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Neighborhood Vigilance, Health Locus of Control, and Smoking Abstinence

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Abstract

Objectives—To examine whether health locus of control mediated relations of self-reported neighborhood vigilance and biochemically verified, continuous short-term smoking abstinence among 200 smokers enrolled in a cohort study.

Methods—A nonparametric bootstrapping procedure was used to assess mediation.

Results—Health locus of control-chance mediated relations between neighborhood vigilance and smoking abstinence in analyses adjusted for sociodemographics and tobacco dependence ($p < .05$).

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Human Subjects Statement
Study procedures were approved by the Institutional Review Board at The University of Texas MD Anderson Cancer Center, and informed consent was obtained from all participants.

Conflict of Interest Statement
Authors have no competing interests pertaining to this research.

Greater vigilance was associated with greater attributions that health was affected by chance, which was associated with a lower likelihood of smoking abstinence.

Conclusions—Results suggest that neighborhood perceptions influence residents' attributions for health outcomes, which can affect smoking abstinence.

Keywords

neighborhood vigilance; neighborhood threat; smoking cessation; locus of control; chance attributions

Recent literature has linked subjective perceptions of the neighborhood context to smoking behaviors. For example, self-reports of neighborhood problems and low ratings of neighborhood safety have been associated with increased smoking prevalence.[1,2] Also, trust among neighbors has been inversely associated with smoking prevalence[3] and the number of cigarettes smoked per day among smokers.[4,5] Similarly, more self-reported neighborhood problems and greater endorsements of the need for vigilance in the neighborhood have been linked to tobacco dependence among smokers.[6] Because these studies controlled for a number of individual- and (in some cases) neighborhood-level sociodemographic variables, they suggest that perceptions of the neighborhood environment may exert a unique influence on smoking behaviors. However, little research has addressed whether neighborhood perceptions affect other smoking-related outcomes, like smoking abstinence during a specific quit attempt, or the mechanisms through which such relations might operate.

Threatening neighborhoods are marked by the presence and/or absence of features that lend to the perception that heightened vigilance is necessary to avoid danger or physical harm.[7] For example, neighborhoods with high crime rates and a lack of police presence might engender high levels of vigilance among residents. Likewise, neighborhoods with substantial physical disorder, such as deserted or dilapidated housing, might also be associated with high vigilance for threat among those living nearby. The structural amplification theory of mistrust posits that high levels of neighborhood threat shape perceptions of powerlessness among residents, amplifying a general sense of mistrust.[8] Powerlessness entails the expectation that one has limited control over life events, which might also extend to the perception of limited control over health behaviors. Thus, one potential mechanism linking threatening neighborhoods (ie, those engendering high levels of vigilance) with smoking abstinence might be health locus of control (HLOC), or the extent to which people believe they can control or affect health-related behaviors and outcomes.

The multidimensional HLOC model specifies 3 causal loci for health outcomes: (1) internal or agent-related causes, (2) external causes determined by powerful others, and (3) external causes determined by chance.[9] People with high internal attributions endorse control over their own health outcomes, whereas those attributing health out-comes to powerful others believe that health care professionals have the greatest influence. Those endorsing high chance attributions believe that health outcomes are based on circumstance or fate. In general, those with higher internal attributions for health outcomes are more likely to engage in healthy behaviors and more successful at making desirable behavior changes, whereas those with higher external attributions are not.[10–14] Thus, it might be that high neighborhood

vigilance leads to lower internal and more external HLOC attributions, which, in turn, might reduce the likelihood of smoking abstinence during a quit attempt.

Although there are no studies examining the relations between neighborhood vigilance and HLOC specifically, there are a few studies that examine the effects of the neighborhood environment on perceived control more generally. These studies have found significant relations between neighborhood disorder and a sense of powerlessness among residents,[15] neighborhood violence and greater external locus of control endorsements,[16] and neighborhood strain and a lower sense of perceived control over various desired outcomes.[7] In addition, research has supported relations between higher internal HLOC endorsements and smoking abstinence, [17] lower chance endorsements and abstinence, [17] and lower powerful others endorsements and abstinence,[18] although the literature is mixed [eg,[19]]. However, many studies in this area have significant methodological limitations, including small sample sizes or a lack of biochemical verification of smoking status.

The current study was designed to explore whether HLOC mediated the relation between neighborhood vigilance and short-term smoking abstinence among treatment-seeking smokers from Houston, Texas, while improving upon the methodological limitations of previous research. Based on the structural amplification theory of mistrust and associated empirical literature, we hypothesized that higher neighborhood vigilance would be associated with more external and less internal attributions for health-related outcomes (ie, a sense of powerlessness to affect health-related outcomes). Based on prior HLOC research and associated theory, we hypothesized that more external and less internal attributions for health-related outcomes would predict lower rates of continuous smoking abstinence during a smoking quit attempt. We improved upon previous work in this area by including a relatively large sample of 200 smokers undergoing a smoking quit attempt and biochemically verifying smoking status, as well as by controlling for multiple covariates in our analyses. The current study has potential to add to the literature by (1) examining if the sense of powerlessness associated with neighborhood vigilance, as posited by the structural amplification theory of mistrust, extends to powerlessness to affect health outcomes; (2) clarifying mixed findings in the literature about the relations between HLOC and smoking abstinence through increased methodological rigor; and (3) extending previous research linking neighborhood vigilance with other smoking-related outcomes (ie, tobacco dependence) to the actual process of smoking abstinence during a quit attempt. This work is a preliminary step in better understanding the links between neighborhood environments and smoking abstinence.

METHODS

Participants and Procedures

Data were collected as part of a longitudinal cohort study examining changes in risk perceptions over time among community smokers attempting cessation. Individuals were eligible to participate if they were English-speaking current smokers aged 18–65, smoked > 5 cigarettes per day for ≥ 12 months, were willing to quit smoking within the next week, had a functioning telephone number and a permanent home address, and possessed a sixth-grade literacy level. Individuals were excluded for regular use of tobacco products other than

cigarettes, the use of pharmacological smoking cessation treatments at enrollment, reported medical contraindications to the nicotine patch, pregnancy or lactation, other household members enrolled in the study, participation in a smoking cessation program in the last 3 months, or active substance use or dependence (other than tobacco).

Participants were 200 smokers recruited from Houston, Texas, who were enrolled in 2006–2007. Data were collected during a phone screening for eligibility and 5 in-person clinic visits. These visits occurred one week prior to the participants' quit date (baseline), on the quit date (week 0), and weeks 1, 2, and 3 following the quit date (week 1, week 2, and week 3). Participants received 4 brief cessation counseling sessions and 4 weeks of nicotine replacement therapy (the patch). Participants were compensated for their time and effort with a $25 department store gift card at each in-person clinic visit.

Measures

All measures were administered by computer, with participants entering their responses via the computer keyboard.

Sociodemographics—Sociodemographics collected during the phone screen included age, race, gender, total annual household income, educational level, employment status, and partner status.

Prequit smoking characteristics—Prequit smoking characteristics collected at baseline included the number of cigarettes smoked per day and time to the first cigarette of the day.

Neighborhood vigilance—*Neighborhood Vigilance* is a 6-item self-report measure of vigilance for threat within the neighborhood,[7,20] with total scores ranging from 6 to 30. Participants are asked to think about their neighborhood and indicate their level of agreement with items including "I am always looking over my shoulder"; "I'm always on guard for things that might come at me"; and "I feel safe in most places without having to be on the lookout for danger" (reverse scored). Participants were free to define "their neighborhood" as they saw fit, and response options were strongly disagree, disagree, neutral, agree, and strongly agree. Higher scores indicate greater vigilance for threat. Neighborhood vigilance was assessed at baseline and treated as individual-level variable rather than an aggregated construct in order to account for differences in the ways in which individual smokers perceived their local environments. The coefficient alpha for neighborhood vigilance in this sample was .74.

Health Locus of Control—HLOC was collected at baseline via the Multidimensional Health Locus of Control Scale - Form B (MHLC), which is an 18-item measure developed to assess an individual's beliefs about the causes of health outcomes.[9] The MHLC yields 3 orthogonal subscale scores (internal, powerful others, chance), each ranging from 6 to 36. Internal items include "If I become sick, I have the power to make myself well again." Powerful others items include "If I see an excellent doctor regularly, I am less likely to have health problems." Chance items include "Often I feel that no matter what I do, if I am going to get sick, I will get sick." Response options were strongly disagree, moderately disagree, slightly disagree, slightly agree, moderately agree, and strongly agree. Higher internal

subscale scores indicate greater internal HLOC, whereas higher powerful others and chance subscale scores indicate greater external HLOC. The coefficient alphas for the internal, powerful others, and chance subscales in this sample were .58, .59, and .73, respectively. These alphas are considered low, but are largely consistent with those reported in other samples using the MHLC.[21]

Smoking abstinence—Smoking status was assessed at postquit weeks 1, 2, and 3. Continuous abstinence from smoking was defined as a self-report of no cigarettes smoked since the quit date (not even a puff) and an expired carbon monoxide level of < 10 parts per million at each assessment. Relapse at any assessment resulted in classification as relapsed from that point forward. Data were available to determine abstinence status for 90.5% of participants at week 1 and 91.5% of participants at weeks 2 and 3. When data were unavailable for determining abstinence, participants were coded as relapsed.

Data Analysis

Each MHLC subscale was examined as a potential mediator of the relations between neighborhood vigilance and continuous abstinence using a continuation ratio logit model.[22,23] See Figure 1 for the conceptual model. A nonparametric bootstrapping procedure was used to examine the significance of mediated effect/s in single mediation models with 5000 resamples with replacement from the data set.[24] Because continuous abstinence is essentially defined as an advancement through stages (abstinent through week 1, 2, or 3), it was treated as an ordinal variable with one observation (ie, abstinent through which week) for every participant. The bootstrapping was performed accordingly (ie, by resampling individual ordinal outcomes from the data set). Because paths *b* and *c* both involve logistic regression, the corresponding estimates of the coefficients were standardized in calculating the indirect effect (*ab*) and the proportion of the mediated effect [PME = ab/(c'+ab)[25]]. All analyses were conducted using R version 2.13.0 [26] and adjusted for stage, sociodemographics, and prequit smoking characteristics. No multiple testing adjustments were made given the exploratory nature of this research.

RESULTS

Participants (N = 200, 58% female, 51% white) reported an average of 21 (+9.6) cigarettes smoked per day prior to quitting. See Table 1 for all participant characteristics. Continuous abstinence rates were 26.5% at week 1, 18.5% at week 2, and 15% at week 3.

Of the 3 MHLC subscales, only HLOC-chance was a significant mediator of the effect of neighborhood vigilance on continuous smoking abstinence through week 3 postquit ($p < .05$; Table 2). Chance was positively and significantly associated with neighborhood vigilance and was negatively and significantly associated with abstinence. The proportion of the mediated effect was 73.2%. Neighborhood vigilance was inversely associated with continuous smoking abstinence, although the total [$\beta = -.018$, SE = .042] and direct effects [$\beta = -.007$, SE = .042] were not significant.

DISCUSSION

The current study was the first to examine potential mediators of the relations of neighborhood vigilance with smoking abstinence. Results indicated that less desirable perceptions of the neighborhood environment were associated with stronger beliefs that health outcomes were attributable to chance, which were associated with a lower likelihood of maintaining short-term continuous abstinence during a specific quit attempt. Although the total effect of neighborhood vigilance on smoking abstinence was nonsignificant, the significant indirect effect through HLOC-chance is potentially important [cf.[27]]. Similar to effects on perceived control more generally, undesirable neighborhoods may affect residents' beliefs about personal control over their health as well, perhaps through similar mechanisms [eg, collective threat, mistrust, depression].[8] Thus, our results provide preliminary support for the extension of the structural amplification theory of mistrust to HLOC, such that threatening neighborhoods may affect not only a global sense of powerlessness but also a specific sense of powerlessness to affect health outcomes. Moreover, our results also clarify mixed findings in the literature regarding the relations of HLOC and smoking abstinence. Specifically, HLOC-chance endorsements predicted smoking abstinence in this well-controlled study with an adequate sample size using repeatedly assessed, biochemically verified smoking status. Implications of our findings include that smokers from more threatening neighborhoods (ie, neighborhoods engendering higher levels of vigilance) may be at increased risk for smoking relapse – even in the context of an aided quit attempt – because they attribute responsibility for quitting smoking to chance or fate. As such, abstinence may be more difficult to maintain for these individuals in the presence of inevitable challenges.

In this sample, the HLOC-powerful others and HLOC-internal subscales were not significant mediators of relations between neighborhood vigilance and short-term continuous smoking abstinence. A post hoc examination of the adjusted *a* paths indicated that neighborhood vigilance was significantly associated with the HLOC-powerful others subscale but not the HLOC-internal subscale. These results, coupled with the significant *a* path for HLOC-chance, suggest that threatening neighborhoods demonstrate a stronger association with external versus internal attributions for health outcomes. This seems fairly consistent with the structural amplification theory of mistrust, suggesting that high levels of neighborhood threat heighten perceptions of powerlessness (ie, general externality) among residents.[8] A post hoc examination of the adjusted *b* paths, however, indicated that neither the HLOC-powerful others nor HLOC-internal subscale was significantly associated with smoking abstinence in this sample. Thus, results suggest that there is something particular about chance attributions for health that relates to the likelihood of maintaining short-term smoking abstinence during a quit attempt. Previous studies focused on other health behaviors (eg, engagement in sports activity, use of teeth protection, fruit and vegetable consumption) cited a similar pattern,[12,14] which has also been demonstrated in relation to smoking frequency.[28] The current study extends this pattern to short-term continuous smoking abstinence during a quit attempt. More research is needed to better understand the reasons that HLOC-chance, but not HLOC-powerful others or HLOC-internal, is associated with health behaviors including short-term smoking abstinence. However, results highlight

that, at least among treatment-seeking smokers, those endorsing high HLOC-chance attributions for health may be at elevated risk for smoking relapse.

Previous research has supported relations between neighborhood perceptions and smoking-related outcomes, such as smoking prevalence[1,2] and tobacco dependence.[6] To our knowledge, the current study was the first to examine relations of one such neighborhood perception measure, neighborhood vigilance, with smoking abstinence during a specific quit attempt. Our results failed to support the total effect of neighborhood vigilance on this outcome. This pattern of results is similar to recent findings focused on the associations of neighborhood collective efficacy (ie, neighborhood-level social cohesion and social control) with smoking cessation, which also cited null results for a total effect.[29] However, other research on similar constructs, such as neighborhood social participation, supports significant relations with smoking cessation.[30] In general, the preliminary nature of the current findings and the mixed results in the literature regarding relations of neighborhood perceptions and smoking abstinence suggest that additional research is needed to better understand how these constructs might be related and the potential implications of those relations for informing interventions to reduce smoking rates.

Although the development and implementation of practical and effective interventions to affect the influence of neighborhood vigilance on smoking abstinence through HLOC-chance are challenging, the relation of HLOC-chance and smoking abstinence found in this study may have relatively more direct practice implications. For example, greater HLOC-chance attributions may lead to lower risk perceptions of smoking harm and low motivation to quit smoking, at least among some groups of smokers [eg, adolescents[13]]. Also, greater HLOC-chance attributions might indicate lower self-efficacy for behavior change, a related but distinct concept[31,32] that increases the risk of smoking relapse. [18,33,34] Therefore, interventions for smokers with higher HLOC-chance attributions might focus on developing realistic expectations of smoking harm, building motivation for quitting, enhancing self-efficacy for behavior change, and increasing hopefulness for achieving behavior change goals. Also, the provision of success experiences that can be attributed to the quitting smoker and the modification of cognitions to reduce chance attributions might be important.[35] However, the greater challenge might be maintaining treatment gains while residing in an atmosphere that can undermine perceptions of personal control. Therefore, a larger impact on health behavior change might be gained from community-level interventions that include neighborhood improvements designed to increase neighborhood safety and promote community engagement. Previous research suggests that positive neighborhood modifications might contribute to desirable behavior changes among residents (eg, decreases in obesity).[36] Additional research is needed to understand the most practical and cost-effective way to alter neighborhood environments to affect smoking and cessation rates. Because the location of tobacco retail outlets in residential areas might affect smoking cessation,[37] it might be interesting to explore the extent to which tobacco outlets are related to perceptions of neighborhood vigilance. It is possible that neighborhood tobacco outlets like convenience stores provide areas for delinquents to congregate, which might lead to increased levels of threat in the neighborhood. If so, zoning restrictions on the location of tobacco retail outlets in neighborhoods might be one way to affect neighborhood vigilance, which might affect health attributions and ultimately smoking abstinence. These ideas are

speculative, but the current study provides a preliminary step in better understanding the ways in which neighborhood environments affect smoking abstinence, and is intended to spur future research in this area.

Strengths of this study include attention to sample size adequacy, biochemical verification of abstinence, and inclusion of relevant covariates. Limitations include reliance on individual neighborhood perceptions, which may not reflect objective neighborhood conditions. The extent to which perceptions diverge from objective indicators might affect the applicability of neighborhood improvement interventions. Also, the same-source reporting bias might have influenced our results. Future studies in this area should be appropriately designed for aggregation of neighborhood perceptions in order to help mitigate this concern, and despite the longitudinal study design, the directionality of effects requires further confirmation. For example, although we hypothesized that neighborhood vigilance affected health locus of control, it is also plausible that health locus of control affected neighborhood vigilance. Post hoc analyses, however, indicated that interchanging the predictor and mediator resulted in a nonsignificant mediation model (detailed results available upon request). Additional limitations include participant (eg, treatment-seeking smokers) and area (eg, major city) characteristics that might affect the generalizability of results. Also, information on participant compliance with treatment (eg, patch adherence) was not assessed in this study, but might have affected abstinence outcomes. Finally, the assessment of abstinence was limited by the parent project design to 3 weeks following the quit attempt. The effect of neighborhood vigilance on longer-term smoking abstinence is unknown. Results of this exploratory study should be replicated with other samples.

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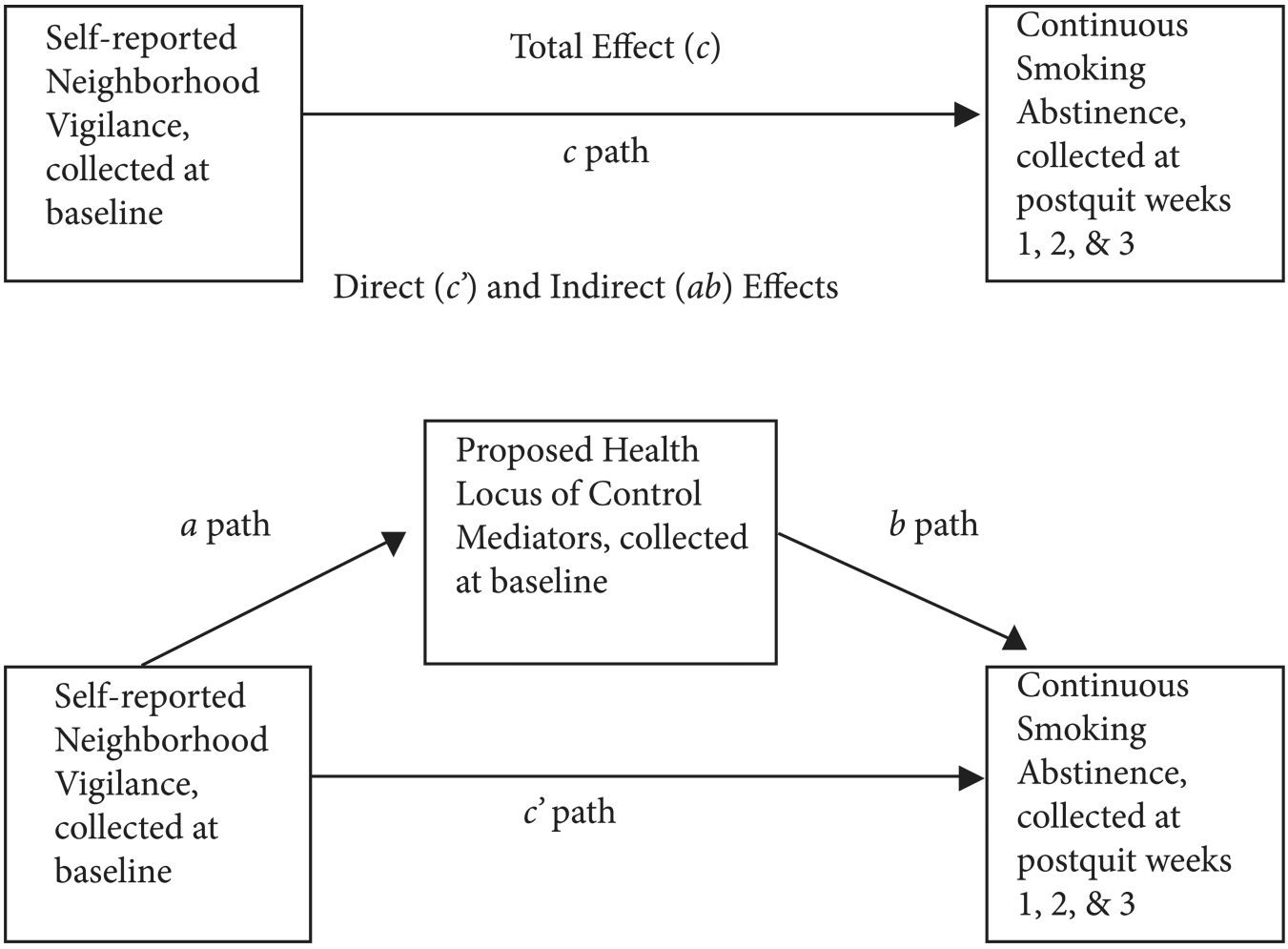

Figure 1.
Hypothesized Conceptual Model of the Indirect Effect (*ab*) of Neighborhood Vigilance on Short-term Smoking Abstinence Through Proposed Mediators

Table 1

Participant Characteristics

Characteristic	Mean (SD)/Percentage	N
Sociodemographics		
Age (years; range 21–65)	46.12 (9.71)	200
Race		
White	51.26	102
Nonwhite	48.74	97
Gender		
Female	57.50	115
Male	42.50	85
Total annual household income		
< $20,000	45.64	89
≥ $20,000	54.36	106
Educational level		
≤ High school diploma	32.00	64
> High school diploma	68.00	136
Employment status		
Employed	52.00	104
Unemployed	48.00	96
Partner Status		
Single/widowed/divorced	71.00	142
Married/living with partner	29.00	58
Prequit Smoking Characteristics		
Cigarettes per day	21.17 (9.58)	200
Time to first cigarette of day		
≤ 5 minutes after waking	40.50	81
> 5 minutes after waking	59.50	119
Neighborhood Vigilance (range 6–30)	16.46 (4.02)	200
Multidimensional Health Locus of Control		
Internal (range 19–36)	29.02 (3.87)	200
Powerful others (range 11–36)	22.77 (4.92)	200
Chance (range 6–36)	18.42 (5.69)	200

Note.
The following variables had missing data: race (N = 1) and income (N = 5). Analyses were run using complete data (N =194). Ranges presented in Table 1 represent the distribution of data in this sample.

Table 2

Significance Testing of the Mediated Effect of Neighborhood Vigilance on Continuous Smoking Abstinence Through Week 3 Post Quit

			Estimate of the Indirect Effect			BC95% CI			
Mediator	β_{apath}	β_{bpath}	**1**	**2**	**SD**	**Lower**	**Upper**	**P**	**PME**
Internal	0.066	0.027	0.002	0.001	0.002	−0.001	0.009	ns	-.-
Powerful Others	0.252	0.001	0.001	<.0001	0.004	−0.008	0.008	ns	-.-
Chance	0.295	−0.068	−0.020	−0.008	0.005	−0.022	−0.001	<.05	0.732

Note.

Effects were tested in a series of single mediator models adjusted for stage, sociodemographics, and prequit smoking characteristics. β *apath* = Estimate of the effect between neighborhood vigilance and the mediator.β_{bpath} = Estimate of the effect between the mediator and smoking abstinence. 1 = The unstandardized indirect effect estimates in the sample. 2 = The standardized indirect effect estimates in the sample. SD = The standard deviation of the standardized indirect effect. BC 95% CI = Bias-corrected 95% bootstrap confidence interval. PME = Proportion of the mediated effect. Internal = Internal subscale of the Multidimensional Health Locus of Control scale. Powerful Others = Powerful others subscale of the Multidimensional Health Locus of Control scale. Chance = Chance subscale of the Multidimensional Health Locus of Control Scale.