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BRIEF COMMUNICATION

# Self-Efficacy, Health Literacy, and Nutrition and Exercise Behaviors in a Low-Income, Hispanic Population

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**Abstract** Public health goals have emphasized healthy nutrition and exercise behaviors, especially in underserved populations. According to social cognitive theory (SCT), self-efficacy and capability (e.g., health literacy) may interact to predict preventative behaviors. We surveyed 100 low-income, native Spanish-speakers living in the United States who were low in English proficiency and predominantly of Mexican heritage. Participants reported their nutritional and exercise self-efficacy, Spanish health literacy, and nutrition and physical activity behaviors. Consistent with SCT, the interaction of self-efficacy and health literacy significantly predicted fruit and vegetable consumption and weekly exercise, and marginally predicted avoidance of high fat foods. For all three interactions, higher health literacy levels strengthened the positive relationship between self-efficacy and health behaviors. The results offer support for the tenets of SCT and suggest—for low-income, Spanish-speaking adults—that a combination of behavioral confidence and literacy capability are necessary to enact appropriate health behaviors.

**Keywords** Self-efficacy · Health literacy · Social cognitive theory · Exercise and physical activity · Nutrition · Hispanic

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## Introduction

Improving dietary behaviors and increasing physical activity is a key public health goal, especially for low-income, Hispanic populations [1]. Low-income Hispanics are at-risk for poor nutritional eating habits (such as consuming foods high in fat) and obesity [1], which then increases risk for developing cancer, diabetes, heart disease, hypertension, and stroke [2]. Additionally, among racial/ethnic groups, Hispanics have the lowest physical activity performance [1]. Exercise helps prevent cardiovascular disease and diabetes, which are prevalent in Hispanic communities [3].

Social cognitive theory (SCT) posits that self-efficacy—one's judgments of his or her abilities to perform an action—drives healthy behavior [4]. However, self-efficacy alone is not enough to generate desirable behavior, the individual must also have the behavioral capability (knowledge and/or skill) to perform the specific act [4]. One indicator of health capability is health literacy, or the extent to which individuals can obtain, process, and comprehend basic health information and services to make informed health decisions [5] (p. 1). Individuals with lower health literacy are less likely to engage in preventative behaviors, may avoid health situations and health information, and report greater barriers to health care [5]. In

Hispanic populations, Spanish health literacy is associated with physical activity, and health literacy and self-efficacy are linked [6]. However, SCT posits both high self-efficacy and adequate health literacy may be necessary to facilitate healthy behaviors, and research has not examined the interaction between these variables on Hispanics' health behavior. Thus, we posit that for low-income, low-English proficiency Hispanics living in the United States, (a) nutrition self-efficacy, (b) health literacy, and (c) the interaction of nutrition self-efficacy and health literacy will positively relate to reported consumption of five fruits and vegetables a day (H1) and fatty food avoidance (H2). Likewise, (a) exercise self-efficacy, (b) health literacy, and (c) the interaction of exercise self-efficacy and health literacy will positively relate to exercising 3 times a week for at least 20 min a day (H3) and weight loss attempts (H4).

## Method

### Participants

One-hundred Spanish-speaking (predominately of Mexican heritage) adults with limited or no English proficiency and who were at or below 200 % of the poverty line were recruited from Lake County, Indiana. The majority of participants were female ($n = 83$, male = 15, missing = 2), had less than a high school education (67.3 %), and were originally from Mexico ($n = 91$; United States = 4; Puerto Rico = 2; Chile, Venezuela, and Cuba = 1). Participants' mean age was 34.85 years ($SD = 11.48$).

### Procedure

The study was reviewed and approved by an institution review board. Two bilingual university extension employees who routinely work with low-income, Spanish-speaking populations helped identify and recruit participants. Participants were compensated $25 in gift cards for completing the 9-page Spanish survey. Participants could have the survey read to them (excluding the health literacy measures).

### Measures

Control variables included education (*operationalized by highest grade completed; e.g., 1 = 1st grade education, 12 = high school degree*), age, and language acculturation [7].

Participants completed two 5-item scales: nutrition self-efficacy and physical exercise self-efficacy [8]. Participants responded on a 4-point scale (1 = *very uncertain* to 4 = *very certain*). The prompt "How certain are you that you could overcome the following barriers? I can manage to stick to healthy foods…" proceeded the nutrition items (e.g., "…even if I need a long time to develop the necessary routines"). Items were reliable (Cronbach's alpha = .86). The prompt "How certain are you that you could overcome the following barriers? I can manage to carry out my intentions to exercise…" proceeded the exercise items (e.g., "…even when I'm tired"). Items were reliable (Cronbach's alpha = .92).

Health literacy was assessed using the abbreviated version of the Spanish Test of Functional Health Literacy in Adults (TOFHLA-S) [9]. Two short exercises from the reading comprehension and two from the numeracy section were used to calculate the scale [9]. Health literacy scores ranged from one to 100, with scores above 66 considered "adequate" health literacy [9]. Participants' scores ranged from 49 to 100 ($M = 84.25$, $SD = 12.86$), with 90 adequate health literacy scores.

The stages of change questionnaire assesses various health behaviors [10], but the current study utilized the four nutrition- and exercise-related items. Four items were individually examined as dependent variables: "Do you consistently eat five fruits and vegetables a day?", "Do you consistently avoid eating high fat foods?", "Do you exercise three times a week for at least 20 min each time?", and "Have you been trying to lose weight?" Answer sets included: *No, I do not intend to in the next 6 months* (1), *No, but I intend to in the next 6 months* (2), *No, but I intend to in the next 30 days* (3), *Yes, I have been, but for less than 6 months* (4), *Yes, I have been for more than 6 months* (5).

## Results

Given that less than 5 % of the data were missing at random according to Little's MCAR test, expectation maximization was used. Descriptive statistics and correlations are reported in Table 1. Four hierarchical regressions were conducted in SPSS 21.0 to examine the four behavioral health outcomes (five fruits and vegetables, avoid fatty foods, exercise, and lose weight). Predictor variables were standardized prior to entry, and were entered as follows: age, education, and language acculturation (Block 1); health literacy and nutrition or exercise self-efficacy (as appropriate to the dependent variable; Block 2); the interaction between health literacy and the relevant self-efficacy (Block 3). Interactions were probed using PROCESS and are described using the Johnson–Neyman statistic, which indicates the regions of significance of the moderator at which the relationship between X and Y is statistically significant. Unstandardized regression coefficients are reported for all regressions in Table 2 and interaction graphs in Fig. 1.

**Table 1** Descriptive statistics and correlations

| | Range | *M* (*SD*) | Skew | Kurt | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. Age | 18–71 | 34.85 (11.37) | .97 | .95 | | | | | | | | | |
| 2. Education | 1–14 | 4.07 (2.50) | 1.60 | 2.84 | .02 | | | | | | | | |
| 3. Lang acculturation | 1–4 | 1.47 (.69) | 1.73 | 2.36 | −.05 | .32** | | | | | | | |
| 4. Health literacy | 49–100 | 84.25 (12.86) | −.64 | −.10 | −.23* | .13 | .00 | | | | | | |
| 5. Exercise self-efficacy | 1–4 | 2.53 (.93) | .10 | −.80 | .14 | .05 | .03 | .40*** | | | | | |
| 6. Nutrition self-efficacy | 1–4 | 3.04 (.82) | −.59 | −.37 | .17$^{\dagger}$ | .26** | .09 | .11 | .07 | | | | |
| 7. Fruits and veg | 1–5 | 3.80 (1.10) | −.44 | −.76 | .07 | .12 | −.02 | .15 | .18$^{\dagger}$ | .05 | | | |
| 8. Avoid fatty food | 1–5 | 3.74 (1.13) | −.62 | −.24 | .12 | .00 | −.07 | .16 | .09 | −.01 | .21* | | |
| 9. Lose weight | 1–5 | 3.51 (1.47) | −.61 | −.99 | .13 | .07 | .00 | .15 | .23* | .04 | .31** | .24* | |
| 10. Exercise | 1–5 | 3.67 (1.24) | −.45 | −.91 | .10 | .08 | .00 | .26** | .33** | −.19$^{\dagger}$ | .39*** | .27** | .49*** |

$^{\dagger}$ $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$

**Table 2** Hierarchal regressions

| | Five fruits and veg | Avoid fatty food | Exercise | Lose weight |
|---|---|---|---|---|
| Age | .08 | .13 | .12 | .19 |
| Education | .15 | .03 | .11 | .11 |
| Lang acculturation | −.07 | −.08 | −.04 | −.03 |
| $R^2$, $F$ | $F = .75$, $R^2 = .02$ | $F = .59$, $R^2 = .02$ | $F = .6$, $R^2 = .02$ | $F = .73$, $R^2 = .02$ |
| Age | .12 | .19 | .12 | .15 |
| Education | .13 | .00 | .17 | .10 |
| Lang acculturation | −.05 | −.07 | −.04 | −.04 |
| Self-efficacy (exercise or nutrition) | .18 | .24$^{\dagger}$ | .41** | .32* |
| Health literacy | −.01 | −.06 | −.32* | −.02 |
| $R^2$, $F$ | $F = 1.18$, $R^2 = .05$ | $F = 1.99$, $R^2 = .06$ | $F = 9.15$***, $R^2 = .18$ | $F = 2.33$, $R^2 = .07$ |
| Age | .11 | .19 | .05 | .12 |
| Education | .12 | −.01 | .24$^{\dagger}$ | .13 |
| Lang acculturation | −.04 | −.05 | −.12 | −.07 |
| Self-efficacy (exercise or nutrition) | .20$^{\dagger}$ | .25* | .45*** | .34* |
| Health literacy | .03 | −.03 | −.30* | −.01 |
| Health literacy × self-efficacy | .25* | .21$^{\dagger}$ | .28* | .13 |
| $R^2$, $F$ | $F = 5.01$*, $R^2 = .10$ | $F = 3.39^{\dagger}$, $R^2 = .09$ | $F = 6.25$*, $R^2 = .23$ | $F = .77$, $R^2 = .08$ |

Unstandardized regression coefficients are reported. Exercise = Exercise three times a week for at least 20 min each time

$^{\dagger}$ $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$

For H1, the third block was statistically significant and explained 10 % of fruit and vegetable (FV) consumption total variance. Nutrition self-efficacy was marginally significant ($B = .20$, $p = .09$), and the interaction between nutrition self-efficacy and health literacy positively associated ($B = .25$, $p = .03$) with FV consumption. The Johnson–Neyman statistic indicated that when the participant's health literacy was above 85.97 (52 % of participants), the relationship between nutrition self-efficacy and FV consumption was statistically significant and positive (although it was not statistically significant below 85.97).

For H2, the third block was marginally significant and explained 9 % of avoiding fatty food total variance. In the third block, nutrition self-efficacy positively linked to avoiding fatty foods ($B = .25$, $p < .001$) and the interaction between self-efficacy and health literacy was marginally significant ($B = .21$, $p = .07$). The Johnson–Neyman statistic indicated that when the participant's health literacy was above 83.16 (55 % of participants), the relationship between nutrition self-efficacy and fatty food avoidance was statistically significant and positive (although it was not statistically significant below 83.16).

For H3, the second and third block were statistically significant and explained 23 % of exercising three times a week total variance. At the third block, exercise self-efficacy positively associated ($B = .45$, $p < .001$), health

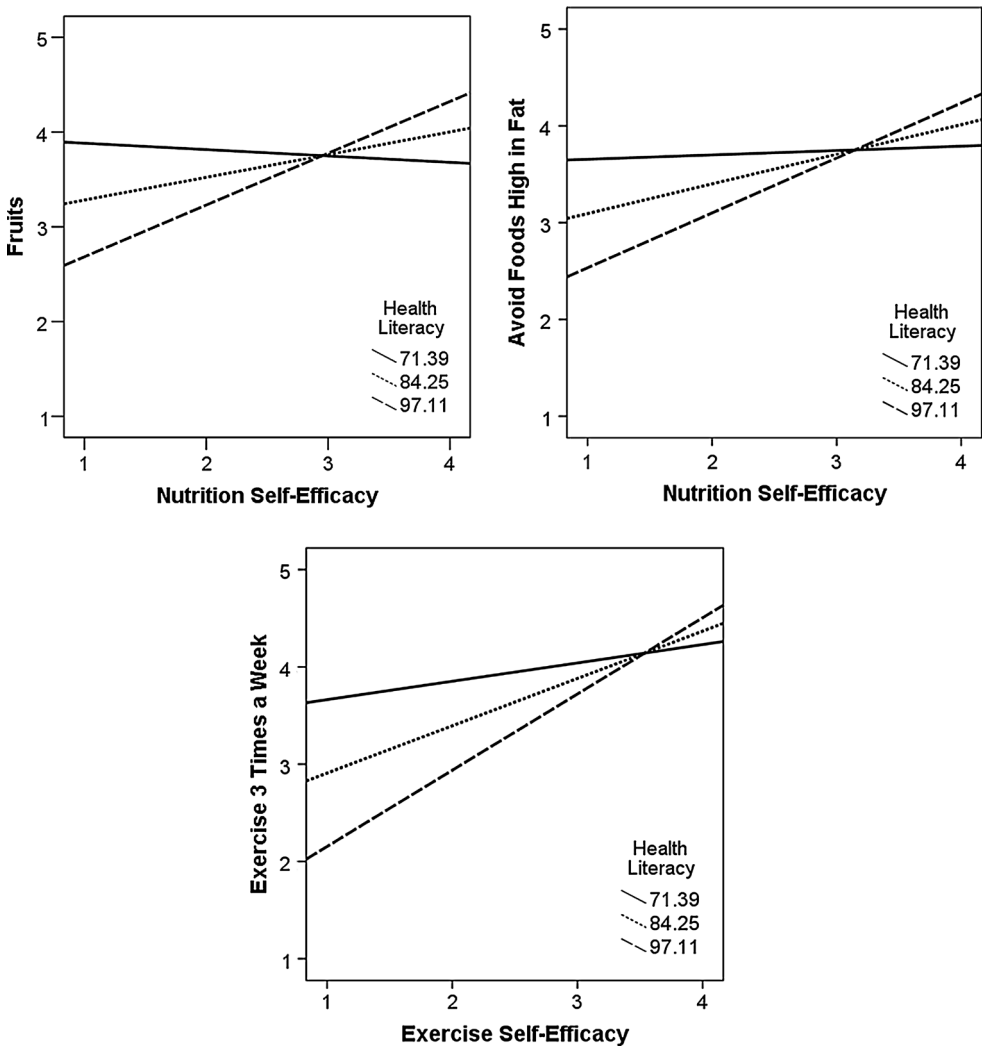


**Fig. 1** Interaction Between Health Literacy and Self-Efficacy

literacy negatively associated ($B = -.30$, $p = .01$), and the two interacted ($B = .28$, $p = .01$) on exercising. The Johnson–Neyman statistic indicated that when the participant's health literacy was above 75.12 (77 % of participants), the relationship between exercise self-efficacy and exercise was statistically significant and positive (although it was not statistically significant below 75.12).

For H4, none of the three blocks were statistically significant for lose weight attempts, although 8 % total variance was explained. Although the block was not statistically significant, exercise self-efficacy positively associated with weight lost attempts ($B = .34$, $p = .03$).

## Discussion

Based on SCT, we examined self-efficacy, Spanish health literacy, and the interaction between the two on nutrition and exercise behaviors in 100 low-income, Spanish-speaking individuals. In the final regression block, self-efficacy positively linked to all four outcomes: eating five fruits and vegetables a day, fatty food avoidance, exercising three times a week for at least 20 min, and weight loss attempts. More importantly, self-efficacy interacted with health literacy on eating fruits and vegetables, avoiding fatty foods, and exercise, although the interaction was only marginally significant for avoiding fat foods. For all three interactions, as participant's health literacy increased, the positive relationship between self-efficacy and the health behavior became stronger. The findings highlight the importance of high self-efficacy and high behavioral capability in predicting health behaviors. Self-efficacy was not significantly related to fruits and vegetables without the interaction (i.e., in the second block), echoing past research that has revealed self-efficacy may not always directly affect health behavior, instead acting in conjunction with skill-oriented variables, such as health literacy. Interventions, campaigns, and programs attempting to increase

preventative behaviors in low-income, Hispanic populations should emphasize constructing health promotion and efficacy-boosting messages at the level of participant health literacy, and ensure that efficacious individuals have access to health literate appropriate resources.

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