

The study is not without its limitations. Outcome measures (e.g., food diaries, cognitive measures) were self-report and may therefore be biased and limit the ability to make generalizations. Because the stated purpose of the study was to explore healthy eating behaviors
in women, participants might have over-reported healthy eating behaviors and under-reported unhealthy eating behaviors (Buzzard, 1998). We tried to account for this response bias by excluding women who initially reported very healthy eating patterns. This measure was, however, self-report and did have low reliability thereby limiting our confidence in the accuracy of reporting one’s healthy food consumption. Likewise, although random assignment to groups preclude the conclusion that there was any systematic bias, participants may have forgotten to report certain foods throughout the day or made incorrect measurement calculations despite the extensive food diary training they received. To improve accuracy in dietary collection, real-time dietary consumption could be collected using smart phones or by making periodic contact with the participant throughout tracking days. Additionally, biochemical data (e.g., carotenoids; fatty acids; vitamin A, C, and D; iron; and sodium; Hunter, 1998; Willett & Lenart, 1998) could be collected to compare and validate food diary reporting. A manipulation check (i.e., the degree to which participants identified with their created self-as-doer statements) of the self-as-doer phrases for the intervention group at the final follow-up appointment was not included in the study. This may limit our ability to assess the degree to which participants identified with the self-as-doer phrases they created. The generalizability of the study is also limited by the specific population (i.e., motivated college women) recruited for the current study and the possibility of demand bias because the majority of interviews were conducted by a single researcher. However, the focus of the study, to better understand healthy eating behaviors, was emphasized several times to all research groups in an attempt to reduce such bias.

Research employing the self-as-doer intervention in a clinical population is needed. Fortunately, the intervention itself was rather simple and required little training, time, and resources. Participants engaged in the task with relative ease; only one woman had difficulty generating six goals related to healthy eating. As such, this intervention could be fairly easily incorporated into an existing intervention framework. Moreover, participants responded well to the intervention and participant feedback suggested that many integrated the self-as-doer language into their everyday lives. Overall, the piloted self-as-doer intervention demonstrates promise for changing healthy diet behaviors. As such, further investigation on this motivational identity construct is warranted as we continue to explore ways that identity can be used to promote healthy behaviors.

Supplementary Material
See http://www.winona.edu/psychology/Brouwer.asp for supplemental materials.

References


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