Psychological factors affecting the association between a lifestyle behavior intervention and depressive symptoms in low-income overweight and obese mothers with young children: a secondary data analysis

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Abstract

Background Psychological factors mediating the effect of lifestyle behavior interventions on mothers' depressive symptoms are unclear. Using data from a community-based lifestyle behavior intervention, this secondary analysis examined whether autonomous motivation, coping self-efficacy, and emotional coping mediated the association between the intervention and depressive symptoms in low-income overweight and obese mothers with young children.

Methods This 16-week intervention had 2 components: Mothers watched 10 video lessons in Digital Video Disc (DVD) format at home and joined 10 peer support group teleconferences (every week in weeks 1–4; then every other week in weeks 5–16). All participants completed reliable and valid measures of autonomous motivation, coping self-efficacy, emotional coping and depressive symptoms via phone at baseline and immediately after the intervention. To assess effect size, proportion of maximum possible (POMP) scores were calculated. To test mediation effects, composite indicator structural equation modeling was performed.

Results The intervention significantly alleviated depressive symptoms ($p = 0.015$, POMP = -4.31%). While the intervention had no influence on autonomous motivation, it significantly increased coping self-efficacy ($p < 0.001$, POMP = 7.4%) and emotional coping ($p = 0.003$, POMP = 3.81%). Coping self-efficacy significantly and negatively mediated the association between the intervention and depressive symptoms ($p = 0.002$, POMP = -2.53%). However, autonomous motivation and emotional coping were not significant mediators.

Conclusions To help this target population alleviate depressive symptoms, clinicians may consider teaching these women practical strategies that can be applied to daily life to boost coping self-efficacy.

Background

Maternal depression is a major global public health problem [1], especially for low-income mothers of young children [2–5] with as high as 50% suffering from this condition [6]. Maternal depression, which is characterized by feelings of helplessness, isolation, guilt, and hopelessness [7], is a serious morbidity for both mother and child and strong predictor of mothers' suicide [1]. Adverse effects on child well-being [8] include behavioral problems, delayed emotional development [2], increased stress, weakened immune system, and impaired maternal and child relational behaviors [9]. To prevent this negative trajectory of child outcomes, helping mothers with young children to prevent or reduce depressive symptoms is critically important [10].

Sadly, a higher percentage of low-income mothers with major depression who have young children receive no treatment for the condition, as compared to a similar group of higher-income mothers (37.3% versus 25.3%, respectively) [11]. Also, low-income mothers who are overweight or obese are more likely to report depression than those with a healthy weight and higher income [2–5]. Moreover, many low-income mothers without depression in the early postpartum period can become depressed a few years later [12],

and depression among overweight or obese mothers can continue across several years after giving birth [13–15]. Yet, interventions to alleviate depressive symptoms have been limited to the perinatal period [15] and have not included low-income overweight and obese mothers with young children, who are a vital priority for intervention.

Fortunately, maternal depression is preventable via healthy lifestyle behavior interventions [16]. In a systematic review and meta-analysis of five randomized controlled trials (RCTs) investigating healthy lifestyle behavior interventions promoting physical activity (PA) and/or nutrition in overweight or obese women of reproductive age, van Dammen and colleagues [16] found that the interventions reduced depressive symptoms. Unfortunately, only two of the five interventions were theory-based, and no analysis was conducted in any of the studies to identify whether any theoretical variables mediated the effect of the intervention on depressive symptoms.

Three theoretical variables, including autonomous motivation, coping self-efficacy, and emotional coping, have been linked to mental health outcomes. Autonomous motivation, which is defined as an inner drive to engage in a behavior because of personal value, interest, or choice, is a key concept of the Self-Determination Theory [17]. Increased autonomous motivation for participating in a PA intervention has been associated with fewer depressive symptoms in middle-aged overweight and obese women [18]. Self-efficacy and emotional coping are key concepts of the Social Cognitive Theory [19]. Self-efficacy in general refers to the confidence that individuals have in their abilities to successfully perform various functions [19]. An inverse association between generalized self-efficacy and depressive symptoms has been demonstrated in depressed low-income mothers of all body sizes with children aged 6 weeks to 36 months [20]. Coping self-efficacy, defined as individuals' confidence in their ability to cope with stressors, threats, and challenges [21], has been found to have a strong negative association with depression in female college students [22]. Emotional coping, which refers to strategies used to deal with negative feelings, has been negatively related to depression in caregivers of children with cerebral palsy [23]. Although evidence has shown associations between depressive symptoms and autonomous motivation, coping self-efficacy, and emotional coping, whether these concepts serve as mediators in lifestyle behavior interventions to alleviate depressive symptoms remains unknown.

Identifying the theoretically informed mediators that underly the alleviation in depressive symptoms from lifestyle behavior interventions (process of change or mediation effect) in varied populations is important so that relevant psychological factors can be efficiently targeted to promote intervention success. Findings from a recent RCT testing a 16-week lifestyle behavior intervention in low-income overweight and obese mothers with young children has shown an intervention effect on coping self-efficacy ($p \leq 0.01$, effect size [Cohen's d] = 0.53, 95% CI: 0.31–0.76), emotional coping ($p \leq 0.01$, $d = 0.38$, 95% CI: -0.49, -0.04), and depressive symptoms ($p < 0.05$, $d = -0.27$, 95% CI: -0.48, -0.04) immediately after the intervention [24]. However, the intervention effect on autonomous motivation and potential theoretical mediators was not examined. To address this gap and extend beyond the finding, this secondary analysis using data from the trial investigated whether autonomous motivation, coping self-efficacy, and emotional coping mediated the association between the intervention and depressive symptoms in low-

income overweight and obese women with young children. It is hypothesized that the intervention would increase autonomous motivation, coping self-efficacy, and emotional coping; and then translate into an alleviation of depressive symptoms.

Methods

Participants and setting

The study procedure for the RCT testing the 16-week lifestyle behavior intervention was approved by the Michigan State University and Michigan Department of Community Health Institutional Review Boards. Women were recruited from The Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) [25] in Michigan while waiting for their appointments. WIC is one of the largest federally funded nutrition programs in the U.S. and serves low-income women who are pregnant, postpartum and breastfeeding; and children from 0–5 years of age. WIC serves individuals with annual household income at or below 185% of the federally poverty line [25].

From 2012–2015, trained peer recruiters invited women to be screened and then measured each potential participant's height and weight to compute body mass index (BMI). To be eligible to participate, women had to have a BMI of 25.0–39.9 kg/m², be non-Hispanic Black or White, be between 18–39 years old, and have a biological child between 6 weeks and 4.5 years old enrolled in WIC. All women meeting eligibility criteria provided written consent prior to participation in the study [26–27]. A detailed CONSORT participant flow diagram has been published previously [27].

Intervention

Details regarding the intervention lessons have been published elsewhere [26]. Briefly, the intervention was 16 weeks in duration and covered topics of stress management (four weeks), healthy eating (five weeks), and physical activity (one week). During the 16-week intervention, intervention participants joined 10 peer support group teleconferences (30-minute/session every week in Weeks 1–4 and then every other week in Weeks 5–16) directed toward enhancing autonomous motivation. WIC dietitians and peer educators, who were trained in motivational interviewing, led the group discussion. Motivational interviewing is a method of communication directed toward eliciting an individual's motivation, especially autonomous motivation [28], for making positive behavioral changes [29]. Intervention participants also watched 10 video lessons in Digital Video Disc (DVD) format at home (20 minutes/lesson every week in Weeks 1–4 followed by every other week in Weeks 5–16). The videos applied concepts of coping self-efficacy, emotional coping, and observational learning processes by showing role models of four peers of the study population. The use of peers enabled participants to relate to role models and observe their positive lifestyle behaviors [19]. The peers demonstrated a variety of practical skills to help viewers choose what they could do to develop feelings of competence and identify their strengths to build coping self-efficacy for positive behavior change. They also showed effective ways to respond to negative emotions to improve emotional coping.

Measures

Data were obtained from 338 women who completed phone interviews designed to assess autonomous motivation, coping self-efficacy, emotional coping, and depressive symptoms at baseline (Time [T]1) and immediately after the 16-week intervention (Time [T] 2). Trained interviewers, who were blinded to group allocation in the RCT, conducted the phone interviews and simultaneously entered data into a data collection system created for the trial.

Demographics. Using a pencil-and-paper survey, women provided demographic data regarding their race, education, employment and smoking status at the screening. Age and postpartum period were calculated based on each woman's and her youngest child's date of birth, respectively.

Autonomous motivation. The validated Treatment Self-Regulation Questionnaire (six items; Cronbach's alpha coefficient [α] = 0.92) was used to assess autonomous motivation [30]. Women were asked about what motivated them to regularly engage in positive behaviors. For example, one reason was, "because I want to take responsibility for my own health." Response choices ranged from 1 (not at all true) to 7 (very true). A higher mean score for the six items indicates higher autonomous motivation.

Coping self-efficacy. A 10-item survey with established construct validity and good reliability (Cronbach's α = 0.92) was used to measure coping self-efficacy. Women were asked about their confidence in or belief about their ability to successfully engage in positive behavior or manage obstacles or challenges. A survey item example was "You can relax, even when you have too much to do." Response choices ranged from 1 = not at all confident to 4 = very confident. A higher mean score for the 10 items indicates higher coping self-efficacy [24].

Emotional coping. A validated 5-item survey (Cronbach's α = 0.91) was used to measure emotional coping or the frequency that appropriate strategies are used to manage emotions or stress. One example of a survey item was "How often do you deal with or prevent stress by talking to family members?" Response choices ranged from 1 = rarely or never to 4 = usually or always. A higher mean score for the five items indicates better emotional coping [31].

Depressive symptoms. The 20-item Center for Epidemiologic Studies Depression Scale (CES-D) with concurrent validity and reliability (Cronbach's α = 0.85–0.90) [32] was used to measure depressive symptoms. Response choices ranging from 0 (rarely or none of the time) to 3 (most or all of the time) were summed. A higher score indicates more depressive symptoms [32].

Statistical analysis

Mplus (version 8) was used to conduct all statistical analyses. Intervention was the exogenous variable (independent variable or predictor). The endogenous variable (outcome or dependent variable) was depressive symptoms. Mediators included autonomous motivation, coping self-efficacy, and emotional coping. Covariate was postpartum period, which has been associated with depressive symptoms [33]. The Composite Indicator Structural Equation (CISE) modeling using maximum likelihood estimation [34]

was performed to examine mediation effects while adjusting for baseline measurements and postpartum period. As shown in Fig. 1, the mediation model tested a system with four equations simultaneously: one endogenous variable (depressive symptoms) and three mediators (autonomous motivation, coping self-efficacy, and emotional coping).

CISE modeling is an errors-in-variables regression approach that models measurement errors in both the exogenous and endogenous variables [35]. CISE modeling creates latent variables by combining items of each separate measurement domain into a single indicator [34]. To control for measurement errors in a CISE model, the error variance of the indicator was fixed at $(1 - \alpha) \cdot \sigma^2$, where α was Cronbach's alpha, and σ^2 was the variance of the composite variable [36]. Model fit was evaluated by the R-squared value of the endogenous variable. Proportion of maximum possible (POMP) scores in the endogenous variable with per unit change in the exogenous variable was calculated to assess effect size: $[\text{parameter estimate}/(\text{maximum scale value} - \text{minimum scale value}) + 1] \cdot 100$ [37].

Results

Demographics

Table 1 presents participants' demographic characteristics ($N = 338$, 212 intervention and 126 comparison). Mean age was 29.39 years ($SD = 4.93$), and mean postpartum period was 1.76 years ($SD = 1.27$). Most women were non-smokers (70.4%) and had some college or less education (75.74%). Over 40% were employed full- or part-time (41.42%). There were significant between-group differences in postpartum period ($p = 0.01$) and employment status ($p = 0.006$).

Table 1
Participant Characteristics ($N = 338$: $n = 212$ intervention; $n = 126$ comparison)

Age (years)	29.21 (4.92)	29.63 (4.95)	0.44
Postpartum period (years)	1.63 (1.23)	1.99 (1.30)	0.01
Race			0.08
Non-Hispanic White	179 (84.43%)	97 (76.98%)	
Non-Hispanic Black	33 (15.57%)	29 (23.02%)	
Smoking			0.28
Non-smoker	175 (82.55%)	98 (77.78%)	
Smoker	37 (17.45%)	28 (22.22%)	
Education			0.47
High school or less	59 (27.83%)	43 (34.12%)	
Some college or technical school	100 (47.17%)	54 (42.86%)	
College graduate or higher	53 (25.00%)	29 (23.02%)	
Employment status			0.006
Full-time	34 (16.04%)	32 (25.40%)	
Part-time	46 (21.70%)	28 (22.22%)	
Unemployed	28 (13.21%)	28 (22.22%)	
Homemaker	79 (37.26%)	28 (22.22%)	
Self-employed, student and other	25 (11.79%)	10 (7.94%)	

Total effects of intervention

The intervention alleviated depressive symptoms ($B = -2.42$, $p = 0.015$, POMP = -4.31%; Table 2). R-squared value was 0.57, meaning the whole mediation model explained about 57% of the variance in depressive symptoms.

Table 2

Direct and indirect effects of mediation testing while adjusting for baseline measures and covariates

	B (SE)	B (95% CI)	p-value	B	POMP
Total Effect of Intervention					
Intervention ◇ Depressive symptoms_T2	-2.42 (1.00)	-4.37, -0.46	0.015	-0.11	-4.31%
Direct Effects					
Intervention ◇ Autonomous motivation_T2	0.12 (0.08)	-0.04, 0.29	0.145	0.07	1.88%
Intervention ◇ Coping self-efficacy_T2	0.30 (0.06)	0.19, 0.41	< 0.001	0.25	7.40%
Intervention ◇ Emotional coping_T2	0.15 (0.05)	0.05, 0.24	0.003	0.18	3.81%
Autonomous motivation_T2 ◇ Depressive symptoms_T2	1.70 (0.71)	0.30, 3.09	0.017	0.13	3.02%
Coping self-efficacy_T2 ◇ Depressive symptoms_T2	-4.80 (1.37)	-7.48, -2.12	< 0.001	-0.25	-8.56%
Emotional coping_T2 ◇ Depressive symptoms_T2	-1.77 (2.82)	-7.29, 3.76	0.530	-0.06	-3.15%
Indirect Effects (Mediation)					
Intervention ◇ Autonomous motivation_T2 ◇ Depressive symptoms_T2	0.21 (0.18)	-0.15, 0.57	0.256	0.01	0.37%
Intervention ◇ Coping self-efficacy_T2 ◇ Depressive symptoms_T2	-1.42 (0.46)	-2.33, -0.51	0.002	-0.06	-2.53%
Intervention ◇ Emotional coping_T2 ◇ Depressive symptoms_T2	-0.26 (0.43)	-1.10, 0.59	0.555	-0.01	-0.45%
Direct Effect					
Intervention ◇ Depressive symptoms_T2	-0.95 (1.02)	-2.95, 1.06	0.355	-0.04	-1.68%
Other Paths					
Postpartum ◇ Depressive symptoms_T2	0.48 (0.35)	-0.21, 1.17	0.171	0.06	0.85%
Depressive symptoms_T1 ◇ Depressive symptoms_T2	0.61 (0.07)	0.47, 0.76	< 0.001	0.57	1.09%
Autonomous motivation_T1 ◇ Autonomous motivation_T2	0.65 (0.07)	0.51, 0.78	< 0.001	0.65	9.90%

	B (SE)	B (95% CI)	p-value	<i>B</i>	POMP
Coping self-efficacy_T1 $\diamond$ Coping self-efficacy_T2	0.79 (0.08)	0.64, 0.95	< 0.001	0.65	19.77%
Emotional coping_T1 $\diamond$ Emotional coping_T2	0.80 (0.09)	0.61, 0.98	< 0.001	0.84	20.94%

Direct and indirect (mediation) effects

Table 2 presents the results of direct and indirect effects while adjusting for baseline measures and postpartum period. Figure 2 presents the significant direct and indirect paths of the mediation testing.

While the intervention did not significantly increase autonomous motivation, it increased coping self-efficacy ($B = 0.30$, $p < 0.001$, POMP = 7.4%) and emotional coping ($B = 0.15$, $p = 0.003$, POMP = 3.81%). When controlling for the intervention, autonomous motivation was positively associated with depressive symptoms ($B = 1.70$, $p = 0.017$, POMP = 3.02%). Coping self-efficacy was negatively associated with depressive symptoms ($B = -4.8$, $p < 0.001$, POMP = -8.56%), but emotional coping was not significantly associated with depressive symptoms.

When assessing the potential role of autonomous motivation and emotional coping as mediators, neither autonomous motivation nor emotional coping significantly mediated the effect of the intervention on depressive symptoms. However, coping self-efficacy negatively mediated the association between the intervention and depressive symptoms ($B = -1.42$, $p = 0.002$, POMP = -2.53%). When controlling for the indirect effects of the intervention on depressive symptoms through autonomous motivation, coping self-efficacy, and emotional coping, the intervention had no significant influence on depressive symptoms. The findings support that coping self-efficacy was the only mediator, but autonomous motivation and emotional coping had no influence on the association between the intervention and depressive symptoms.

Discussion

To our knowledge, this study is the first to show that coping self-efficacy, but not autonomous motivation or emotional coping, may be responsible for reducing depressive symptoms following a lifestyle behavior intervention for low-income overweight and obese women with young children. The finding that coping self-efficacy significantly mediated the association between the intervention and depressive symptoms is inconsistent with results from another RCT that showed neither problem-focused coping, problem-solving ability, nor social coping mediated the effect of a problem-solving education intervention on depression among low-income mothers with young children [38]. The contradictory findings might have resulted from differences between the studies in participant demographics and measurement. While the current study included predominately Non-Hispanic White overweight and obese women, the previous study included predominately Hispanic women with all body sizes [38]. The current study measured coping self-efficacy, whereas the prior study measured mastery or the degree that women perceived themselves as

being in control of their lives [38]. Even though the current study showed a small effect size (POMP = -2.53%) for coping self-efficacy, it underscored the importance of including coping self-efficacy in intervention studies aimed at alleviating depressive symptoms in low-income overweight and obese women with young children [39].

The current study demonstrated that the lifestyle behavior intervention alleviated depressive symptoms. This finding is consistent with results of a prior systematic review and meta-analysis of five RCTs conducted with overweight or obese women of reproductive age who participated in lifestyle behavior interventions [16]. Four of the five interventions tested in the RCTs were directed toward improving both PA and diet, and one focused only on increasing PA. However, in contrast to the current study, none of the five interventions had a stress management component. Moreover, none of the RCTs specifically focused on only low-income women with young children; therefore, the findings cannot be generalized to this high-risk group. Only one study was found that included predominately low-income women to test the effect of a lifestyle behavior intervention on reducing depressive symptoms. The culturally-tailored intervention, which was designed to increase PA and improve diet among Latina pregnant or postpartum women, consisted of home visits and group meetings that were conducted during pregnancy and between two and six weeks postpartum. Compared to the control, the intervention group had a significantly greater decrease in depressive symptoms from baseline to late pregnancy; however, from baseline to approximately six weeks postpartum, no between-group differences occurred [40]. Although continued research is needed in this area, the findings suggest that interventions addressing only PA and/or diet may not be adequate for achieving this outcome in low-income women with young children.

The positive intervention effect on coping self-efficacy supports results from both a mind-body intervention for human immunodeficiency virus (HIV)-infected individuals [41] and a self-directed cognitive behavioral therapy and mindfulness-based stress reduction intervention for adults [42]. Similar to the current study, these two studies included practical problem-solving strategies (e.g., time management; realistic goal setting) to overcome daily challenges in order to manage stress [26, 43]. Researchers aiming to increase coping self-efficacy may want to consider including practical problem-solving strategies in future studies.

Consistent with a prior study of young women [22], this study found that increasing coping self-efficacy reduced depressive symptoms. The findings support Bandura's [44] Social Cognitive Theory propositions that high coping self-efficacy can mitigate depressive symptoms. Some examples of strategies to increase coping self-efficacy are modeling appropriate behaviors, providing feedback on progress to promote mastery, using verbal persuasion through encouraging statements [44], helping individuals to identify strengths, recognizing existing skills, and encouraging small steps to change [24].

The finding that this study's intervention increased emotional coping was consistent with results from a RCT that included family caregivers of individuals with dementia [45]. Both the current and prior studies focused on teaching participants relaxation exercises (e.g., breathing deeply, counting to 10, and taking a walk) [24] and emotion-focused coping strategies (e.g., thinking positively and seeking emotional

support). Therefore, relaxation exercises and emotion-focused coping strategies may warrant consideration to increase emotional coping.

Results from the current study showing that emotional coping had no influence on depressive symptoms were consistent with those from a mindfulness-based intervention to reduce overeating in low- to middle-income overweight pregnant women [46]. The similar findings suggest that emotion-focused coping strategies may be insufficient for reducing depressive symptoms in overweight and obese women who have a low-income.

The lack of an intervention effect on autonomous motivation in this study contrasted with results from a PA intervention for overweight and obese women [47]. The inconsistent findings may have occurred due to measurement issues. To measure autonomous motivation, the current study included the Treatment Self-Regulation Questionnaire [30], whereas the latter study used the behavior-specific Exercise Self-Regulation Questionnaire [47]. Regardless, this study's lack of an intervention effect on autonomous motivation was not completely surprising because of low attendance in the peer support group teleconferences (average 2.6 [SD = 3.4] of 10 teleconferences; 12.4% completed all 10). Despite efforts to schedule teleconferences at times convenient for each group's members, women's busy schedules, sudden time conflicts, or disconnected phones prevented them from attending some sessions [27]. Thus, the inability to receive the expected dose of motivational interviewing may have hampered the intervention effect on autonomous motivation.

The positive association between autonomous motivation and depressive symptoms in this study is counter to Self-Determination Theory and evidence indicating that autonomous motivation contributes to enhancing positive mental health outcomes [48–50]. However, one prior study did show that greater intrinsic motivation was positively related to depressive symptoms among athletes playing team sports, the majority of whom were female [51]. One potential explanation for the positive association is that individuals with more depressive symptoms are likely to experience greater psychosocial demands, which may result in increased autonomous motivation to meet the demands [52]. This information suggests that the association between autonomous motivation and depression may be more complex than anticipated [51], warranting further investigation.

Strengths and limitations

The study had strengths and limitations. Strengths included its sample of socioeconomically disadvantaged overweight and obese women with young children, a group notably underrepresented in RCTs [53–54]. Because the current study only included overweight and obese mothers of young children in the Midwestern U.S., the findings may not be generalizable to healthy weight mothers and women in other geographical regions. The depressive symptoms data were obtained via self-report instead of clinician interview (or electronic health record), the latter of which is the gold standard for diagnosing a mental health condition [53]. However, the CES-D is the most commonly used measure for depressive symptoms, and conducting clinician interviews to collect data on depressive symptoms is not practical in

community settings. Also, this study was a secondary analysis, which might have been underpowered to detect some significant findings.

Conclusion

Findings support the importance of increasing coping self-efficacy in interventions to alleviate depressive symptoms in low-income overweight and obese women with young children. Teaching women practical strategies that can be applied to daily life may be one important approach for accomplishing this task. Future research continues to be needed to unravel key psychological mechanisms through which interventions decrease depressive symptoms.

Abbreviations

α : Cronbach's alpha, BMI: body mass index; CES-D: Center for Epidemiologic Studies Depression Scale; CISE: composite indicator structural equation; DVD: Digital Video Disc; human immunodeficiency virus: HIV; POMP: proportion of maximum possible; PA: physical activity; RCT: randomized controlled trial; SD: standard deviation; T: time; US: United States; WIC: Women, Infants, and Children.

Declarations

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Authors' contributions

LBR contributed to the study conceptualization, design, methodology, literature search, and writing of the initial draft and revisions to the manuscript. MC contributed to the study conceptualization, design, methodology, data interpretation, writing of the manuscript, and revisions to the manuscript. JL contributed to data interpretation and revisions to the manuscript. RB contributed to the data analysis and interpretation and provided revisions to the manuscript. All authors read and approved the final version.

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Kidney Disease. ClinicalTrials.gov Identifier NCT01839708; Date of registration: February 28, 2013; Date the first participant was enrolled: September 2012; <https://clinicaltrials.gov/ct2/show/NCT01839708>

Availability of data and materials

The datasets generated and/or analyzed during the current study are not publicly available because we are in the stage of data analysis to answer other research questions. However, data are available from the corresponding author based on reasonable request.

Ethics approval and consent to participate

The study was approved and monitored by the Michigan Department of Community Health and Michigan State University Institutional Review Boards. Participation was voluntary. All participants provided written consent to participate if they met the study criteria and understood the requirements.

Consent for publication

Our manuscript does not include any individual data or sensitive personal information; therefore, consent for publication is not applicable in this case.

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Figures

Figure 1

Structure of mediation model testing

Figure 2

Significant paths of mediation model adjusting for baseline measures and covariate