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Abstract

Latent profile analysis identified health locus of control profiles among 436 Hispanic Americans who completed the Multidimensional Health Locus of Control scales. Results revealed four profiles: *Internally Oriented-Weak*, *-Moderate*, *-Strong*, and *Externally Oriented*. The profile groups were compared on sociocultural and demographic characteristics, health beliefs and behaviors, and physical and mental health outcomes. The *Internally Oriented-Strong* group had less cancer fatalism, religiosity, and equity health attributions, and more alcohol consumption than the other three groups; the *Externally Oriented* group had stronger equity health attributions and less alcohol consumption. Deriving multidimensional health locus of control profiles through latent profile analysis allows examination of the relationships of health locus of control subtypes to health variables.

Keywords

beliefs, ethnicity, health psychology, locus of control, quantitative methods

Health locus of control (HLC) is a multidimensional construct reflecting the extent to which individuals believe their health is controlled by various sources (Wallston et al., 1978). Wallston et al. (1978) developed the Multidimensional Health Locus of Control (MHLC) scales to quantify the extent to which individuals believe their health is controlled internally, by chance, and by powerful others (e.g. doctors, nurses). The God HLC scale, which measures religion-based HLC, was later added as a fourth scale (Wallston et al., 1999). These four loci of control have been shown to be orthogonal, and the multidimensional structure of HLC has been supported in extensive health research (Wallston, 2005).

In a special issue of the *Journal of Health Psychology* reviewing decades of research using

the MHLC scales, Wallston (2005), the primary developer of the scales, specifically called for the identification of HLC profiles, simultaneously considering the scales in relation to one another rather than in isolation, and then examining the relationship of HLC profiles to health

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variables. Wallston and Wallston (1982) originally hypothesized that eight HLC profiles (“typologies”) existed based on patterns among scores on the three original scales of Internal, Chance, and Powerful Others HLC. Among the few studies that have derived HLC profiles using these three scales, all have used cluster analysis. No single study has found all eight hypothesized profiles, though seven of the profiles have been found in at least one study each. Those that have been replicated include “pure internal” (high internal, low chance, low powerful others; Buckelew et al., 1990; Raja et al., 1994; Wiegmann and Berven, 1998; Yeoum, 1997), “pure powerful others” (low internal, low chance, high powerful others; Wiegmann and Berven, 1998), “pure chance” (low internal, high chance, low powerful others; Jenkins and Patterson, 1998; Raja et al., 1994; Rock et al., 1987; Wiegmann and Berven, 1998; Yeoum, 1997), “double external” (low internal, high chance, high powerful others; Buckelew et al., 1990; Frick et al., 2007; Jenkins and Patterson, 1998; Rock et al., 1987), “believer in control” (high internal, low chance, high powerful others; Buckelew et al., 1990; Jenkins and Patterson, 1998; Raja et al., 1994; Rock et al., 1987; Wiegmann and Berven, 1998; Yeoum, 1997), “yeah-sayer” (high internal, high chance, high powerful others; Frick et al., 2007; Raja et al., 1994; Rock et al., 1987; Wiegmann and Berven, 1998; Yeoum, 1997), and “nay-sayer” (low internal, low chance, low powerful others; Buckelew et al., 1990; Jenkins and Patterson, 1998; Raja et al., 1994; Rock et al., 1987; Yeoum, 1997). The only profile that has not been replicated using cluster analysis is “internal/fate” (high internal, high chance, low powerful others). Across these studies, the number and types of profiles uncovered have varied, ranging from two profiles in a study that used both a measure of coping strategies and the MHLC scales to derive profiles (Frank et al., 1987) to six profiles in another study analyzing just the MHLC scales (Rock et al., 1987). No studies have attempted to derive HLC profiles that include the more recently introduced fourth scale, God HLC.

This study used latent profile analysis (LPA), rather than cluster analysis, to examine HLC among a sample of Hispanic American adults. Like cluster analysis, LPA is a statistical technique that interprets patterns of responses to variables and thereby assigns individuals to internally homogenous, orthogonal, mutually exclusive groups (Roesch et al., 2010). However, although both share a common primary aim, LPA is considered a stronger statistical alternative to traditional cluster analysis. LPA takes error into account, while cluster analysis assumes there is no error in profile membership. Additionally, in LPA, the observed data are used to estimate parameter values for the model (Vermunt and Magidson, 2002), and LPA applies more formal criteria to aid in the identification of groups (Collins and Lanza, 2010). Of note, this study incorporated the God HLC scale, in addition to the three original MHLC scales, in deriving HLC profiles. In addition, to date, no studies have examined the MHLC scales using LPA in a sample of Hispanic Americans, despite the fact that they are the fastest growing demographic group in the United States (Ennis et al., 2011). Therefore, the first aim of this study was to derive profiles from all four MHLC scales using LPA. The second aim was to compare the derived profile groups on sociocultural and demographic characteristics, health beliefs, health behaviors, and physical and mental health outcomes, to determine whether profiles are associated with important individual differences.

Method

Participants

The community-based sample consisted of 436 English- and Spanish-speaking Hispanic American adults, the majority of whom were of Mexican descent. Participants completed a 2-hour survey assessing demographic variables, health history, and health attitudes and behaviors. Eligibility criteria included self-identifying as Hispanic American, being at least 21 years old, residing in the United States, and preferring to read, write, and speak in either Spanish or

English. Prior to human subject enrollment, the sponsoring universities' Institutional Review Boards approved all study procedures and materials.

Measures

Sociocultural and demographic variables. Gender, age, education, annual household income, acculturation, and religiosity were assessed by self-report. The Brief Acculturation Scale for Hispanics (BASH; Norris et al., 1996) was used to measure level of acculturation. The BASH is a four-item measure that uses language as a proxy for acculturation. The BASH has been shown to have good reliability and structural validity in English- and Spanish-speaking Hispanic Americans (Mills et al., 2014b). Respondents select from a 5-point scale ranging from Only Spanish (1) to Only English (5). Higher scores indicate greater acculturation to the United States. Internal consistency reliability was good in the present sample ($\alpha = .94$). The Duke University Religion Index (DUREL; Koenig et al., 1997) was used to assess three dimensions of religiosity (organizational, non-organizational, and intrinsic religiosity). Organizational and non-organizational religiosity are measured with one question each, which is rated on a 6-point scale ranging from never (1) to several times a week (6). Intrinsic religiosity is measured by summing the answers to three questions, which are each rated on a 5-point scale ranging from definitely not true (1) to definitely true (5). Internal consistency reliability for the intrinsic religiosity subscale in the present sample was good ($\alpha = .89$).

Health beliefs. The health belief variables examined were cultural health attributions, cancer fatalism, optimism, and pessimism.

MHLC scales. The MHLC scales, described above, are four orthogonal scales measuring internal, chance, powerful others, and God HLC dimensions (Wallston et al., 1978, 1999). Each scale consists of six statements (e.g. I'm in control of my health) and is rated on a 6-point Likert-type scale ranging from strongly

disagree (1) to strongly agree (6). Scale scores are calculated by summing the six items on that scale, and can range from 6 to 36. Higher scores indicate greater conviction in the type of HLC being assessed. In the present sample, internal consistency reliability was acceptable for the Internal HLC ($\alpha = .72$) and Chance HLC subscales ($\alpha = .70$), marginal for the Powerful Others HLC subscale ($\alpha = .66$), and good for the God HLC subscale ($\alpha = .86$).

Cultural Health Attributions Questionnaire (CHAQ). The CHAQ is a 24-item measure of Latino health beliefs that consists of six vignettes describing positive and negative health experiences, each of which is followed by four possible causes/attributions (Murguía et al., 2000). Two of these reflect equity attributions and two reflect behavioral–environmental attributions. The statements are rated on a 5-point scale ranging from no effect (1) to great effect (5). Subscales are computed by averaging individual items, and can range from 1 to 5. Internal consistency reliability was good for the equity attributions subscale ($\alpha = .85$) and acceptable for the behavioral–environmental attributions subscale ($\alpha = .73$).

Powe Fatalism Inventory (PFI). The PFI is a 15-item instrument used to measure beliefs associated with cancer fatalism (Powe, 1995). Response options for each item are “yes,” “no,” or “don't know.” Total scores are generated by summing the number of “yes” responses provided. Internal consistency reliability was good for the present sample ($\alpha = .80$).

Revised Life Orientation Test (LOT-R). The LOT-R consists of 10 items, 3 of which measure optimism, 3 of which measure pessimism, and 4 of which are filler items. Responses range from strongly disagree (1) to strongly agree (5) (Herzberg et al., 2006). Internal consistencies for the very brief three-item optimism ($\alpha = .64$) and pessimism ($\alpha = .53$) scales were marginal.

Health behavior variables. Health behavior variables were assessed by self-report questions

from the Centers for Disease Control Behavioral Risk Factor Surveillance Survey (Centers for Disease Control and Prevention, 2005). The health behavior variables examined were tobacco and alcohol consumption, and compliance with National Cancer Institute and American Cancer Society colorectal cancer (CRC) screening guidelines.

Physical and mental health outcomes. The variables examined were anxiety, depression, and general physical health status.

GAD-7. The GAD-7 is a seven-item self-report measure of anxiety symptoms over the prior 2 weeks (Spitzer et al., 2006). Response options are “not at all,” “several days,” “more than half the days,” and “nearly every day,” scored 0, 1, 2, and 3, respectively. Total scores can range from 0 to 21, with higher scores indicating more severe anxiety symptoms. Internal consistency reliability was strong for the present sample ($\alpha = .93$). The GAD-7 was recently validated for use with English- and Spanish-speaking Hispanic Americans and demonstrated strong psychometric properties (Mills et al., 2014a).

Patient Health Questionnaire-9 (PHQ-9). The PHQ-9 is a nine-item self-report measure of depressive symptoms over the prior 2 weeks (Kroenke et al., 2001). Each of the nine Diagnostic and Statistical Manual of Mental Disorders-IV-TR (American Psychiatric Association (APA), 2000) criteria for major depression are rated from 0 to 3, reflecting frequencies of “not at all” to “nearly every day,” respectively. Responses are summed to calculate a total score that can range from 0 to 27. Higher scores indicate more severe depressive symptoms. Internal consistency reliability was strong for the present sample ($\alpha = .90$). The PHQ-9 has been validated for use with English- and Spanish-speaking Hispanic Americans and has demonstrated strong psychometric properties (Merz et al., 2011).

Health-Related Quality of Life-4 (HRQOL-4). The HRQOL-4 is a four-item measure of self-

reported overall health used in the Behavioral Risk Factor Surveillance System questionnaire (Centers for Disease Control and Prevention, 2005). The first question of the measure (i.e. “Would you say that in general your health is (a) excellent, (b) very good, (c) good, (d) fair, or (e) poor?”) was used in this study. Higher scores indicate worse overall health.

Procedure

Participants were recruited through flyer distribution, community outreach, and word of mouth. After providing written informed consent, each participant completed questionnaires in his or her preferred language of English or Spanish. Upon completion of the survey, each participant was given US\$75 as a token of appreciation for time and effort.

Analytic plan

LPA was conducted using MPlus 6.1 (Muthén and Muthén, 1998–2012) to derive categorical latent variables that represent profiles of individuals who score similarly on the four MHLC scales (Wallston et al., 1978). In LPA, the probability that an individual is properly classified into the best-fitting group is estimated simultaneously within the overall model (Hill et al., 2006). Models are estimated with classes added iteratively to determine which model is the best fit to the data.

For the present analysis, each iterative model was evaluated using the Akaike Information Criterion (AIC; Akaike, 1974), sample size-adjusted Bayesian Information Criterion (sBIC; Schwarz, 1978), the Bootstrapped Likelihood Ratio Test (BLRT; Arminger et al., 1999; McLachlan and Peel, 2000), and Entropy (Ramaswamy et al., 1993). The AIC and sBIC are descriptive fit indices wherein smaller values indicate superior fit. The BLRT compares the fit of a target model (e.g. a 2-profile model) to a comparison model with one fewer profile (e.g. a 1-profile model). The p value generated for the BLRT indicates whether the solution with more profiles ($p < .05$) or fewer profiles ($p > .05$) fits the data better. Entropy

demonstrates the percentage of individuals in the sample who are classified correctly given the specific model. In addition to these indices, each model was evaluated on interpretability.

After the best-fitting model was determined, analyses of variance (ANOVAs) were conducted to identify differences among profile groups on sociocultural and demographic characteristics, health beliefs and behaviors, and physical and mental health outcomes. Post hoc comparisons were conducted using Tukey's Honestly Significant Difference test. Cohen's *ds* were used to examine pairwise standardized differences across profile groups for all statistically significant variables. Of note, only participants aged 50 years and above were included in the CRC screening analysis. The full sample was used in all other analyses.

Results

Participant characteristics

Of the 436 participants, 50.2 percent were women, with a mean age of 42.5 years. Approximately half (48.2%) completed questionnaires in English, with the other half (51.8%) in Spanish. Complete descriptive statistics for sociocultural and demographic variables are reported in Table 1.

HLC profiles

Models containing one, two, three, four, and five profiles were fit to the data. The model fit indices for each LPA are presented in Table 2. All indicators of model fit suggested that the two-profile solution fit better than the one-profile solution, that the three-profile solution fit better than the two-profile solution, and that the four-profile solution fit better than the three-profile solution. Although all indicators of model fit suggested that the five-profile solution was superior to the four-profile solution, the fifth class comprised only 1.6 percent of the sample, suggesting that it was a spurious group. Therefore, the four-profile solution was considered the best fit to the data. No models with additional profiles were explored

because the five-profile solution contained a class with less than 5 percent of the sample, which commonly occurs when too many profiles have been extracted (Hipp and Bauer, 2006; Roesch et al., 2010).

The overall sample means and conditional response means used to substantively interpret the four-profile model are presented in Table 3. Profile 1 comprised 25 percent of the sample ($n=111$), Profile 2 comprised 19 percent of the sample ($n=85$), Profile 3 comprised 50 percent of the sample ($n=218$), and Profile 4 comprised 5 percent of the sample ($n=22$). Based on relative MHLC scale scores, profiles were labeled: *Internally Oriented-Moderate* (Profile 1), *Internally Oriented-Weak* (Profile 2), *Internally Oriented-Strong* (Profile 3), or *Externally Oriented* (Profile 4). For all profiles, scores on the Internal subscale were higher than scores on the Chance, Powerful Others, and God HLC subscales. The *Internally Oriented-Strong* profile represents individuals for whom scores on the Chance, Powerful Others, and God HLC subscales were notably lower than the overall sample means for those subscales. The *Internally Oriented-Moderate* profile represents individuals for whom scores across Chance, Powerful Others, and God HLC subscales were relatively similar to the overall sample means. The *Internally Oriented-Weak* profile represents individuals for whom scores on the Chance, Powerful Others, and God HLC subscales were marginally higher than the overall sample means for those subscales. The *Externally Oriented* group represents individuals for whom scores on the Chance, Powerful Others, and God HLC subscales were notably higher than the overall sample means for those subscales.

Comparisons of profiles on sociocultural and demographic characteristics, health beliefs and behaviors, and physical and mental health outcomes

Results of the ANOVAs are presented in Table 4. For sociocultural and demographic characteristics, significant differences were found

Table 1. Participant characteristics.

| Variable | Value |
|--|-------------|
| Language (n, %) | |
| English | 210, 48.2 |
| Spanish | 226, 51.8 |
| Gender (n, %) | |
| Male | 217, 49.8 |
| Female | 219, 50.2 |
| Marital status (n, %) | |
| Married | 211, 48.4 |
| Divorced, separated, or widowed | 71, 16.3 |
| Living with a partner | 29, 6.7 |
| Never married | 124, 28.4 |
| Don't know/missing | 1, 0.2 |
| Education (n, %) | |
| Less than high school | 121, 27.8 |
| High school diploma | 52, 11.9 |
| Trade or vocational school degree, some college, or associate's degree | 157, 36.0 |
| Bachelor's degree or higher | 99, 22.7 |
| Don't know/missing | 11, 2.5 |
| Income (n, %) | |
| Less than US\$15,000 | 114, 26.2 |
| Less than US\$35,000 | 119, 27.3 |
| Less than US\$75,000 | 120, 27.5 |
| US\$75,000 or more | 43, 9.9 |
| Don't know/missing | 40, 9.2 |
| Religious affiliation (n, %) | |
| Catholic | 301, 69.0 |
| Christian, non-Catholic | 74, 17.0 |
| Other | 56, 12.8 |
| Don't know/missing | 5, 1.2 |
| Hispanic background (n, %) | |
| Mexican/Mexican American | 368, 84.4 |
| Other | 59, 13.5 |
| Don't know/missing | 9, 2.1 |
| Religiosity (M, SD) | |
| Organizational | 3.47, 1.52 |
| Non-organizational | 2.94, 1.78 |
| Intrinsic | 11.74, 3.43 |
| Age (M, SD) | 42.5, 14.1 |
| Acculturation (M, SD) | 10.98, 4.89 |

M: mean; SD: standard deviation.

among profiles for age, organizational religiosity, non-organizational religiosity, and intrinsic

religiosity. Post hoc comparisons revealed that the *Internally Oriented-Strong* group was significantly younger than the *Externally Oriented* group ($d=-.55$). With regard to religiosity, the *Internally Oriented-Strong* group had significantly lower organizational religiosity than the *Internally Oriented-Moderate* ($d=-.40$), *Internally Oriented-Weak* ($d=-.58$), and *Externally Oriented* ($d=-.89$) groups. Similarly, the *Internally Oriented-Strong* group had significantly lower intrinsic religiosity than the *Internally Oriented-Moderate* group ($d=-1.48$), the *Internally Oriented-Weak* group ($d=-.71$), and the *Externally Oriented* group ($d=-.95$). The *Internally Oriented-Strong* group also had significantly lower non-organizational religiosity than the *Internally Oriented-Moderate* ($d=-.33$) and *Externally Oriented* ($d=-.86$) groups.

For health beliefs, significant mean differences were found for cancer fatalism, equity health attributions, and optimism. Specifically, the *Internally Oriented-Strong* group had significantly lower cancer fatalism than the *Internally Oriented-Moderate* ($d=-.40$), *Internally Oriented-Weak* ($d=-.64$), and *Externally Oriented* ($d=-.85$) groups. With regard to equity health attributions, the *Internally Oriented-Moderate* group had significantly higher scores than the *Internally Oriented-Strong* group ($d=.83$) and lower scores than the *Internally Oriented-Weak* ($d=-.40$) and *Externally Oriented* ($d=-1.45$) groups. Furthermore, the *Internally Oriented-Weak* group had significantly higher scores than the *Internally Oriented-Strong* group ($d=.66$) and lower scores relative to the *Externally Oriented* group ($d=-.94$). The *Internally Oriented-Strong* group had significantly lower scores than the *Externally Oriented* group ($d=-2.32$). Finally, with regard to optimism, the *Internally Oriented-Moderate* group had significantly lower scores than the *Internally Oriented-Weak* group ($d=-.47$).

For health behaviors, significant differences among profile groups were only found for alcohol consumption, and not for CRC screening or tobacco consumption. However, despite the

Table 2. Model fit indices.

| Solution | AIC | sBIC | BLRT p value | Entropy |
|-----------|------------|------------|----------------|---------|
| 1 profile | 10,969.416 | 10,976.650 | – | – |
| 2 profile | 10,831.565 | 10,843.319 | < .001 | .743 |
| 3 profile | 10,763.488 | 10,779.763 | < .001 | .854 |
| 4 profile | 10,720.252 | 10,741.048 | < .001 | .865 |
| 5 profile | 10,696.733 | 10,722.050 | < .001 | .879 |

AIC: Akaike Information Criterion; sBIC: Sample size-adjusted Bayesian Information Criterion; BLRT: Bootstrapped Likelihood Ratio Test.

Table 3. Overall sample means (SE) and profile conditional response means (SE).

| | N | Internal | Chance | Powerful Others | God |
|------------------------------|-----|--------------|--------------|-----------------|--------------|
| Overall sample | 436 | 26.38 (0.27) | 15.82 (0.30) | 21.41 (0.29) | 14.27 (0.37) |
| 4-profile solution | | | | | |
| Internally Oriented-Moderate | 111 | 26.41 (0.54) | 16.47 (0.54) | 21.97 (0.54) | 16.54 (0.59) |
| Internally Oriented-Weak | 85 | 25.95 (0.72) | 19.48 (0.82) | 22.17 (0.75) | 23.18 (0.58) |
| Internally Oriented-Strong | 218 | 26.40 (0.41) | 13.36 (0.38) | 20.53 (0.43) | 7.82 (0.21) |
| Externally Oriented | 22 | 27.56 (1.47) | 21.86 (1.82) | 24.09 (1.69) | 32.03 (0.77) |

SE: standard error.

overall main effect, post hoc analysis revealed no statistically significant pairwise mean differences in alcohol consumption. For mental and physical health outcomes, there were no significant differences among profile groups. Groups did not differ on anxiety, depression, or general physical health status.

Discussion

The primary goals of this study were (1) to identify HLC profiles in Hispanic Americans using LPA, and (2) to compare the profile groups on sociodemographic characteristics and health beliefs, behaviors, and status. A four-profile solution was supported in the present analysis. The four HLC profiles showed fairly consistent values on Internal HLC, but varied on the other three dimensions, which have been traditionally conceptualized as representing more external attributions of control. Interestingly, in every group, if one external dimension was relatively low, the other two dimensions were similarly low. The consistency among Chance, Powerful Others, and God HLC values in the profiles

derived provides support for the interpretation of God HLC as an external form of HLC.

Previous cluster analyses have found “pure” configurations such as “pure chance” and “pure internal” (Buckelew et al., 1990; Jenkins and Patterson, 1998; Raja et al., 1994; Rock et al., 1987; Wiegmann and Berven, 1998; Yeoum, 1997); the present analysis did not uncover a truly “pure” typology, although the *Internally Oriented-Strong* group had an Internal HLC value close to the overall mean and relatively lower values on the other subscales. The lack of a clearly “pure” profile suggests that Hispanic Americans perceive their health to be controlled by multiple sources simultaneously, albeit at different levels.

With regard to sociodemographic variables, significant differences ($p < .05$) among HLC profiles were found for age and all three religiosity dimensions. For health belief variables, differences were found among HLC profiles for cancer fatalism, equity attributions, and optimism. The differences between the *Internally Oriented-Strong* and *Externally Oriented* groups were most notable. Previous research

Table 4. Comparison of HLC profiles on demographic, health status, health belief, and health behavior variables (N=436).

| Outcome | df | F | pη ² | M (SD) | | | |
|-------------------------|--------|-------------------|-----------------|------------------------------|----------------------------|-----------------------------|----------------------------|
| | | | | Internally Oriented-Moderate | Internally Oriented-Weak | Internally Oriented-Strong | Externally Oriented |
| Gender | 3, 432 | 0.17 | < .01 | 0.49 (0.50) | 0.48 (0.50) | 0.51 (0.50) | 0.55 (0.51) |
| Age | 3, 431 | 2.62 [†] | .02 | 42.29 (14.30) | 43.48 (13.76) | 41.47 (13.62) _a | 49.95 (16.88) _a |
| Income | 3, 423 | 2.07 | .01 | 6.30 (7.42) | 5.77 (7.24) | 6.59 (7.38) | 10.32 (12.82) |
| Education | 3, 428 | 1.26 | .01 | 6.29 (2.26) | 6.01 (3.74) | 6.73 (2.97) | 6.09 (6.41) |
| Acculturation | 3, 418 | 1.11 | .01 | 11.68 (4.92) | 10.88 (5.21) | 10.71 (4.71) | 10.30 (5.13) |
| Org religiosity | 3, 429 | 11.18* | .07 | 3.68 (1.42) _a | 3.94 (1.45) _b | 3.09 (1.50) _{abc} | 4.36 (1.36) _c |
| Nonorg religiosity | 3, 430 | 6.50* | .04 | 3.22 (1.77) _a | 3.07 (1.74) | 2.63 (1.74) _{ab} | 4.09 (1.63) _b |
| Intrinsic religiosity | 3, 429 | 18.32* | .11 | 12.52 (2.56) _a | 12.91 (2.37) _b | 10.62 (3.92) _{abc} | 14.14 (1.32) _c |
| Cancer fatalism | 3, 407 | 12.48* | .08 | 4.70 (3.09) _a | 5.46 (3.31) _b | 3.53 (2.67) _{abc} | 6.33 (3.85) _c |
| Equity attributions | 3, 387 | 55.21* | .30 | 2.09 (0.68) _{abc} | 2.40 (0.84) _{ade} | 1.59 (0.53) _{bdf} | 3.18 (0.81) _{cef} |
| Beh-Env attributions | 3, 390 | 1.14 | .01 | 4.12 (0.61) | 4.14 (0.58) | 4.16 (0.57) | 4.40 (0.50) |
| Optimism | 3, 408 | 3.52* | .03 | 8.77 (1.96) _a | 9.70 (1.96) _a | 9.18 (2.02) | 8.81 (1.64) |
| Pessimism | 3, 413 | 1.66 | .01 | 6.34 (1.78) | 6.44 (1.93) | 5.97 (2.04) | 5.88 (2.00) |
| Tobacco consumption | 3, 429 | 1.13 | .01 | 1.34 (0.67) | 1.26 (0.58) | 1.28 (0.55) | 1.50 (0.80) |
| Alcohol consumption | 3, 426 | 3.38* | .02 | 2.98 (3.26) | 2.65 (3.88) | 3.81 (4.49) | 1.57 (2.89) |
| CRC screening (n = 138) | 3, 134 | 0.15 | < .01 | 0.71 (0.46) | 0.69 (0.47) | 0.71 (0.46) | 0.80 (0.42) |
| Depression | 3, 417 | 1.05 | .01 | 4.85 (4.77) | 4.60 (4.58) | 4.46 (5.61) | 6.50 (6.17) |
| Anxiety | 3, 422 | 0.77 | .01 | 5.16 (5.36) | 5.06 (5.35) | 4.66 (5.12) | 6.32 (6.29) |
| Physical health status | 3, 430 | 2.19 | .02 | 2.86 (0.95) | 2.88 (0.93) | 2.66 (0.99) | 3.05 (1.00) |

Within each row, means with the same subscript are significantly different from one another. Post hoc comparisons were conducted using Tukey's Honestly Significant Difference test.

M: mean; SD: standard deviation; df: degrees of freedom; pη²: partial eta-squared from omnibus ANOVA; Org Religiosity: organizational religiosity; Nonorg Religiosity: non-organizational religiosity; Beh-Env Attributions: behavioral–environmental attributions; CRC Screening: colorectal cancer screening; ANOVA: analysis of variance.

*p < .05; †p < .06.

has shown that cancer fatalism is positively associated with God HLC and Chance HLC (Roncancio et al., 2011). Therefore, it is not surprising that the *Internally Oriented-Strong* group demonstrated the lowest levels of cancer fatalism. Conversely, the *Externally Oriented* group made more equity health attributions than the other groups. Prior research has demonstrated that Chance HLC is positively correlated with equity health attributions (Fox et al., 2014; Murguía et al., 2000). Individuals who attribute their health to external sources may believe their health is controlled by factors such as justice, retribution, or luck.

With regard to health behavior variables, only alcohol consumption showed a significant

difference among the belief profiles. However, post hoc analysis demonstrated no statistically significant pairwise differences in alcohol consumption between sets of profiles. Because the profiles identified in the present LPA were conceptualized as independent of one another, no complex contrasts were evaluated. Finally, no significant differences were found across profiles for the health status variables (i.e. depression, anxiety, physical health status). This may be a result of the study's middle-aged, volunteer, community-based sample. Research examining HLC profiles in clinical samples, with a wider range of physical and mental health concerns, may demonstrate stronger relationships between profiles and outcomes.

This study should be interpreted within the context of relevant limitations. Participants were predominantly Mexican American, limiting the generalizability of the findings. However, nearly two-thirds of Hispanics living in the United States report being of Mexican descent, diminishing concerns related to this limitation (Lopez et al., 2013). In addition, because this was a cross-sectional study, causal relationships cannot be determined. Furthermore, internal consistency reliability on the Powerful Others HLC subscale was marginal.

Despite these limitations, the present findings provide support for the use of LPA in deriving HLC typologies. Further research using LPA can help to identify HLC profiles in other Hispanic American samples, including clinical samples, as well as in samples representing other ethnicities and cultures. Then, research can examine how such profiles may relate to other health-related behaviors and outcomes. Identifying HLC profiles that relate to health beliefs, practices, and outcomes could prove important to prevention and intervention efforts, as HLC beliefs represent a potentially modifiable cognitive variable.

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