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Healthy-Eater Self-Schema and Dietary Intake

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The types and amounts of foods consumed have been shown to influence the health risks of individuals. Empirical evidence has documented a link between high dietary fat and low fiber intake and the risks for cardiovascular disease, some types of cancer, and obesity. Dietary surveys of Americans show higher fat and lower fiber intake than stipulated in the *Dietary Guidelines for Americans*, despite the noted increase in public awareness regarding the importance of adopting healthy eating habits. The lack of congruence between the availability of dietary knowledge and behavioral adherence to dietary recommendations suggests a need to further understand the predictors of dietary intake. In this study, the authors used the schema model of the self-concept to explore the role of self-beliefs in predicting dietary intake in community-dwelling, working-class, middle-aged adults.

Keywords: *diet and eating; health behavior; descriptive quantitative; methods; adults; self-schema*

Cognitive Predictors of Dietary Intake

Assuming that a healthy adult is aware of what constitutes a "healthy diet" and possesses the resources needed to acquire "healthy" foods for consumption, the question remains what individual factors motivate one's food choices. Investigators have found that being in favor of reducing the fat consumed in one's diet and the identification of oneself as someone who is concerned about the health consequences of what he or she eats predicts the intention to consume a low-fat diet, with the intention found to be a strong predictor of behavior (Armitage & Conner, 1999; Sparks & Guthrie,

201

1998; Sparks, Shepherd, Wieringa, & Zimmermanns, 1995). In other studies, dietary intake was predicted by concerns about health, appearance, and body weight, as well as enjoyment of the taste of foods (Contento & Murphy, 1990; Tuorila & Pangborn, 1988). Yet the use of different conceptual frameworks and different definitions of variables, namely, attitude and dietary intake, makes drawing firm conclusions about predictors of dietary intake challenging.

More recently, investigators have examined beliefs about the self in relation to dietary intake. The self-concept has been recognized to influence health behaviors (Stein & Markus, 1996). Moreover, dietary intervention studies that have used individual-based counseling approaches tailored to participants' beliefs about themselves in relation to their diets (Brug, Glanz, Van Assema, Kok, & Van Breukelen, 1998; Campbell et al., 1994; Lutz et al., 1999; Smith, Owen, & Baghurst, 1997) were more successful in influencing dietary intake than community studies that used standardized educational interventions (Croft et al., 1994; Fortmann, Taylor, Flora, & Winkleby, 1993; Luepker et al., 1994). Empirically, self-efficacy, or the belief in one's ability to perform specific behaviors in specific situations (Bandura, 1997), was found to predict dietary intake in many studies (Glanz et al., 1994; Herrick, Stone, & Mettler, 1997; McCann et al., 1995; Plotnikoff & Higginbotham, 1995; Shannon et al., 1997). Thus, to develop more successful dietary interventions, further exploration into relevant self-knowledge is needed.

Theoretical Framework

The theoretical framework chosen for this study is the self-concept, defined as part of the cognitive-affective system that includes knowledge structures about the self that provide organization to one's personal experiences (Markus & Wurf, 1987). Self-knowledge, or knowledge about one's thoughts, desires, and behaviors, was found to be more efficiently encoded and recalled than semantic knowledge (Klein & Loftus, 1993) and a powerful regulator of behavior (Stein & Markus, 1996). Self-knowledge structures, called "self-schemas," are domain specific and socially constructed (Herzog & Markus, 1999); they include generalizations about the self that are derived from past experiences and focused on some aspect of the self viewed by an individual as important, as well as representations of the self in specific situations and events (Markus, 1977). Self-schemas were identified in the health-related domains of exercise (Kendzierski, 1990), smoking (Shadel, Niaura, & Abrams, 2000), sexuality (Andersen, Cyranowski, & Espindle, 1999), body weight (Stein & Hedger, 1997), dieting to lose weight

(Kendzierski & Whitaker, 1997), and healthy eating (Kendzierski & Costello, 2004). In those studies, schematics (i.e., those who had perceptions of themselves as identifying with the behaviors or body images) were found to perform relevant behaviors more frequently and consistently than non-schematics, who had no self-schemas in the domains.

Studies on self-schemas related to eating have examined dieter and healthy-eater self-schemas. A longitudinal study of dieting behavior in 67 female college students examined the dieter self-schema in relation to past dieting experience, intention, and current behavior (Kendzierski & Whitaker, 1997). Schematics, who had significantly more dieting experience than the nonschematics, showed stronger and more consistent correlations between their intentions and behaviors compared with nonschematics throughout the semester. The authors concluded that the self-schema provided a strong impetus toward translating one's intention into behavior.

Kendzierski and Costello (2004) examined healthy-eater self-schema, defined as one's belief about himself or herself as someone who ate in a healthy manner, in relation to dietary intake in 49 female college students. Their results showed that students who saw themselves as healthy eaters (healthy-eater schematics) consumed more fiber, $M = 15.66 \pm 8.46$ versus 11.4 ± 5.39 g, $t(47) = 2.04$, $p < .05$, and less total fat, $M = 20.9\% \pm 8.2\%$ versus $25.1\% \pm 8.6\%$ of total kilocalories, $t(47) = -1.76$, $p < .05$, than nonschematics.

Purpose

These studies were conducted in adolescent samples. No published studies involving middle-aged adults have examined the influence of a healthy-eater self-schema on dietary intake. The current study extends the work of Kendzierski and Costello (2004) by (a) testing the self-schema model in a different age group, namely, middle-aged working adults, and (b) examining possible mediators of the relationship between a healthy-eater self-schema and dietary intake.

The outcome variable in this study was dietary intake, defined as the types and amounts of foods consumed by an individual. The main research question was, How does a healthy-eater self-schema relate to dietary intake in a sample of middle-aged adults? The hypotheses tested were as follows:

> *Hypothesis 1:* Persons with healthy-eater self-schemas available in memory (healthy-eater schematics) will report healthier dietary intakes, including lower fat and higher complex carbohydrate intakes, compared with those with no self-schemas in the domain (healthy-eater nonschematics).

Hypothesis 2: Healthy-eater schematics will have more diet-health association knowledge and nutrition knowledge compared with healthy eater nonschematics.

Hypothesis 3: Healthy-eater schematics will report higher healthy eating self-efficacy compared with healthy-eater nonschematics.

Hypothesis 4: The effect of a healthy-eater self-schema on dietary intake is mediated by diet-health association knowledge, nutrition knowledge, and self-efficacy.

Method

Sample and Procedure

An exploratory descriptive design was used. The data were collected through self-administered questionnaires. A convenience sample of middle-aged working adults was targeted. Inclusion criteria were (a) age 40 to 65 years, (b) current employment, (c) Caucasian and African American race, and (d) middle-class status. Ethnic groups were chosen to ensure that the items on the measure of dietary behavior were representative of the participants' usual diets. Socioeconomic status was controlled because of its effect on dietary patterns, whereby income determines the availability of food sources. Middle-class status was defined as having completed at least middle school level of education and having an occupation with a score of at least 5 on Hollingshead's two-factor index of social position, thus excluding farmers, unskilled and skilled manual workers, machine operators, and semiskilled workers (Miller, 1991).

The recruitment site was a health maintenance organization (HMO). Approval was secured from the institutional review board of the university at which the study was conducted and the administration of the HMO. The HMO's administration was informed of the inclusion criteria and provided a list of its employees accordingly; 385 employees were identified who fit the study's inclusion criteria. The administration requested that a research assistant from its staff take responsibility for participant recruitment; thus, that HMO employee sent an e-mail announcement to potential participants informing them about the study. One week later, the research assistant sent a reminder e-mail and informed them that the investigator would be visiting the HMO for recruitment. During the visit, which took place during lunch break in the cafeteria, 53 questionnaire packets were distributed face to face to the employees who happened to be there at the time. One day after the visit, 332 questionnaires were placed in the mailboxes of the remaining eligible participants by the HMO's research assistant, who sent

reminder e-mails to all potential participants 1 and 3 weeks later. Of the 385 questionnaires distributed, 74 were returned (response rate = 19.22%). Participants were offered as incentive individualized feedback on their results. Fifty-two participants (70.27%) requested feedback, which was mailed within 1 week of receipt of the completed questionnaires.

Instruments

Healthy-eater self-schema. The healthy-eater self-schema scale included three key phrases: "healthy eater," "eat in a nutritious manner," and "careful about what I eat," which were rated on two 11-point scales for self-descriptiveness and importance (Kendzierski & Costello, 2004). Self-descriptiveness indicated how much the participant thought the item described him or her; for example, the item "careful about what I eat" was rated from 1 (*does not describe me at all*) to 11 (*describes me a lot*). Importance indicated how much an item mattered to the participant and to how the participant saw himself or herself; "careful about what I eat" was thus rated from 1 (*not at all important*) to 11 (*very important*). An individual was classified as a healthy-eater schematic if he or she rated at least two of the three items between 8 and 11 on both self-descriptiveness and importance; otherwise, the person was classified as a nonschematic. One item relevant to eating, "fast food eater," was included in the scale to assess its discriminant validity. The concurrent validity of the measure was tested in the study by Kendzierski and Costello (2004); healthy-eater schematics were found to consume more fiber (15.6 ± 8.46 vs. 11.40 ± 5.39 g, $p < .05$) and less total fat ($20.9\% \pm 8.2\%$ vs. $25.1\% \pm 8.6\%$, $p < .05$) compared with nonschematics. Reliability testing was not reported for this scale.

A panel of three experts, one psychology professor and two dietitians, supported the content validity of the self-schema scale for middle-aged adults. Correlations between "fast food eater" and the healthy-eater schema self-descriptiveness items yielded *r* values of $-.24$ ($p = .045$) for "healthy eater," $-.31$ ($p = .007$) for "eat in a nutritious manner," and $-.19$ ($p = .108$) for "careful about what I eat." The correlations between the importance ratings of "fast food eater" and the self-schema items were .26 ($p = .03$), .23 ($p = .051$), and .19 ($p = .108$), respectively. These findings support the discriminant validity of the self-schema measure. Internal consistency testing in the current study yielded a Cronbach's α value of .90.

Diet-health association knowledge. Diet-health association knowledge was defined as awareness of the association between the type of nutrients one consumes and the occurrence of health problems, and measured by a

diet-health awareness test (DHA), developed by the U.S. Department of Agriculture (USDA) in 1989 (Tippett & Cypel, 1997). The DHA asks participants whether they have heard of any health problem that may be related to the intake of fat, saturated fat, fiber, cholesterol, salt, calcium, sugar, iron, and being overweight. Next to each question, respondents are asked to indicate which health problems are related to the nutrient in question, from a list of 17 diseases. Dichotomous scoring (0 for incorrect or does not know, 1 for correct) was used for the items. A panel of experts from USDA supported the scale's content validity. Internal consistency testing using Kuder-Richardson Formula 20 (KR-20) showed values of .80, .77, and .76 over 3 years (Sapp & Jensen, 1997). The DHA was later modified by removing the questions on iron and saturated fat intake and removing anemia from the list of health problems, and the revised version was used in the current study. A summative score (ranging from 0 to 30) is obtained. The DHA was pilot tested with 30 middle-aged university employees prior to the current study; many participants complained that the questions' format was difficult for self-administration. Thus, the questions were changed to a multiple-choice format with 8 choices, instead of the list of 16 diseases. The KR-20 coefficient in the current study was .81.

Nutrition knowledge. Nutrition knowledge was defined as knowledge about the food choices needed for the adoption of a healthy diet. The measure included 15 items from the Nutrition Knowledge section of the Diet and Health Knowledge Survey, version 1994-1996. Twelve items provided pairs of foods, asking respondents to indicate which has more fat or saturated fat (e.g., butter or margarine), and 3 items asked about the relationship between the cholesterol and fat contents of foods. The scoring of items was dichotomous. Psychometric testing was done on the previous (1989) version of the survey, which included more questions on the kilocalorie and fiber contents of foods. A panel of nutrition experts from the USDA established the tool's content validity. Internal consistency testing yielded KR-20 coefficients of .70, .63, and .59 over 3 years (Sapp & Jensen, 1997). Questions about the fiber contents of food were not used in this study, because pilot testing showed poor knowledge of fiber contents, which resulted in a floor effect and lower reliability scores than if these items were deleted. Summative scores were calculated (ranging from 0 to 15). A KR-20 of .68 was obtained in the current study.

Self-efficacy. Self-efficacy was measured with the Self-Efficacy Scale, a 23-item instrument on which participants rated on a scale ranging from 0

(*not at all confident*) to 10 (*extremely confident*) their ability to perform 23 dietary behaviors consistent with a diet low in fat and high in complex carbohydrates (Sheeshka, Woolcott, & McKinnon, 1993). A sample item is "Eat at least three servings of vegetables every day." A mean score was calculated. Exploratory factor analysis extracted four factors: (a) control of portion sizes, (b) resisting high fat snacks and desserts, (c) selection of high fiber foods, and (d) use of low-fat milk instead of whole milk. Reliability testing yielded a Cronbach's α coefficient of .87 (Sheeshka et al., 1993). In this study, Cronbach's α coefficient was .92, and the four-factor structure was replicated.

Dietary intake. Dietary intake was measured by the Diet Habit Survey (DHS), a 32-item questionnaire (Connor et al., 1992). The DHS asks about dietary intake in the past month and includes nine sections: meat, fish, and poultry (5 items); dairy products and eggs (7 items); fats and oils (5 items); sweets and snacks (3 items); grains, beans, fruits, and vegetables (5 items); salt (5 items); and seafood (2 items). The DHS was chosen because it mostly uses food combinations or meals, which are easier to remember than distinct food items, which are often used in food-frequency questionnaires. All items (except those about the grains, beans, fruits, and vegetables) have a multiple-choice format; the remaining 5 items are open, asking participants to indicate the amounts of foods eaten per day or week. A sample item is "What type of ground meat do you usually eat? (a) regular hamburger; (b) lean ground beef; (c) extra lean/ground chuck; (d) super lean/ground round; (e) ground sirloin, ground turkey breast, ground breast chicken; (f) Eat no ground meat." Each choice is assigned a score, with higher scores indicating healthier (lower fat, higher fiber) foods. An overall summative score is used, in addition to scores for cholesterol and saturated fat and for carbohydrates. Higher scores reflect a healthier diet, higher complex carbohydrate intake, and lower cholesterol and saturated fat intake. On the basis of the overall score, a respondent's diet is classified as follows: current American diet (37% fat) for a score less than 170 for men (<147 for women), Diet 1 (30% fat) for a score of 170 to 215.3 for men (147 to 185.8 for women), Diet 2 (25% fat) for a score of 215.4 to 272.8 for men (185.9 to 230.8 for women), Diet 3 (20% fat) for a score of 272.9 to 342 for men (230.9 to 282 for women), or Diet 4 (10% fat) for a score of 342.1 to 389 for men (282.1 to 330 for women) (Connor et al., 1992). Moderate correlations of the DHS with 24-hour dietary recall were documented in a dietary intervention study (Connor et al., 1992) at baseline and after the intervention, for cholesterol and saturated fat scores (*r* = .33 and .42, respectively,

$p < .001$). Significantly higher total and low-density lipoprotein cholesterol values were found in persons eating the current American diet compared with those consuming the 25%-fat diet. Also, persons who did not change their diet categories after the intervention had slight increases in their blood cholesterol levels, whereas those who progressed one or two categories had significant decreases ($p = .008$). Twelve dietitians administered and scored the DHS to a subsample, and no significant differences were noted in their ratings. Cronbach's α coefficients were .95 and .88 for the cholesterol and saturated fat and the carbohydrate scores, respectively. One multiple-choice question was later added on food choices made in restaurants and another on the use of low-fat recipes (Connor et al., 1992). In the current study, the overall Cronbach's α coefficient was .74, with α = .84 for the cholesterol and saturated fat scale and α = .48 for the carbohydrate scale. The α coefficient for the carbohydrate scale was lower than that reported by Connor et al., possibly because of the large variability in the responses to the individual carbohydrate items, including many participants who did not answer these questions, which were open ended and relied on recall.

Demographic, anthropometrics, and health related variables. The participants were asked about age, gender, ethnicity, education, occupation, yearly household income, and marital status. They were also asked about height and weight, whether they had any health problems, high blood cholesterol levels, or family histories of heart disease; whether they were smokers; their exercise status; and whether and why they were on any special diets.

Statistical Analysis

The data were analyzed using SPSS Version 12 (SPSS, Inc., Chicago, IL). The DHS had 20% missing data when using the summative score. However, participants with missing and complete DHS data did not differ on any of the study variables. Moreover, all but three of the participants with missing data had only one question missing, which did not affect their dietary classification. Thus mean scores for the DHS, carbohydrate, and cholesterol and saturated fat scales were used instead of the summative score in the analyses. On the basis of the literature, a moderate effect size ($R^2 = .13$) was estimated for the correlation analyses (multiple regression with four predictors). With α set at .05 and power at 0.7, a sample of at least 100 was needed to have sufficient power, so a sample size of 150 was sought (Polit & Beck, 2008).

Means and frequencies are used to describe the variables under study. Independent t tests and χ^2 tests were performed to compare healthy-eater schematics and nonschematics on the study variables. Regression analyses with mediation testing were used to test the mediation hypothesis. The Sobel statistic was also computed for each mediator to test for an indirect effect of healthy-eater self-schema on dietary intake through the mediator (Preacher & Hayes, 2004).

Results

Sample Characteristics

The sample included 74 employees of the HMO. The majority of the sample were married (56.8%), White (67.6%), and female (78.4%), with at least some college education (91.9%). The mean age was 48.82 ± 6.55 years (range = 36 to 65 years), with 52% of the sample 40 to 50 years old. Ninety-three percent of the participants ($n = 69$) reported annual household incomes of $30,000 or higher. About half of the participants (47.7%) were in administrative or executive or management positions, 24.6% were professionals, and 26.2% had clerical jobs.

The mean body mass index (BMI) was 28.40 ± 6.53 kg/m^2, with 37.6% of participants having BMIs within the normal range (20 to 24.99 kg/m^2), 32.1% being overweight (BMI = 25 to 30 kg/m^2), and 32.2% being obese (BMI > 30 kg/m^2). Medical conditions were reported by 27% of the sample ($n = 20$); the most frequently reported condition was arthritis (6.9%), followed by diabetes (4.2%), and then back problems. About half the sample (50.7%) reported family histories of heart disease, 28.4% high blood cholesterol, and 20.3% high blood pressure. More than one quarter of the sample ($n = 21$) reported being on special diets; of those, 40% reported the type of diet as a combination diet, such as a low-fat and low-calorie diet; 30% reported low-fat or low-cholesterol diets; 15% reported diabetic diets; and the remainder reported low-sugar or vegetarian diets. Only 9.5% of the sample were smokers, and 59.5% reported exercising at least twice weekly.

Forty-nine percent of the sample ($n = 36$) were classified as healthy-eater schematics. The participants had overall good levels of self-efficacy ($M = 6.88 \pm 2.00$), nutrition knowledge ($M = 10.21 \pm 2.64$), and diet-health association knowledge ($M = 21.04 \pm 4.40$). The mean DHS score was 4.09 ± 1.03 (range = 2.28 to 7.76). The diets of 51.4% of the sample ($n = 38$) could be classified as the current American diet; 30.7% consumed the diet

recommended as healthy, 13.3% the 25%-fat diet, and the remainder the 20%-fat diet.

Healthy-Eater Schematics

As shown in Table 1, healthy-eater schematics had significantly healthier diets than nonschematics, with lower cholesterol and higher complex carbohydrate intakes noted in the healthy-eater schematics compared with the nonschematics; thus, Hypothesis 1 was supported. Moreover, healthy-eater schematics were more likely to be on 30%-, 25%-, and 20%-fat diets than nonschematics (31.4% vs. 27.8%, 17.1% vs. 8.3%, and 8.6% vs. 0%, respectively) but less likely to consume the typical American diet (42.9% vs. 63.9%); however, the result did not reach statistical significance ($\chi^2 = 5.72$, $p = .126$). Healthy-eater schematics also had significantly higher diet-health association knowledge than nonschematics, but their nutrition knowledge scores did not differ significantly; thus, Hypothesis 2 was only partially supported. Significantly higher self-efficacy scores were also noted in the healthy-eater schematics compared with the nonschematics, thus supporting Hypothesis 3.

We compared the availability of a healthy-eater schema in those who reported being on special diets with those not reporting such diets. Although a higher proportion of those on special diets had healthy-eater self-schema (61.9%) compared with those not on such diets (44.2%), the difference was not statistically significant ($\chi^2 = 1.87$, $df = 1$, $p = .17$).

Mediation Testing and the Prediction of Dietary Behavior

Bivariate correlations were calculated between the study variables, and results are shown in Table 2. Dietary intake was significantly associated with healthy-eater self-schema, self-efficacy, and diet-health association score but not with nutrition knowledge. The three hypothesized mediators (nutrition knowledge, diet-health association, and self-efficacy) were not significantly correlated with one another. These correlations did not change in strength or statistical significance after controlling for age and BMI.

Regression analyses were performed to test possible mediation effects on the relationship between healthy-eater self-schema and dietary intake. In the first set of regression analyses, healthy-eater self-schema was used to predict dietary intake and was found to be a significant predictor, as expected ($\beta = .34$, $R^2 = .11$, $p = .004$). Next, in three separate regression

Table 1
Group Differences on Select Variables Between Healthy-Eater Schematics and Nonschematics

Variable	Healthy-Eater Schematic (n = 36)		Nonschematic (n = 37)		df	t	p
	M	SD	M	SD			
Diet score	4.45	1.16	3.75	0.75	69	−2.99	.004
Carbohydrate score	10.87	4.99	8.36	3.19	60	−2.56	.037
Cholesterol and saturated fat score	3.43	0.85	3.07	0.60	71	−2.13	.013
Diet-health association knowledge	22.61	4.30	19.78	3.85	71	−2.96	.004
Nutrition knowledge	10.57	2.67	9.89	2.63	69	−1.09	.28
Self-efficacy	7.55	1.75	6.27	2.06	71	−2.87	.005

211

Table 2
Bivariate Correlations Between the Study Variables

Variable	1	2	3	4	5
1. Healthy-eater self-schema	—				
2. Self-efficacy	.32***	—			
3. Nutrition knowledge	.13	−.02	—		
4. Diet-health association knowledge	.33***	.20*	.06	—	
5. Dietary intake	.34***	.67†	.00	.26**	—

Note: All correlations are Pearson's *r* values, except those involving the healthy-eater self-schema variable, which are point biserial correlations.
*.05 < *p* < .10. **p < .05. ***p < .01. †*p* < .001.

analyses, healthy-eater self-schema was used to predict the hypothesized mediators and was found to be a significant predictor of self-efficacy ($\beta = .32$, $R^2 = .10$, $p = .005$) and diet-health association knowledge ($\beta = .33$, $R^2 = .11$, $p = .004$), but not nutrition knowledge ($\beta = .13$, $R^2 = .02$, $p = .28$). In the third step, dietary intake was regressed on each mediator. Self-efficacy ($\beta = .67$, $R^2 = .45$, $p < .001$) and diet-health association knowledge ($\beta = .26$, $R^2 = .07$, $p = .029$) were significant predictors but not nutrition knowledge ($\beta = .13$, $R^2 = .02$, $p = .28$).

The final regression analysis included dietary intake as the dependent variable and healthy-eater self-schema, nutrition knowledge, diet-health association knowledge, and self-efficacy as predictors. The results are shown in Table 3. The model explained 49% of the variance in dietary behavior. The only significant predictor was self-efficacy ($\beta = .63$, $p = .000$); diet-health association knowledge, nutrition knowledge, and healthy-eater self-schema did not have a significant contribution to the variance in dietary intake. These findings suggest a mediating effect of self-efficacy on the association between healthy-eater self-schema and dietary intake.

These findings were supported by the Sobel test for mediation, which was computed for each mediator separately. The test was significant for self-efficacy (Sobel statistic = .39, *SE* = .16, *z* = 2.44, *p* = .015) but not nutrition knowledge (Sobel statistic = .023, *SE* = .05, *z* =.49, *p* = .626) or diet-health association knowledge (Sobel statistic = .11, *SE* = .10, *z* = 1.17, *p* = .24). These findings support an indirect effect of healthy-eater self-schema on dietary intake through self-efficacy only, so Hypothesis 4 was only partially supported.

Table 3
Regression Analysis for Predicting Dietary Behavior (*n* = 71)

Variable	*B*	*SE* of *B*	β	*t*	*p*
Healthy-eater self-schema	.22	.20	.11	1.10	.276
Nutrition knowledge	.05	.04	.12	1.28	.205
Diet health association knowledge	.02	.02	.07	0.77	.443
Self-efficacy	.33	.05	.63	6.76	.000

Note: R^2 = .49, *p* = .000.

Discussion

This study is the first to explore healthy-eater self-schemas in middle-aged adults, a group at risk for diet-related health problems. In our community-dwelling sample of middle-aged, working-class adults, approximately half showed evidence of a healthy-eater self-schema, a stable, elaborated cognition of the self related to eating in a healthy, nutritious manner. Furthermore, those with healthy eater self-schemas had higher levels of knowledge related to the link between diet and health and higher levels of healthy eating self-efficacy. Finally, as predicted, the availability of a healthy-eater self-schema predicted self-reported healthy eating patterns, and the results suggest that this effect was mediated through self-efficacy.

The results showing a positive association between a healthy eater self-schema and healthy eating are consistent with those of Kendzierski and Costello (2004). In both studies, healthy-eater schematics reported significantly lower fat and higher complex carbohydrate intakes than non-schematics. Eating habits are acquired early in life, under the influence of multiple biological, psychological, and social factors (Rozin & Vollmecke, 1986). Self-schemas are developed in a given domain through related personal experiences and feedback from others. A possible interpretation of the correlation between a healthy eater self-schema and healthy eating is that one's conception of his or her eating style gets developed across the life span on the basis of the food choices one makes. One's self-conception of his or her eating style would become that of a healthy eater if linked with knowledge of the relationship between health and diet, as found in the current study. The media and life experiences afford this knowledge, which provides an individual with the identity of a healthy eater if his or her eating patterns match those of a healthy diet; this was reflected in the healthy-eater schematics' confidence in their ability related to eat in a healthy manner

(self-efficacy) and actual performance of healthy eating behaviors (dietary intake).

It was interesting to note the lack of an association between self-schema and nutrition knowledge. The measure of nutrition knowledge included questions about the cholesterol and fat contents of select food items, with relatively high knowledge scores noted in this sample. The lack of an association suggests that encoding nutrition facts is not necessarily associated with the conception of the self as a healthy eater. Self-schema in a domain is determined by perceiving related behaviors not only as self-descriptive but also as important to the way a person sees himself or herself (Kendzierski, 2007); thus, nonschematics may possess the nutrition knowledge yet do not perceive, for instance, that choosing low-fat foods describes them or is important to their self-images. These findings are consistent with the literature that nutrition knowledge, though necessary, is not sufficient to predict dietary behaviors (Contento et al., 1995) and suggest that adults are able to encode information when it is not self-relevant but that such knowledge does not play a role in behavioral regulation. Moreover, about one quarter of the sample's being on a special diet may explain the high knowledge score and lack of variability of this variable, because being on such a diet requires knowledge seeking. An alternative explanation may be the weak reliability of the nutrition knowledge instrument (KR-20 = .68), considering that this variable was not significantly associated with any other variable. The inclusion of the fiber knowledge items in this study may have led to significant differences between the healthy-eater schematics and the nonschematics, because the latter had lower complex carbohydrate intakes, which would suggest lower related knowledge compared with the healthy-eater schematics.

The fact that diet-health association knowledge did not mediate the association between self-schema and behavior, whereas self-efficacy did, may be interpreted on the basis that self-efficacy reflects the procedural knowledge component of the healthy-eater self-schema. On the other hand, acquiring mere knowledge about which nutrients relate to health and illness may not be enough to translate into healthy eating, unless it is perceived as important to one's self-image. This interpretation is supported by examination of the participants who reported being on special diets; these participants had significantly higher self-efficacy, diet-health association knowledge, and dietary intake scores than their counterparts. Self-efficacy also involves confidence in performing desired behaviors in the presence of challenging situations or barriers (Bandura, 1997), which can be acquired as a person gains experience of behaviors involved in being on a special diet. Alternatively, the limited sample size may account for the lack of a mediating effect of knowledge, which may have been found in a larger sample.

Being on a special diet did not significantly relate to self-conception as healthy eater, a finding consistent with that of Kendzierski and Costello (2004). The lack of this relationship may be explained by the fact that the special diet experience may have been rather recent and thus not strong enough to allow the stabilization of a healthy-eater self-schema in this group. These individuals may have considered healthy eating to be important to them (25% stated that they were on special diets only to maintain their health), but they had not yet developed self-schemas as healthy eaters; more time may be needed. If a special diet is aimed at fixing a problem such as weight or illness (as for the remaining 75%), healthy eating per se may not be important to self-image, and thus the knowledge and experience accumulated through such a diet will not be enough to translate into a healthy-eater self-schema. Alternatively, the participants who reported being on special diets may have failed to follow dietary recommendations, because on the basis of their DHS scores, their diet categories did not differ from those not on special diets. Lowe (2003) found that individuals in weight reduction programs often do not meet the prescribed calorie restrictions and require the provision of meals to succeed in achieving their dieting goals; such information is not available from the data in this study.

The use of a convenience sample homogeneous on age, education, and socioeconomic status; the modest sample size; and the low response rate (19.22%) limit the generalizability of the results. The levels of education and socioeconomic status in the sample could account for the high scores on the knowledge questionnaires. Yet the aim of the study was restricted to a preliminary test of the self-schema model in relation to dietary intake in middle-aged adults, while limiting the confounding effects of relevant demographic variables. The response rate in this study was much lower than those reported in mailed surveys of dietary behavior, which ranged between 24% (Smith et al., 1997) and 81% (Plotnikoff & Higginbotham, 1995), with high rates obtained in samples recruited from experimental studies. Although we have no information about reasons for failure to participate, it is possible that the length and complexity of the questionnaire, which included other variables not reported in this article and started with three open-ended questions, discouraged some from participating. Self-selection bias was thus possible. Nevertheless, it was noted from the code numbers of the returned questionnaires that those who responded were mostly from the participants who were given the questionnaires on site. Thus, face-to-face administration instead of a mailed survey may have improved the response rate; however, this was not possible, because we were not granted direct access to the sample except for the single recruitment visit to

the HMO. An extension of the current study needs to be made with a larger sample and some modifications in design, with a more direct approach to recruitment and the use of interviews.

The findings of this study support the relationship between self-conception as a healthy eater and healthy eating in a sample of middle-aged adults, which was found to be mediated by self-efficacy. The findings have potential for use in dietary counseling. Different strategies may benefit schematics and nonschematics (Kendzierski, 2007). For nonschematics, self-perceptions about healthy eating may be explored and dietary recommendations tailored accordingly; much support, education, and motivational interventions are needed to move them toward healthy eating, because they are expected to be less attentive to schema-related information.

For healthy-eater schematics, if a person is found to be unaware of some of his or her unhealthy eating patterns, these can be pointed out, and the person can be taught self-monitoring techniques, because schematics resist schema-inconsistent information. Once convinced of their shortcomings, schematics are likely to adhere to dietary recommendations. If, on the other hand, unhealthy eating is due to difficulty in adopting specific habits or low self-efficacy, interventions to enhance self-efficacy may be implemented, such as setting gradual goals and attempting small, incrementally more difficult changes in behavior.

In conclusion, self-schemas regarding eating, once identified, are potential targets for dietary intervention and counseling, aimed at promoting healthy eating patterns.

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