The Multidimensional Health Locus of Control Scales: Testing the Factorial Structure in Sample of African American Medical Patients

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Objective: A fifth subscale was recently added to the widely used multidimensional health locus of control (MHLC) measure, and little is known about the factor structure of the MHLC with the new scale among African Americans from disadvantaged backgrounds. Also, few studies have examined differences in Health Locus of Control (HLOC) beliefs across medical patients from similar demographic backgrounds.

Methods: We asked participants to complete a survey about HLOC beliefs and extracted biological markers from their medical charts. Participants were drawn from patients of internal medicine and infectious disease clinics at a charity hospital in Baton Rouge, Louisiana. In total, we surveyed 186 African American patients who were diagnosed with HIV/AIDS or type 2 diabetes.

Results: Confirmatory factor analysis could not confirm a 5-factor structure; however, a new 3-factor structure was produced that includes 1) internal health beliefs, 2) external health beliefs, and 3) God health beliefs. Patients with HIV/AIDS reported more external and God HLOC beliefs than did patients with type 2 diabetes.

Conclusions: The factor structures that emerged from previous research may not be appropriate to use when conducting research with individuals from a low SES who are also from an ethnic/racial minority background. Our findings suggest a new 3-factor structure for the MHLC. Future research should examine whether patients with HIV/AIDS may benefit from interventions that target external beliefs to improve health behavior. (*Ethn Dis*. 2009;19:192–198)

Key Words: Health Locus of Control, Diabetes, HIV/AIDS, African American, Low Income

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Introduction

Health locus of control (HLOC) can be defined as a person's beliefs regarding whether internal or outside forces have control over their health.[1] People may believe they have the most control over their disease or that other people, healthcare providers, or chance/fate plays more of a role in predicting medical outcomes. The multidimensional HLOC (MHLC) scale, which measures 4 types of HLOC, including internal, chance/fate, other people, and doctors,[2] recently added an additional scale to measure God HLOC (the extent that a person believes that God exerts control over a specific disease).[3] God HLOC beliefs should be investigated because research suggests that 94% of US adults believe in God, 90% pray to God, and most participate in religious practices.[4] Moreover, reviews have highlighted the importance of religion and spirituality in health and healing,[5] and this association may be especially important to consider in ethnically diverse populations.[6]

Ethnicity/Race and HLOC Beliefs

The God subscale of the MHLC is an independent, fifth factor and has good reliability among populations of predominantly White patients with rheumatoid arthritis and systematic sclerosis.[3] In light of the increased reliance on spirituality and religion that is commonly found in lower–socioeconomic status (SES) communities, particularly minority communities, the God HLOC scale may be a useful tool for examining religious health beliefs and their effect on health behaviors among these people. However, further evaluation of the psychometric properties of the God HLOC scale in a low-SES minority population are needed before it is appropriate for use in such communities.[7,8] Despite recommendations of greater cultural sensitivity in the use of the MHLC scales,[9] few studies have examined HLOC beliefs among ethnic minorities,[10] even though chronic illness is more prevalent, disease complications are more frequent, and adherence to medication regimens can be problematic among individuals who are of low SES and from an ethnic minority background.[11,12] Too often, researchers use measurement scales to conduct research in populations from different demographic backgrounds, with the assumption that factor structure, validity, and norms for the scales will not differ across groups. However, psychometric properties may differ for a number of scales, depending on the demographics of the target population. In a study that examined the factorial validity of the original MHLC scales in a sample of healthy, ethnically diverse college students,[10] factor analysis supported a 3-factor solution across groups with a

Despite recommendations of greater cultural sensitivity in the use of the MHLC scales,[9] few studies have examined health locus of control beliefs among ethnic minorities[10]…

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smaller number of items from each scale. Although provocative, the ethnic groups represented in this study were White American, Filipino American, and Latino American. The results of this study cannot be extrapolated to the large number of individuals who are of African American background, who are ill, and who are living in the United States without few resources.

Medical Condition and HLOC Beliefs

Contextual variables may play a role in HLOC beliefs; illness itself is a contextual variable that may affect HLOC beliefs.[13] Within disease types, severity of illness and response to treatment can alter HLOC beliefs and their interaction with psychological outcomes.[14] Control beliefs, then, may differ between illnesses. To date, few if any studies have examined God HLOC beliefs in patients with HIV/AIDS or type 2 diabetes by using the MHLC scales. Given the finding that African American individuals are disproportionately afflicted by type 2 diabetes and HIV/AIDS, [15,16]often report high levels of religiosity and spirituality,[17] and the finding that religious beliefs can be inversely related to following medical provider recommendations,[18,19] the investigation of HLOC beliefs in African American medical patients is highly relevant.

The purpose of this study was to test the factorial structure of the MHLC scales, including the new God MHLC scale, in a sample of African American patients who are of low SES. The second aim of this study was to compare HLOC beliefs across 2 samples of patients with different chronic diseases who have similar demographic backgrounds.

METHODS

Participants

All participants identified themselves as African American and were attending a charity hospital in southern Louisiana. Patients who receive care from this hospital are predominantly indigent (51%), receiving Medicaid (24%) or Medicare benefits (13%), or are self-pay or prisoners (12%).

The inclusion criteria for patients with type 2 diabetes were a physician diagnosis of type 2 diabetes for at least 1 year, taking prescribed medication to treat diabetes, and being aged ≥18 years. We enrolled 82 African American patients with type 2 diabetes; of these, 18% were men and 82% were women, the average age was 53.0 years(standard deviation [SD] 11.2 years), and average education was 11.5 years (SD 2.2 years). Patients were single (32%), married (31%), separated or divorced (22%), or widowed (15%). The average time since diagnosis was 101.9 months (SD 91.9 months). Mean hemoglobin (Hb) A1C level was 8.6% (SD 2.4 percentage points), and reported levels ranged from 5.0%–15.1%.

Inclusion criteria for the HIV/AIDS sample included physician diagnosis of HIV and age ≥18 years. We enrolled 107 patients with HIV/AIDS in this study. Participants were 50% male and 50% female, were middle aged (mean age 37.6 years), had on average a high school education (mean 12.1 years, SD=1.9 years), and most were unemployed (67%); 62% were single, 18% were married, 14% were divorced, and 6% were separated. Most participants (70%) were taking HIV antiretroviral medications. The average length of HIV diagnosis was 68.9 months (SD 47.1 months). Most participants (54%) had HIV viral loads <5000 copies/mL, although 18% had counts 5001–50,000 copies/mL, and 28% had counts >50,000 copies/mL. Sixteen percent of participants had T-cell counts <100/μL, 18% had 101–250/μL, 36% had 251–500/μL, and 30% had ≥501/μL.

Measures

The Oral Comprehension section of the Woodcock-Johnson III Test of Achievement[20] was used to determine if participants' comprehension abilities were adequate to understand the measures used in the present study. Demographic questionnaires were administered to obtain age, sex, race, education, marital status, employment, time since diagnosis of HIV or diabetes, and medication status. Disease-specific information was obtained through chart review, including type of diabetes and HbA1C levels or CD4 count and viral load.

The MHLC form C^2 consists of 18 items and measures beliefs that the patient controls his or her own health. Responses are based on a 6-point Likert scale, and answers range from 1 (strongly disagree) to 6 (strongly agree). The *internal*, *chance*, and *God* subscales consist of 6 items each, and scores range from 6 to 36. The *other people* and *doctor* subscales consist of 3 items, and scores range from 3 to 18. Higher scores indicate stronger belief in the specific HLOC. The subscales have demonstrated adequate level of internal consistency (Cronbach α) coefficients ranging from .70 to .87 (internal=.87, chance=.82, other people=.70, doctor=.71). Research with the MHLC scales has also demonstrated an adequate test-retest reliability estimate (r=.80) and good concurrent validity evidence with other measures of HLOC (r=.59).[2] Internal consistency for the additional God subscale ranged from .87 to .94.

Procedure

This study was approved by the institutional review board at Louisiana State University Medical School and Earl K. Long Hospital in Baton Rouge, Louisiana. The primary investigator and 4 research assistants recruited participants from internal medicine, family practice, and HIV clinics at a charity hospital. During scheduled data collection days, all patients who entered the waiting room of the clinics were approached. If the patient agreed to participate, he was asked to provide informed consent, including consent for review of medical charts. After consent

was given, participants were then briefly interviewed, and the oral comprehension portion of the Woodcock-Johnson III was administered. Patients who did not pass the comprehension test (n=5) were not included in the study but were debriefed and compensated for their time. Participants were compensated (money or a snack) on completion, and medical charts were reviewed for confirmation of medical diagnoses and treatment regimen and either date of last HbA1C test and most recent HbA1C levels or CD4 counts and viral load levels.

RESULTS

Data from 186 African American patients were used to estimate reliability and construct validity for the MHLC scales. Although data existed for 189 participants, 1 respondent showed invariant answers to all questions, and 2 respondents did not answer a question and were excluded from the main analysis, reducing the final sample size to 186.

Data were screened for irregularities. The normality of the distributions of each item was examined because the confirmatory factor analysis is vulnerable to the violation of the normality assumption. As a result, most items showed moderate to severe skew. Therefore, the exploratory and confirmatory factor analyses were conducted by using maximum likelihood estimation with adjusted standard errors, which is robust to non-normality.

Construct Validity

A confirmatory factor analysis with maximum likelihood estimation with adjusted standard errors using Mplus (version 4.1, Muthén & Muthén, Los Angeles, California) was performed with the 24-item MHLC scales to examine if the original factor structure of MHLC was applicable to the data. As a result, the original 5-factor model did not show a good fit to the data (Satorra-Bentler χ^2 (246, N=186)=402.39, P<.001; CFI=.84; TLI=.82; RMSEA=.06; SRMR=.08) .[21] The poor fit of the original model indicated that the original model may not have been appropriate for our sample. Another possibility is that the poor fit was caused by the relatively small sample size.

To examine the factor structure in the sample further, an exploratory factor analysis was performed by using maximum likelihood estimation with adjusted standard errors with oblique rotation (Promax). The 5-factor model could not be estimated because there was no convergence. The results of the exploratory analysis with different numbers of factors and Satorra-Bentler χ^2 difference test[22] results are presented in Table 1. The 4-factor model seemed to fit the data best. However, when the content of the items was examined, the factor loadings of the 4-factor model (Table 2-1) were not very different from the loadings of the 3-factor model (Table 2-2). The only difference between the 2 models was that the fourth factor includes only part of the items in the first factor in the 3-factor model. Considering the content of the items and the similarities of the factor structures, the more parsimonious 3-factor model seems to be the most reasonable model. The first factor includes *doctor* and *internal* items in the original scale, the second factor includes *God* items in the original, and the third factor includes *chance* and *other people* scale items. As in the previous confirmatory factor analysis, the results of the exploratory factor analysis also showed that the original 5-factor model is not appropriate for the current data.

Table 1. Comparison of exploratory factor analysis results

Model	S-B χ^2	*df*	S-B scaled $\Delta\chi^2$	Δdf	RMSEA
1. Factor 1	679.05	252			.095
2. Factor 2	471.21	229	175.30**	23	.075
3. Factor 3	274.17	207	163.74**	22	.042
4. Factor 4	227.79	186	44.17**	21	.035

Because both confirmatory and exploratory factor analysis showed inadequate fit of the original factor structure, the mean subscale scores were calculated based on the factor analysis results. Items in *doctor* and *internal* factors and items in *chance* and *other people* factors were combined. Pearson product moment correlations were calculated with the newly created 3-subscale scores of HLOC to examine the relationships among the scale dimensions. The *God* HLOC subscale was significantly correlated with *chance* plus *others* (r=.41) (Table 3). For each of the HLOC scales, higher scores indicated more belief that diabetes or HIV is controlled by said subscale. For example, higher scores for the *God* subscale indicated that patients strongly believed that God controls their medical condition.

Reliability Estimate

Reliability estimates were calculated for each of the 3 subscales. Adequate to good Cronbach α's were demonstrated for *doctor* plus *internal* (α=.72), *chance* plus *others* (α=.74), and *God* (α=.83) HLOC subscales.

Medical Condition Differences

We used χ^2 and independent groups t tests to test demographic differences between the 2 groups. We found more women in the diabetes group, 15 male and 59 female patients, whereas more men were in the HIV/AIDS group, 66 male and 49 female patients, $\chi^2(1)$=25.90, P<.001. The HIV/AIDS sample consisted of younger participants than the diabetes group and

Table 2-1. Factor Loadings from Exploratory Factor Analysis on MHLC Scale

MHLC Factor	Item	I	II	III	IV
Internal	1. If my health worsens, it is my own behavior, which determines how soon I feel better again.	**.33**	−.19	.07	0.18
	5. I am directly responsible for my health getting better or worse.	**.44**	−.02	−.09	0.36
	6. Whatever goes wrong with my health is my own fault.	.20	−.15	.15	**0.65**
	7. The main thing that affects my health is what I do myself.	.38	.06	−.03	**0.56**
	14. If my health gets worse, it is because I have not been taking proper care for myself.	.10	.13	−.18	**0.7**
	20. I deserve credit when my health improves and the blame when my health gets worse.	−.09	.05	.09	**0.45**
Chance	3. Most things that affect my health happen to me by chance.	.02	.10	**.42**	0.11
	9. Luck plays a big part in determining how my health improves.	−.42	−.09	**.49**	0.15
	13. If my health gets worse it is a matter of fate.	−.11	.21	**.44**	−0.07
	15. Whatever improvement occurs with my health is largely a matter of good fortune	−.09	−.07	**.70**	0.06
	17. If I am lucky, my health will get better.	.02	.05	**.56**	−0.02
	18. As to my health, what will be, will be.	.10	−.11	**.82**	−0.08
Doctor	4. If I see my doctor regularly, I am less likely to have problems with my health.	**.46**	.09	.06	0.04
	11. Following my doctor's orders is the best way to keep my health from getting worse.	**.50**	−.10	.16	0.01
	21. Whenever my health gets worse, I should consult my doctor.	**.25**	.23	−.10	0.2
Powerful Others	12. In order for my health to improve, it is up to other people to see that the right things happen.	.03	−.02	**.55**	−0.08
	19. The type of help I receive from other people determines how soon my health improves.	.03	.05	**.38**	0.14
	23. Other people play a big role in whether my health improves, stays the same, or gets worse.	.10	.11	**.40**	−0.07
God	2. If my health worsens, God determines whether I feel better again.	.26	**.38**	.22	−0.15
	8. Most things that affect my health happen because of God.	−.17	**.34**	.00	0.02
	10. God is responsible for my health getting better or worse.	−.01	**.63**	.05	−0.01
	16. Whatever happens to my health is God's will.	−.05	**.69**	.05	−0.05
	22. Whether or not my health improves is up to God.	−.00	**.85**	.02	0.03
	24. God is in control of my health.	.04	**.94**	−.11	0.05

Note. Values in bold indicates the highest factor loading. Results are based on Maximum Likelihood with Adjusted Standard Errors and Promax rotation.

shorter time (in months) since diagnosis than the diabetes group.

Multivariate analysis of covariance (MANCOVA) was performed with the two medical conditions as an independent variable and the 3 MHLC scale scores as dependent variables. In addition, sex, age and time since diagnosis were included as covariates. MANCOVA resulted in the significant effect of the medical condition variable (Wilks Λ=.900, F=6.59, P<.001, η^2=.10). More specifically, patients with HIV/AIDS had higher ratings of *chance* plus *other*, t(184)=3.78, P<.001, and *God*, t(184)=4.25, P<.001, subscales than did people with type 2 diabetes, whereas they did not show such differences on the *internal* plus *doctor* scale, t(184)=1.30, P=.20 (Table 4). No covariates explained the significant amount of variance, and effect size estimates were all small (η^2 for sex=.012; η^2 for age=.016; η^2 for time=.03).

DISCUSSION

The Structure of the MHLC Scales

There has been a recent call for further refinement and testing of the MHLC scales in ethnically diverse groups of medical patients.[9,10] We attempted to replicate a 5-factor structure that is the combination of form C of the MHLC scales and the *God* HLOC scale. Confirmatory factor analysis could not replicate the 5-factor structure, which can either be interpreted as a weakness of the MHLC scales or meaningful differences between the present sample and previous samples. Given the plethora of previous studies that have found the MHLC scales to be reliable and valid, the latter hypothesis is more plausible. That is, individuals living in the Southeast United States, who identify themselves as African American and who are of low SES may be different from higher SES White Americans in terms of their health locus of control beliefs.

Subsequent exploratory analyses demonstrated an unexpected 3-factor structure of HLOC beliefs in this sample of medical patients who reported being of low-SES and African Americans (Table 2-2). A 3-factor structure for the MHLC scales is not novel. Similar to the present findings, researchers tested the MHLC scales in an ethnically diverse college sample and also discovered a 3-factor solution,[10] consistent across 3 ethnic groups (White, Filipino, Latino). However, this 3-factor structure is unlike ours in that their items loaded onto *internal*, *chance*, and *powerful others*. Further, Malcarne et al commented, "The crucial difference was that a smaller number of items loaded strongly and consistently on each factor,"[10] which was not consistent with our findings. Finally, they used an older

Table 2-2. Factor Loadings from Exploratory Factor Analysis on MHLC Scale

MHLC Factor	Item	I	II	III
Internal	1. If my health worsens, it is my own behavior, which determines how soon I feel better again.	**.39**	−.16	.01
	5. I am directly responsible for my health getting better or worse.	**.59**	−.08	−.11
	6. Whatever goes wrong with my health is my own fault.	**.69**	−.23	.13
	7. The main thing that affects my health is what I do myself.	**.73**	−.02	−.02
	14. If my health gets worse, it is because I have not been taking proper care for myself.	**.63**	−.07	−.12
	20. I deserve credit when my health improves and the blame when my health gets worse.	**.32**	−.04	.12
Chance	3. Most things that affect my health happen to me by chance.	.12	.18	**.43**
	9. Luck plays a big part in determining how my health improves.	−.11	−.05	**.47**
	13. If my health gets worse it is a matter of fate.	−.11	.31	**.48**
	15. Whatever improvement occurs with my health is largely a matter of good fortune	.04	.08	**.68**
	17. If I am lucky, my health will get better.	.03	.19	**.56**
	18. As to my health, what will be, will be.	.04	.11	**.75**
Doctor	4. If I see my doctor regularly, I am less likely to have problems with my health.	**.32**	.14	.04
	11. Following my doctor's orders is the best way to keep my health from getting worse.	**.33**	.00	.09
	21. Whenever my health gets worse, I should consult my doctor.	**.31**	.18	−.07
Powerful Others	12. In order for my health to improve, it is up to other people to see that the right things happen.	−.01	.13	**.53**
	19. The type of help I receive from other people determines how soon my health improves.	.16	.11	**.39**
	23. Other people play a big role in whether my health improves, stays the same, or gets worse.	.02	.23	**.41**
God	2. If my health worsens, God determines whether I feel better again.	.04	**.48**	.26
	8. Most things that affect my health happen because of God.	−.11	**.31**	.08
	10. God is responsible for my health getting better or worse.	−.04	**.62**	.18
	16. Whatever happens to my health is God's will.	−.10	**.69**	.20
	22. Whether or not my health improves is up to God.	−.01	**.83**	.20
	24. God is in control of my health.	.02	**.89**	.10

Note. Values in bold indicates the highest factor loading. Results are based on Maximum Likelihood with Adjusted Standard Errors and Promax rotation.

version of the MHLC scales and measured *God* HLOC, which again makes it difficult to compare their findings with ours.

The 3 factors found for this study can best be described as: God, internal, and external. The first factor, which we labeled the *God* HLOC factor, appears to have the strongest validity in that its items and loadings are similar to previous findings. Predictably, all 6 items that were originally created for the *God* scale loaded together onto the same factor. However, for the second factor, which we labeled the *internal* factor, a number of the items from the doctor scale loaded onto factor 1 with the bulk of the internal HLOC items. One way to interpret this common loading onto the *internal* factor is that individuals who are African Americans from disadvantaged backgrounds, and who are experiencing chronic medical condition such as diabetes or HIV/AIDS may view *internal* and *doctor* loci of control in a similar manner. Whereas individuals from higher SES levels may have access to more services and information outside their healthcare provider's office (eg, internet access, second opinions, health seminars or support groups that would require transportation), African American individuals living with few resources, like the present sample, may view their own (internal) control of their health problems as directly related to the informa-

Table 3. Intercorrelations between HLOC Scale Scores

Scale	1	2	3
	Patients (N=186)		
1. Internal + Doctor HLOC	(.72)		
2. Chance + Others HLOC	.04	(.74)	
3. God HLOC	−.08	.41*	(.83)

Note. * P<.001. Numbers in the parentheses are Cronbach's alpha coefficients.

Table 4. Means and Standard Deviations for Three Locus of Control Scales for Diabetic and HIV/AIDS Samples

HLOC Scales	Diabetes (n=81)	HIV/AIDS (n=105)	95% CI of Mean Difference
Internal + Doctor	4.62 (.85)	4.46 (.81)	−.08–.40
Chance + Others*	2.52 (.95)	3.04 (.91)	.25–.79
God*	3.21 (1.33)	3.98 (1.14)	.41–1.13

Note. Numbers in the parentheses are standard deviations.
* Statistically significant at P<.001.

tion disseminated by their healthcare providers. In other words, their sense of internal responsibility to take care of their health may be intricately tied to their doctor's responsibility and dissemination of information. If access to information on how to take care of one's health problems is gained only through contact with healthcare providers, this may blur the lines between independent *internal* and *doctor* HLOC beliefs. However, these hypotheses are speculation, and future research needs to be conducted to better understand this finding.

The third factor that was determined from the exploratory analysis was the *external* factor, which consists of a number of the items from the *powerful others* scale loaded onto a common factor with a number of items from the *chance* HLOC scale. The 2 items from the original *powerful others* scale that loaded onto a common factor with the *chance* HLOC items were ''In order for my health to improve, it is up to other people to see that the right things happen'' and ''The type of help I receive from other people determines how soon my health improves.'' One hypothesis to understand this finding is that the African Americans in this study may view assistance from others as unpredictable and up to chance or fate. On the other hand, it could simply be that poor psychometric properties of the *doctor* and *powerful others* scales could account for this finding.

Although the factor loadings for the 3-factor structure are weaker than preferred, our findings suggest that HLOC may be perceived differently among people who are socially disadvantaged, of an African American ethnic background, African American living in the southern United States. The individuals in the present study appeared to conceptualize only 3 types of control over their health, which would include a combination of personal control mixed with expectations of doctor's perceived responsibility, a combination of chance and influence of others on their health, and belief that God is responsible for correcting their medical problems. On the other hand, the findings may not be the result of ethnicity but may be a function of the effect of SES on belief systems. Recently, researchers have found that social status is more important in determining health outcomes or behaviors than is ethnicity.[23] The present study needs to be replicated with an ethnically diverse, low SES, sample in order to answer this question. If the 3-factor structure can be replicated, we may be able to conclude that such a factor structure should be used by researchers working in disadvantaged communities regardless of /ethnic background.

Medical Condition Differences

Compared with patients with type 2 diabetes, individuals living with HIV/AIDS reported greater external locus of control beliefs. Patients with HIV/AIDS endorsed slightly stronger beliefs that God, other people in their lives, and chance affect their disease, compared with patients with diabetes, though both samples were drawn from the same population. We are unsure why these differences were found and at this point can only make speculations. For example, there may be inherent differences between the 2 diseases that could account for the medical condition differences in HLOC beliefs. Although both diseases disproportionately affect African Americans, HIV/AIDS and type 2 diabetes differ in their social stigma.[24] Patients with HIV/AIDS may adopt an *external* HLOC as a form of psychological protection. For example, unlike patients with type 2 diabetes, individuals living with HIV/AIDS may understand that they have a stigmatized disease and that, sadly, society often blames those who contract the disease. Taking this hypothesis one step further, assuming less responsibility for one's health may in turn lessen the pain caused by society's prejudice and discrimination aimed at individuals living with HIV/AIDS.

Another hypothesis has to do with premorbid HLOC beliefs and their potential effect on health behavior. For example, people with HIV/AIDS may have high premorbid *external* HLOC beliefs that may have put them at risk for contracting HIV. If people believe that God, chance, or other people determine whether they will contract HIV, then they may be less likely to take precautions (ie, using condoms or sterile needles) to protect themselves from HIV. Research has suggested that an external HLOC may be related to active substance use,[25] which also may place a person at greater risk for HIV compared with people who do not abuse substances. Finally, although the 2 samples were drawn from a similar low-SES population, the two groups differed in some demographic variables. However, we controlled for time since diagnosis, sex, and age in all of the between-group analyses, which significantly decreases the chance that these variables caused the differences in HLOC beliefs.

Limitations and Implications

There are number of obvious limitations of the present study (eg, small sample size); however, the notable limitation is the large number of potential confounding variables not accounted for in the present findings. Given the demographic differences (eg, race/ethnicity, SES, geographic location, and culture) between the present sample and samples used in previous research, we cannot say with certainty which variables are relevant when comparing our findings to previous findings. Future research should take on more systematic and scientifically rigorous research that could control for confounding variables. For example, a study that compared the factor structure of the MHLC scales in White Americans and African American samples taken from the same region with similar SES

backgrounds would help elucidate ethnicity differences, or lack of differences, in factor structure of the MHLC scales. Similarly, in order to look at SES effects, it may be helpful to compare the factor structure of the MHLC scales in lower- versus higher-SES people from a homogeneous ethnic/racial group.

Future studies are needed before any firm conclusions can be drawn about the 3-factor structure that was discovered during our investigation. The present findings also indicate a need for future research to examine disease differences in HLOC beliefs. As seen in this study, people with HIV/AIDS endorsed more external than internal HLOC beliefs. Healthcare providers may benefit from understanding that people who are living with diverse medical illnesses may have varying HLOC beliefs that can affect health behavior, and perhaps interventions can be implemented to increase internal control beliefs in at-risk populations.

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