Social Determinants of Health and Health Outcomes: The Mediating Role of Coping Strategies

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ABSTRACT

Background: Associations between poor health and sociodemographics exist, but the role of coping strategies in this relationship is understudied. Therefore, we examined how adaptive and maladaptive coping affected the relationship between social determinants of health and health outcomes.

Methods: Participants completed survey questions about demographics, health status, and coping strategies. Mediation analyses examined whether education, income, and race affected health status indirectly through coping behaviors.

Results: Maladaptive, but not adaptive, coping strategies, mediated the relationship between income and health and education and health.

Discussion: The use of maladaptive coping strategies plays an intervening role in the relationship between income and health and education and health for some groups. Recommendations for promoting education and policies to reduce the use of maladaptive coping are discussed.

BACKGROUND

Addressing health disparities by advancing health equity is a primary focus of the Healthiest Wisconsin 2020 state health plan. Yet, in 2016 Wisconsin received a "D" on the Health of Wisconsin Report Card for its all-ages health disparity grade.[1] Promoting health equity requires efforts at both state and local levels, yet it can be challenging to make meaningful changes because some social determinants of health (SDOH) are difficult to modify (eg, race, neighborhood poverty, etc). One way to mitigate such challenges may be to address modifiable factors like stress and coping, which might play a role in the link between SDOH and health outcomes.

Stress is associated with both SDOH and poor health outcomes.[2,3] Mitigating the negative effects of stress on health may be one way to improve health and achieve health equity, but stress resulting from SDOH may not always be modifiable or avoidable, especially for certain sociodemographic groups. For example, race-related vigilance may be an uncontrollable stressor and difficult to eliminate. Although changing the experience of stress linked to various SDOH may not always be feasible, one can employ effective coping strategies as a means of ameliorating the negative effects of stress on health.

Employing active coping behaviors, such as planning, seeking social support, and exercising restraint (ie, adaptive coping)[4] is linked with good health outcomes.[5] Using strategies that employ disengagement or responses that prevent or interfere with active coping (eg, denial of the stressor, giving up, avoidance, and substance use) are considered maladaptive[4] and have been linked with poor health.[5] Although diverse forms of coping can be used to address a single stressor,[4] the degree to which successful coping can be enacted often depends on sociodemographic and socioeconomic (SES) factors. For example, those with low SES and those in the cultural minority often have fewer resources to deal with stressors and, therefore, fewer opportunities to prevent negative health outcomes caused by those stressors.[6,7] Others argue that those with lower SES and those in the racial minority use more maladaptive strategies to cope and, consequently, report more mental and physical health symptoms.[8]

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Overall, the mitigating effects of adaptive coping are well established, but less is known about the mediating role that coping might play between SDOH and health outcomes. Risky health behaviors, such as smoking and high alcohol consumption, are sometimes used to cope with stressful events and have acted as mediators between childhood aversive events and adult health.[9] Consequently, coping—especially maladaptive coping—may have an intervening effect on health behaviors, but more research on the relationship between SDOH and diverse forms of coping behaviors is still needed. For example, those with different sociodemographic backgrounds may employ different coping strategies that may be differentially affecting health outcomes. It also may be possible that those who are more educated have more information about successful coping strategies and can employ more adaptive strategies. These relationships are untested, however.

The purpose of this study is to explore the role of adaptative and maladaptive coping strategies in the relationship between sociodemographic and socioeconomic factors, such as race, education, and income and health. It is hypothesized that adaptative coping strategies will mediate the relationship between SDOH and health status such that those with higher education and higher income and those in the majority with regards to race will be associated with using more adaptive coping strategies and better health. It is also hypothesized that maladaptive coping strategies will mediate the relationship between SDOH and health status such that those with less education and less income and those in the minority race will be associated with using more maladaptive coping strategies and having poorer health.

Table 1. Participant Demographics

	N (%)	General Health Status, Mean (SD)	Maladaptive Coping Behaviors, Mean (SD)	Adaptive Coping Behaviors, Mean (SD)
Sex				
Male	38 (23.6)	3.37 (.82)	21.74 (5.60)	35.57 (9.39)
Female	122 (75.8)	3.49 (.96)	19.59 (5.43)	35.92 (9.61)
Race				
White	148 (91.9)	3.49 (.91)	20.24 (5.54)	36.06 (9.40)
Minority[a]	11 (6.8)	3.00 (1.10)	19.67 (7.28)	32.33 (11.11)
Black	4 (2.5)	3.25 (.96)	22.33 (6.03)	39.67 (10.79)
Hispanic or Latino/a	3 (1.9)	2.33 (1.53)	27 (0.00)	31 (0.00)
American Indian/ Alaskan Native	2 (1.2)	2.5 (.71)	12 (NA)[b]	20 (NA)[b]
Asian	2 (1.2)	4.00 (0)	NA[c]	NA[c]
Education				
High school or less	18 (11.2)	2.72 (1.13)[d]	23.08 (5.14)	35.92 (7.29)
Some college or AA degree	52 (32.3)	3.37 (.86)[e]	18.83 (5.16)	34.05 (8.91)
Bachelor's degree	52 (32.3)	3.69 (.78)[e]	20.53 (6.72)	36.38 (9.12)
Post-college degree (MA, PhD, professional)	38 (23.6)	3.63 (.91)[e]	20.36 (4.42)	37.66 (11.37)
Income				
<25,000	37 (23.0)	3.16 (1.01)[d]	21.52 (5.21)	38.15 (7.23)
25,000-49,999	41 (25.5)	3.10 (.77)[d]	21.52 (6.66)	36.17 (9.05)
50,000-100,000	58 (36.0)	3.64 (.74)[e]	18.69 (5.07)	33.78 (10.24)
>100,000	25 (15.5)	4.04 (1.06)[e]	19.63 (4.86)	36.78 (10.95)

Abbreviations: NA, not available; AA, Associate in Arts; MA, master's degree, PhD, doctoral degree.
[a] Minority category is comprised of the 4 groups below it.
[b] Not available because only one participant had complete data.
[c] Not available because participants did not have complete data.
[d,e] Indicates significant difference between cohorts within category ($P < .05$) based on Tukey's post-hoc comparison tests.

METHODS

Participants were 161 adults ranging in age from 18 to 78 years mean = 38.24, SD = 12.55). Most participants were women (75.8%), white (91.9%), and had a college degree (32.3%). See Table 1 for additional demographics. After Institutional Review Board approval, participants were recruited via advertisements posted at local businesses and on local social media groups. Invitations to participate were also made at local community events (eg, festival and holiday events) and through the La Crosse County Human Services Department. All interested participants were given an anonymous link to complete the survey online at a time convenient for them. For those who were in the La Crosse County Human Services Department, paper and pencil surveys were also available. Informed consent was provided as a cover letter for the paper and pencil survey and as the first webpage of the online survey. Completion of the survey was indication of consent. In survey instructions, participants were asked to answer all questions to the best of their abilities, but there were no penalties for skipping questions. Data collection lasted for approximately 9 months, beginning in the summer and ending the following spring. Participants were entered in a drawing for a chance to win one of five $25 gift cards to a local convenience store.

Measures

Demographics and Health Status. Participants completed questions about age, sex, education, ethnicity/race, income, and general health status. All demographic and health status questions were used from the Behavioral Risk Factor Surveillance System questionnaire. For health status, participants were asked to rate their general health on a scale of 1 (Excellent) to 5 (Poor). Items were reverse scored such that larger values indicated better health. For education, participants identified the highest level of education they completed, with 8 options ranging from "grade school" to "earned doctorate/medical/law degree." For income, participants reported their gross household income by responding to

Figure 1. Conceptual Model of the Hypothesized Intervening Effect of Coping Behaviors on the Relationship Between Social Determinants of Health (SDOH) and General Health Status

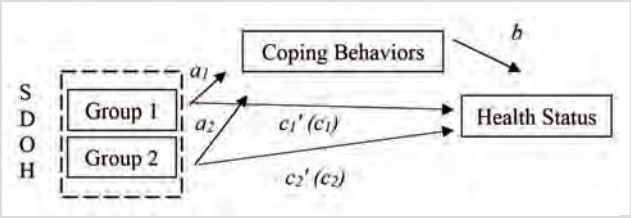


Table 2. Indirect Effects of Mediation Variables

Maladaptive Coping		
Mediation	**Indirect Effect**	**95% BCCI**
Race		
Race » Maladaptive » Health	.04	[-.45, .52]
Education		
Some college/AA » Maladaptive » Health	.28[a]	[.05, .54]
College degree » Maladaptive » Health	.17	[-.08, .45]
Post-college degree » Maladaptive » Health	.18	[-.04, .41]
Income		
$25,000-$49,999 » Maladaptive » Health	.00	[-.19, .22]
$50,000-$100,000 » Maladaptive » Health	.17*	[.02, .38]
>$100,000 » Maladaptive » Health	.12	[-.08, .34]
Adaptive Coping		
Mediation	**Indirect Effect**	**95% BCCI**
Race		
Race » Adaptive » Health	.03	[-.08, .22]
Education		
Some college/AA degree » Adaptive » Health	.02	[-.04, .10]
College degree » Adaptive » Health	-.004	[-.08, .06]
Post-college degree » Adaptive » Health	-.02	[-.12, .05]
Income		
$25,000-$49,999 » Adaptive » Health	.01	[-.05, .07]
$50,000-$100,000 » Adaptive » Health	.02	[-.07, .12]
>$100,000 » Adaptive » Health	.01	[-.06, .07]

Unstandardized coefficients are reported. Bootstrap sample was 5,000.
[a]Indicates a significant value at $P < .05$. For race, white is the comparison group, for education, high school education or less is the comparison group, and for income, $25,000 or less is the comparison group.
Abbreviations: BCCI, bias corrected confidence intervals, AA, Associate of Arts.

1 of 7 options, ranging from "less than $15,000" to "$100,000 or more." Given characteristics of respondents and to facilitate statistical analyses, ethnicity, education, and income values were recoded. Created categories and frequencies for each variable can be found in Table 1.

Coping. Adaptative and maladaptive coping were measured using the Brief COPE.[10] Participants responded to 28 items on a scale of 1 (I haven't been doing this at all) to 4 (I've been doing this a lot) on the degree to which they have used various behaviors in dealing with problems. Example statements include, "been turning to work or other activities to take my mind off things," and "I've been learning to live with it." The Brief COPE has 14 subscales that were combined to represent adaptive and maladaptive coping. Subscales used to represent adaptive coping included active coping, use of emotional support, use of instrumental support, positive reframing, planning, humor, acceptance, and religion. Subscales used to represent maladaptive coping included self-distraction, denial, substance use, behavioral disengagement, venting, and self-blame. Scores ranged from 12 to 48 for maladaptive coping and 16 to 64 for adaptive coping. In the current study, Cronbach's alpha for the overall measure was .90, .81 for the maladaptive subscale, and .90 for the adaptive subscale.

Statistical Analysis

Descriptive statistics and frequencies were calculated for all variables. Given the disproportionate number of females in the study, chi-square analyses were conducted to determine if males and females were equally represented in each demographic category (ie, education, income, and race). Independent *t*-tests and 1-way ANOVAs (with Tukey's post-hoc tests) also were calculated to determine if key outcome variables differed depending on survey type and among demographic groups.

Multicategorical mediation analyses[11] were conducted to determine the role of coping behaviors (both adaptive and maladaptive coping) in the relationships between SDOH (education, income, and race) and general health status. Mediation analysis is a statistical method to explore the mechanisms through which one variable (X = SDOH) affects another (Y = General Health Status). It is a regression-based path analysis that partitions the effects of X on Y into direct and indirect pathways.[11] Figure 1 represents the conceptual model. Path *a* represents the effects of the SDOH variable on coping behaviors. Because SDOH are categorical, a referent group was created for each SDOH variable (eg, income less than $25,000 was the referent group for income). Consequently, each *a* pathway represents the mean difference between the referent group and the identified comparison group of each SDOH variable.[11] Thus, statistical significance in pathway a_1 would indicate that compared to the referent group, group 1 had a higher or lower value of the mediator (depending on the positive or negative value of a_1). Path *b* represents the effects of coping behaviors on general health, controlling for the SDOH variable. Path *c'* represents the direct effect. The direct effect measures the effect of SDOH on general health, not associated with coping behaviors. Again, given the categorical nature of the SDOH, each group is compared to the referent group and *c'* represents the relative direct effect of being in that group compared to the referent group. The total effect, the influence of the SDOH variable on general health without the effect of coping behaviors, is labeled as path *c*. Finally, the indirect effects, which measure the effect and significance of the mediator (ie, maladaptive and adaptive coping behaviors), are found in Table 2. Referent groups were computed as follows: education was having a high school education or less; income was making $25,000 or less; for race, white was the referent group.

To determine statistical significance of the indirect effects (ie, the role of maladaptive and adaptive coping behaviors), bootstrapping procedures with bias corrected confidence intervals (BCCI) were used.[11] In mediational analysis, bootstrapping procedures estimate the characteristics of a population by sampling, with replacement, a large number of times until an empirical representation of the sampling distribution can be used to generate confidence intervals for the indirect effects.[11] This nonparametic bootstrapping method does not assume normality in the sampling distribution and was used because self-reported health behaviors are generally skewed. In this study, the empirical approximation of the sample was created using 5,000 samples, and a 95% BCCI was used to determine significance of the intervening effects. All analyses were conducted using IBM SPSS 24.

RESULTS

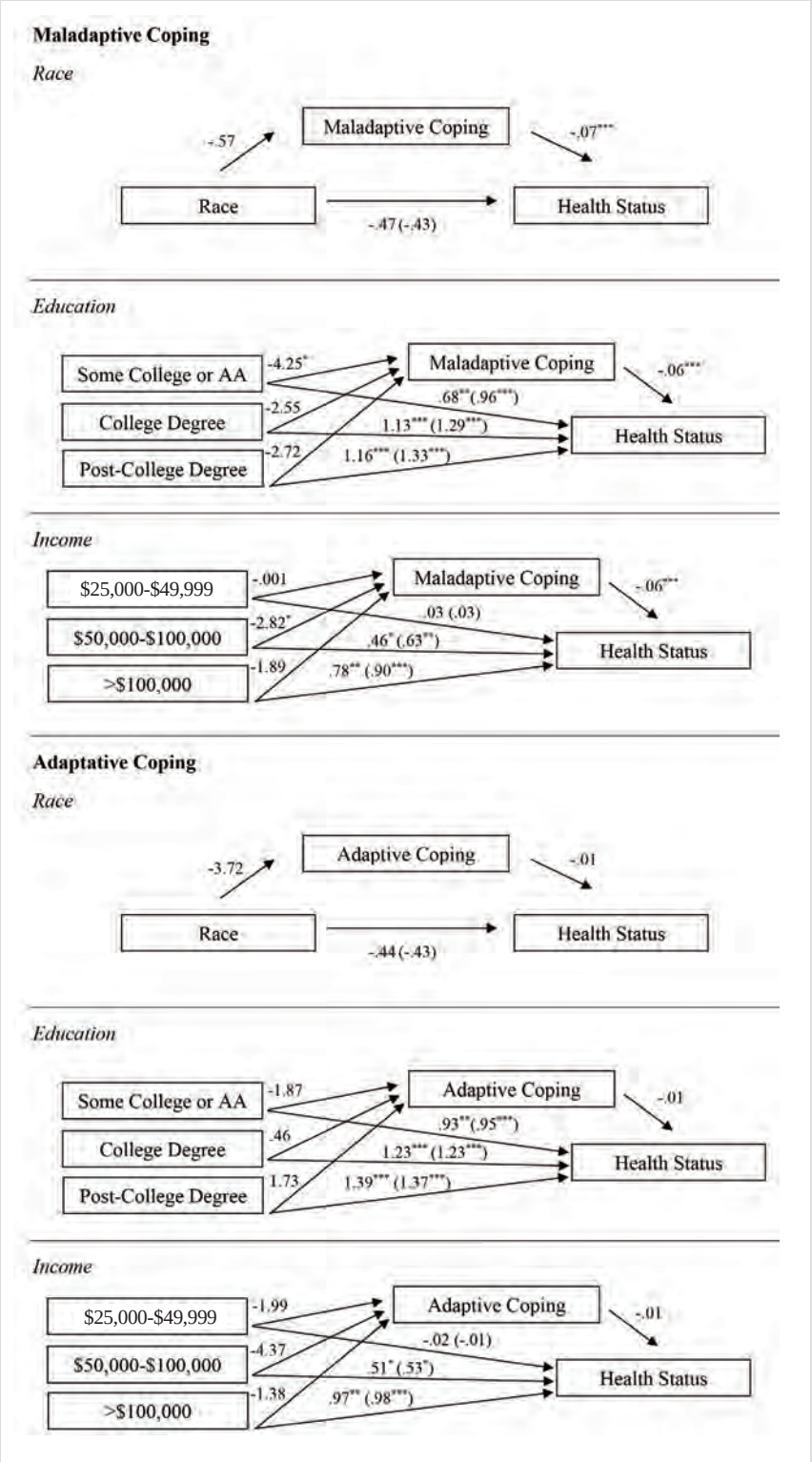
Group Differences by Sex, Survey Type, and Outcome Variable

Males and females were equally represented in education ($\chi^2[3] = 1.81$, $P = .61$), income ($\chi^2[3] = 1.00$, $P = .80$), and race groups ($\chi^2[1] = .64$, $P = .43$). There were also no significant differences found between males and females in general health status ($t[159] = -.63$, $P = .53$), or maladaptive ($t[111] = 1.78$, $P = .08$) and adaptive coping behaviors, ($t[112] = -.17$, $P = .86$).

Only 14 individuals completed the paper and pencil version of the survey. Those who did were less educated ($\chi^2[3] = 36.17$, $P < .001$) and more likely to be in the minority race ($\chi^2[1] = 4.29$, $P = .04$). They also employed more maladaptive coping styles (mean = 24.64, SD = 3.96) than did those who completed the survey online (mean = 19.74, SD = 5.56, $t[112] = -2.84$, $P = .005$), and they reported a significantly lower health status (mean = 2.50, SD = 1.01) than those who completed the survey online (mean = 3.55, SD = .87, $t[160] = 4.25$, $P < .001$).

Regarding demographic differences on outcome variables, those with a high

Figure 2. Maladaptive and Adaptive Coping Behaviors as Mediators Between Social Determinants of Health (SDOH) and General Health Status



Indirect effects of maladaptive and adaptive coping behaviors on the direct effect of race, education, and income on general health status. Path values represent unstandardized regression coefficients. The value inside the parenthesis represents the total effect. Values outside the parenthesis represent the direct effect, the effect of SDOH on health status controlling for maladaptive and adaptive coping, of race, education, and income on general health behaviors. For race, white is the comparison group; for education, high school education or less is the comparison group; and for income, $25,000 or less is the comparison group. [a]$P < .001$, [b]$P < .05$, [c]$P < .01$. Abbreviation: AA, Associate of Arts.

school education or less reported significantly lower health status compared to those with some college (t[157] = -2.67, P = .04), a college degree (t[157] = -24.06, P < .001), and a post-college degree (t[157] = -3.61, P = .002). Likewise, those making $25,000 or less reported significantly lower health status compared to those making $50,000 to $100,000 ($t$[158] = -2.64, P = .04) and those making more than $100,000 ($t$[158] = -3.91, P = .001). Those making $25,000 to $49,999 also reported significantly lower health status compared to those making $50,000 to $100,000 ($t$[158] = -3.09, P = .01) and more than $100,00 ($t$[158] = -4.28, P < .001). Means and standard deviations are in Table 1.

Mediational Analysis Results

Coefficients for the mediation model pathways can be found in Figure 2, and indirect effects and statistical significance of the mediation variables are in Table 2. Results indicate that maladaptive coping was a significant intervening variable for education and income but not for race. For education, those who had a high school degree or less used, on average, significantly more maladaptive coping strategies compared to those with some college education or an Associate's degree, which was associated with poorer health status. The mean difference in the use of maladaptive coping behaviors was 4.25. For income, those who made $25,000 or less used, on average, significantly more maladaptive coping strategies than those making $50,000 to $100,000, which was associated with poorer health status. The mean difference in use of maladaptive coping strategies was 2.82. All other group comparisons were not statistically significant. Additionally, adaptive coping was not a significant intervening variable for education, income, or race.

DISCUSSION

Results supported hypotheses regarding the role of maladaptive coping strategies in the relationship between education and health and income and health, but only for certain groups. This supports previous research that those with less education and income are likely to have poorer health and use more maladaptive coping strategies.[6-8] Moreover, it provides new evidence that maladaptive coping may be associated with some of these disparities in health outcomes because of its role in the relationship between SDOH and general health. Perhaps the use of maladaptive strategies may be more common among those with less education and income because these individuals lack resources to find means other than maladaptive strategies to address their stressors. Furthermore, maladaptive strategies like distraction and disengagement may be a more financially and emotionally feasible solution in the face of certain chronic stressors (eg, cancer diagnosis, neighborhood conditions, etc) that may be more common for those with less education and income. Maladaptive coping like avoidance and distraction is argued to work better to reduce stress than adaptive strategies when the situation is uncontrollable, like in the case of poverty, despite the long-term negative health consequences.[7] Perhaps those with low income and/or low education may be using more maladaptive strategies because they are effective for immediate needs, despite their negative long-term consequences.

Contrary to our hypothesis, maladaptive coping did not play a role in the relationship between race and health. Our sample was predominately white (92%) and mostly female (76%). The lack of variability in the study may have contributed to a loss of power to be able to detect the hypothesized relationships. Also contrary to our hypothesis, adaptive coping strategies did not play a role in the relationship between any of the SDOH and health status. All education and income groups used similar levels of adaptative coping strategies, thus leaving little variability to detect differences in how it might explain the relationship between SDOH and health status. Our results suggest that when working toward health equity, practitioners and public health workers may need to focus more strongly on addressing differences in the use of maladaptive coping rather than adaptive coping strategies, especially among those with low income and less education.

Implications and Recommendations

Providing services or education to identify and reduce the use of maladaptive strategies, and expand one's repertoire of coping strategies, may be one way to promote health, especially among those with low income or less education. An existing example of such a model has been developed by the Substance Abuse and Mental Health Service Administration with the goal of increasing adaptive coping strategies and reducing maladaptive strategies, such as substance abuse.[12] This approach uses a Screening, Brief Intervention, and Referral to Treatment (SBIRT) model[13] during a primary care visit, which allows primary care providers to assess alcohol use and misuse while also educating patients about substance use and providing advice on adaptive coping strategies. If needed, referrals to additional treatment and care can be made during this visit. Similar techniques could be used for other maladaptive coping behaviors too, such as behavioral disengagement, venting, and self-blame. Other ways to address maladaptive coping behaviors include facilitating conversations with patients about the use of coping strategies, like denial and behavioral disengagement, and providing additional resources for managing stress and avoiding self-blame for uncontrollable situations. Likewise, implementing public health communication strategies about the detrimental effects of maladaptive strategies, such as self-distraction, venting, and substance abuse, in community health plans or social media and public service announcement campaigns could reduce the use of such maladaptive strategies. Finally, we recommend investing in additional, local- and state-level research aimed at identifying the role of stress and coping in the relationship between SDOH and health disparities.

Limitations and Future Research Suggestions

The population, although representative of the county in which it

took place, was primarily white and female. More research exploring coping strategies and health in men and minority populations is needed. Generalizability is also limited by the use of self-rated measurement tools and a single question about self-rated health. Self-rated responses may be confounded by social desirability among other factors. Although the anonymous nature of the study likely reduced some of these biases, health status and other related factors should be explored in a more comprehensive and objective way (eg, disease states, biological measures of physical fitness, biological measure of vital signs, and blood tests).

There are also likely several confounding variables that were not addressed in the study. Future researchers also could explore how factors like access to health care, social support, employment status, and other confounding variables might affect the relationships examined in this study. The use of experimental methods also would reduce the impact of confounding variables and biases. Study methods, including the use of mediational analyses, were correlational, thus limiting our ability to make causal claims about the relationship between SDOH, coping strategies, and health status. Although it is less likely that health and coping behaviors might determine one's SDOH status, experimental and intervention designs are needed to determine if equipping individuals with strategies for reducing maladaptive coping strategies would eliminate or reduce the health disparities related to education and income.

CONCLUSIONS

Understanding the mechanisms by which sociodemographic and socioeconomic factors affect health status is one way to work toward achieving health equity. We found that the use of maladaptive coping strategies is implicated in the relationship between income and health status and education and health status. Given such findings, addressing the use of maladaptive coping strategies among these populations might be a way to work toward reducing disparities in health and achieving health equity.

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