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# Exploring Factors Associated with Gender Differences in Perceived Stress among Adults with Higher Body Weight in the United States—A Cross-Sectional Analysis

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**Abstract:** This study aimed to explore factors associated with perceived stress in adults with higher body sizes. An analysis of data from participants who self-reported higher body weight was conducted (n = 1716). The mean (standard deviation) age was 55.92 (15.94) years and 71.3% and 28.7% identified themselves as women and men, respectively. Gender differences in perceived stress, desire for weight loss, trust in physicians, body affirmation, and perceived weight discrimination were examined. Perceived stress and perceived weight discrimination were significantly higher in women than in men, while trust in physicians and body affirmation was higher in men than women. Trust in physicians and body affirmation were both negatively associated with perceived stress. Perceived weight discrimination and desire for weight loss were both positively associated with perceived stress. Trust in physicians, body affirmation, and perceived weight discrimination were examined as mediators of the observed gender differences between men and women. Trust in physicians, body affirmation, and perceived weight discrimination were significant mediators of the relationship between gender and perceived stress. These results suggest that a possible point of intervention for addressing gender differences in rates of perceived stress among higher body weight adults may be to increase trust in physicians, encourage body affirmation, and reduce weight discrimination.

**Keywords:** perceived stress; higher body size; trust in physicians; body affirmation; perceived weight discrimination



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## 1. Introduction

Weight bias, stigmatizing a person due to their body weight, is prevalent in society. This is often based on the misconception that high body weight is a personal responsibility and that it is a result of a lack of self-discipline. People with higher body weight are often discriminated against in their workplace, educational, and healthcare settings [1–4]. Perceived weight discrimination is known to be harmful to one's health because it is associated with chronic medical conditions such as arteriosclerosis, diabetes, high cholesterol, and myocardial infarction in those with high body weight independent of stressful life events, body mass index (BMI), physical activity, and sociodemographic variables [5]. Current literature shows how weight bias negatively affects not only patients' health but also the patients' relationships with primary healthcare providers [2]. According to a systematic review, patients with a higher body weight reported that their physicians assumed that they were not taking the necessary actions to reduce their body weight and offered general advice or attributed all their symptoms to them having a higher body weight without obtaining a proper history or conducting a thorough examination [6]. Patients generally have a positive response to weight loss support and weight monitoring. However, when weight stigma is internalized, patients can become sensitized to cues of negative judgment from clinicians [6]. Trust in physicians can be diminished if the patients feel that their

physicians stigmatize them because of their weight [7]. This may be a significant problem for women particularly as they perceive more weight bias [4] and it has been reported that women have less trust in healthcare providers than men [8].

Individuals with high body weight are more likely than those with normal weight to experience stressful life events [9] and more stressful life events were reported by those who perceived weight discrimination compared to those who did not perceive weight discrimination [5]. It has been shown that stress is associated with poor dietary habits as well as increased energy intake, especially in women [10,11]. In addition, stress can cause multiple negative health outcomes, affecting metabolic and cardiovascular health [12,13]. Several studies have reported that there is a gender difference in perceived stress such that stress is higher among women than men [14–16]. Not only women with obesity but also women who are moderately higher in body weight are likely to have increased stress than their normal weight counterparts [9]. Furthermore, body dissatisfaction and the desire for weight loss are generally high in adults with higher body weight and women tend to have higher body dissatisfaction [17].

Since stress can contribute to several negative health effects, understanding the factors contributing to the gender difference in perceived stress in adults with obesity is important in order to find solutions to improve health outcomes. However, the factors contributing to the gender difference in perceived stress in adults with obesity are not clear. Perceived weight bias, trust in physicians, body affirmation, perceived weight discrimination, and desire for weight loss may have a role in contributing to greater stress among women, however to date, this has not to our knowledge been examined.

Therefore, the purpose of this study is to examine factors that may account for differences in perceived stress between men and women with higher body weight in the United States.

## 2. Materials and Methods

### *2.1. Study Population*

Adults who were more than 18 years of age in the United States were recruited. Participant screening including attention checks, obtaining informed consent, online data collection, and compensation was conducted by Qualtrics (Qualtrics, Provo, UT, USA), an online data collection service that recruited the sample between April 2021 and October 2021. Potential participants responded to the statement "I consider myself overweight" using a 7-point scale, with seven being the highest level of agreement. Only those participants that indicated a 5 or above on the scale were recruited.

### *2.2. Study Design*

The present study is an exploratory, secondary analysis of data collected for a weight framing manipulation study. Prior to the collection of the data, the participants were randomly assigned to read a weight-framing article manipulation which framed weight as controllable, as a disease, or in the control condition they read about climate change. The manipulation did not influence any of the reported measures and thus we collapsed across conditions for this analysis. The framing manipulation, data, and analyses can be found at Open Science Framework (OSF) https://osf.io/bxru5/. Other measures were collected to examine separate hypotheses/models. The previously mentioned measures are listed on OSF.

This research study was reviewed and approved by the Institutional Review Board at the University of Mississippi (IRB #21x-164).

### *2.3. Data Collection*

Following demographics political orientation was assessed on a scale from 0 = very liberal to 6 = very conservative. Self-reported height and weight were collected and body mass index (BMI) was calculated. Participants completed questions of the following

surveys and items for each survey were averaged to form overall composite scores. (See Supplementary Materials).

Perceived stress in the present moment in the participants was assessed using the 10-item Perceived Stress Scale worded for the present moment ("Right now, I feel that I am unable to control the important things in my life". "Right now, I feel angry because of things that are outside of my control". 1—Strongly Disagree to 7—Strongly Agree) [18].

The Body Affirmation scale was used to determine body affirmation and the survey had 5 items including "I am proud of my body weight" and "My body size enriches my life" which were scored as 1—Strongly Disagree to 7—Strongly Agree [19].

A 4-item Perceived Discrimination scale was used to assess the severity of perceived discrimination in those with a higher body size [19]. This survey aimed to assess the severity of discrimination experienced as a group and included questions such as "Fat people are stigmatized" and "Fat people are discriminated against more than people who are not fat". Responses were scored as 1—Strongly Disagree to 7—Strongly Agree.

The 11-item Trust in Physicians Scale was used to assess the trust participants had regarding their physicians [20]. This included questions such as "I trust my doctor so much I always try to follow his/her advice" and "I feel my doctor does not do everything he/she should for my medical care" that were reverse coded as well as questions such as 1—Strongly Disagree to 5—Strongly Agree).

Participants' weight loss desire was measured using a 5-item scale [19]. Examples of the items included in this scale are, "Losing weight is important to me" and "I believe that dieting and weight loss are effective for most people". These were scored from 1—Strongly Disagree to 7—Strongly Agree.

### *2.4. Statistical Analysis*

Descriptive data are presented as mean and standard deviation (SD). Correlations between variables were examined. Gender differences were identified using a *t*-test and effect sizes were assessed using Cohen's D. We conducted a hierarchical linear regression to examine how trust in physicians, body affirmation, and perceived discrimination are associated with perceived stress. We examined a mediation model using ordinary least squares path analysis in PROCESS (Model 4) [21] with 5000 bootstrapped samples and significant effects were indicated by a bootstrapped confidence interval that did not encompass 0. To be consistent with our prior analyses, age, and political orientation were included as covariates.

## **3. Results**

### *3.1. Study Participant Characteristics*

A total of 1840. adults in the United States were recruited and those who missed the attention checks (n = 90), failed to complete measures (e.g., discrimination, body affirmation, and desire for weight loss; n = 23) or identified as a gender other than men or women (N = 11) were excluded because of the smaller numbers precluded there examination for cross-group comparisons. The final sample of 1716 consisted of 78.3% White/European American, 7.3% African American, 3.3% Hispanic/Latino American, 2.6% Asian American, 2% Multi-racial, 1.4% Native American/American Indian, and 4.9% other. The age of the participants ranged from 18 to 96 years with a mean (SD) age of 55.92 (15.94) years. The mean (SD) for BMI for the 1342 subjects who reported their height and weight was 32.19 (7.73) $kgm^{-2}$. Of the study participants, 71.3% and 28.7% identified themselves as women and men, respectively.

Correlations between trust in physicians, perceived stress, weight loss desire, body affirmation, perceived discrimination, and age are depicted in Table 1. The gender differences for the variables were tested using a *t*-test and effect sizes are presented as Cohen's D in Table 2. Men reported greater trust in their physicians and greater body affirmation than women. Women reported greater perceived stress and perceived weight discrimination than men.

**Table 1.** Correlation analysis.

| Variables | Trust in Physicians | Perceived Stress | Weight Loss Desire | Body Affirmation | Perceived Discrimination | Age | Political Orientation |
|---|---|---|---|---|---|---|---|
| Trust in physicians | - | | | | | | |
| Perceived Stress | **−0.31** ** | - | | | | | |
| Weight Loss Desire | **0.16** ** | **0.06** * | - | | | | |
| Body Affirmation | **0.07** * | **−0.14** ** | **−0.08** ** | - | | | |
| Perceived Discrimination | 0.04 | **0.18** ** | **0.15** ** | **0.14** ** | - | | |
| Age | **0.08** ** | **−0.26** ** | **−0.21** ** | **−0.25** ** | **−0.11** ** | - | |
| Political Orientation (1 = Conservative, 7 = liberal) | −0.003 | **0.12** ** | 0.004 | **0.06** * | **0.18** ** | **−0.16** ** | - |
| α | 0.91 | 0.91 | 0.66 | 0.88 | 0.77 | - | - |

Note: Pearson correlation (R values are shown). Bolded values are significant; * = $p < 0.05$, ** = $p < 0.01$. α indicates Cronbach's alpha for each measure.

**Table 2.** Gender differences.

| | Women (n = 1225) | Men (n = 491) | Effect Size (Cohen's D) |
|---|---|---|---|
| Age | 55.75 (−15.95) | 56.45 (−15.93) | −0.04 |
| Trust in physicians | 3.72 (−0.82) | 3.98 (−0.76) | **−0.33** ** |
| Perceived Stress | 3.70 (−1.3) | 3.23 (−1.16) | **0.38** ** |
| Weight Loss Desire | 4.97 (−0.92) | 4.99 (−1.05) | −0.02 |
| Body Affirmation | 3.02 (−1.23) | 3.37 (−1.46) | **−0.27** ** |
| Perceived Discrimination | 4.62 (−1.19) | 4.46 (−1.18) | **0.14** ** |
| Political Orientation | 3.89 (−1.85) | 3.82 (−1.91) | 0.04 |

Note: Bolded values are significant; ** = $p < 0.01$ for independent *t*-test.

### *3.2. Factors Associated with Perceived Stress and Desire to Lose Weight*

Perceived stress shows a significant negative correlation with trust in physicians in Table 1 (r = −0.31, $p < 0.01$). Hierarchical linear regression analysis was performed to study the factors associated with perceived stress (Table 3). Gender (0 = women), age, and political orientation were entered in Step 1 as covariates. In step 2, trust in the physicians, body affirmation, and perceived discrimination were entered as simultaneous predictors of the perceived stress. Several factors were associated with perceived stress. There were significant effects of each of the covariates (age, gender, and political orientation) in Step 1: $F(3, 1712) = 62.35$, $p < 0.001$, $\Delta R^2 = 0.10$. There was a significant increase in $R^2$ in Step 2: $\Delta F$ $(3, 1709) = 95.09$, $p = 0.001$, $\Delta R^2 = 0.13$; Model: $F (6, 1709) = 83.86$, $p < 0.001$, $R^2 = 0.23$. Trust in physicians (b = −0.42, SE = 0.03, $p < 0.001$, 95% CI [−0.49, −0.36]) and body affirmation (b = −0.19, SE = 0.02, $p < 0.001$, 95% CI [−0.24, −0.15]) were negatively related to perceived stress, while perceived weight discrimination (b = 0.19, SE = 0.02, $p < 0.001$, 95% CI [0.14, 0.23]) was positively related to perceived stress. Trust in physicians was the strongest predictor of perceived stress within the model.

There were several factors associated with weight loss desire according to the hierarchical regression analysis (Table 3). Only age was a significant covariate in Step 1: $F(3, 1712) = 25.52$, $p < 0.001$, $\Delta R^2 = 0.04$. There was a significant increase in $R^2$ in Step 2: $\Delta F$ $(3, 1709) = 48.44$, $p < 0.001$, $\Delta R^2 = 0.08$; Model: $F (6, 1709) = 30.68$, $p < 0.001$, $R^2 = 0.12$. Trust in physicians (b = 0.22, SE = 0.03, $p < 0.001$, 95% CI [0.16, 0.27]) and perceived weight discrimination (b = 0.12, SE = 0.02, $p < 0.001$, 95% CI [0.08, 0.16]) were positively related to a desire for weight loss, while body affirmation (b = −0.13, SE = 0.02, $p < 0.001$, 95% CI [−0.16, −0.10]) was negatively related to weight loss desire. Trust in physicians was the strongest predictor within the model.

**Table 3.** Associations for perceived stress and weight loss desire.

| | Perceived Stress | | | Weight Loss Desire | | |
|---|---|---|---|---|---|---|
| | **b (SE)** | **$\Delta R^2$** | **95% CI** | **b (SE)** | **$\Delta R^2$** | **95% CI** |
| Step 1 (Covariates) | | 0.10 ** | | | 0.04 ** | |
| Age | −0.02 (0.002) ** | | [−0.02, −0.02] | −0.01 (0.001) ** | | [−0.02, −0.01] |
| Gender (0 = Women) | −0.46 (0.002) ** | | [−0.58, −0.33] | −0.03 (0.05) | | [−0.07, 0.13] |
| Political Orientation | 0.05 (0.02) ** | | [0.02, 0.08] | −0.02 (0.01) | | [−0.04, 0.01] |
| Step 2 (Predictors) | | 0.13 ** | | | 0.08 ** | |
| Trust in Physicians | −0.42 (0.03) ** | | [−0.49, −0.36] | 0.22 (0.03) ** | | [0.16, 0.27] |
| Body Affirmation | −0.19 (0.02) ** | | [−0.24, −0.15] | −0.13 (0.10) ** | | [−0.16, −0.10] |
| Perceived Weight Discrimination | 0.19 (0.02) ** | | [0.14, 0.23] | 0.12 (0.02) ** | | [0.08, 0.16] |

Regression Analysis findings are presented. Abbreviations: b = Unstandardized beta, CI = Confidence interval; $\Delta R^2$ = Change in $R^2$; SE = Standard error. Note: Significant findings are shown as ** = $p < 0.01$.

### *3.3. Factors Mediating the Relationship between Gender and Perceived Stress*

Given the gender differences observed for perceived stress, we examined whether trust in physicians, body affirmation, and perceived discrimination mediated the relationship between gender and perceived stress using a mediation model. The overall model was significant, Model: $F(6, 1709) = 83.86$, $p < 0.001$, $R^2 = 0.23$. There was evidence of a significant mediational effect of trust in physicians, b = −0.11, SE = 0.02, 95% CI [−0.15, −0.07], body affirmation, b = −0.07, SE = 0.02, 95% CI [−0.10, −0.04], and perceived discrimination, b = −0.03, SE = 0.01, 95% CI [−0.05, −0.01], in the relationship between gender and stress (See Figure 1).

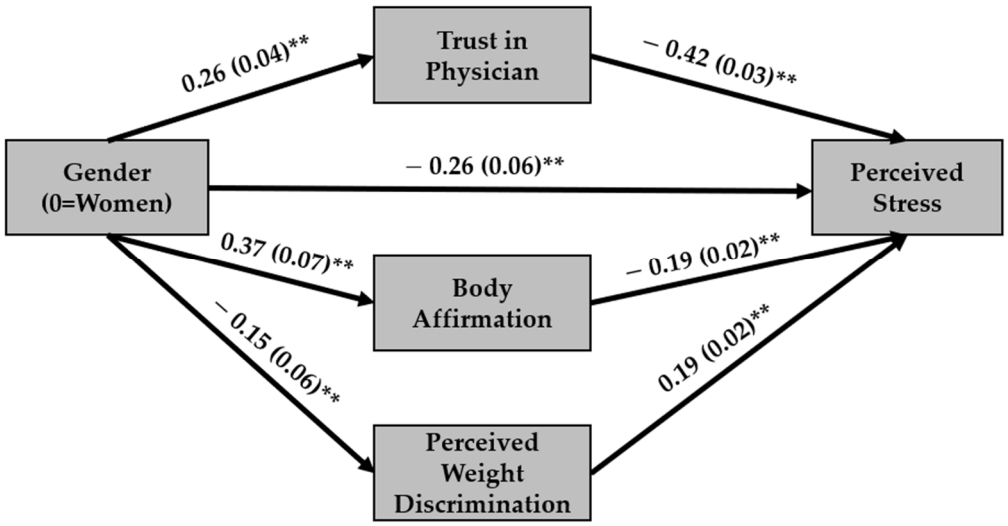


**Figure 1.** Mediational Model of Gender Differences in Stress. Note: ** $p < 0.01$.

## 4. Discussion

To our knowledge, this is the first large-scale cross-sectional study in the United States to examine how body affirmation, perceived weight discrimination, and trust in physicians account for the gender differences in perceived stress in adults with higher self-reported body weights. This secondary data analysis was conducted using cross-sectional data collected from 1716 adults with self-reported higher body weight in the United States. In the present study, women had higher perceived stress than men. It was also observed that there were gender differences in perceived stress, trust in physicians, body affirmation, and perceived weight discrimination. Most importantly, trust in physicians, body affirmation, and perceived weight discrimination significantly mediated the relationship between gender and perceived stress.

Similar to the present study, previous studies also report that psychological stress is higher in women than men [14,15]. Cultural expectations and pressures surrounding thinness are higher for women than men in the United States which may also contribute to the increased stress they are experiencing. Even women who are moderately overweight have been shown to experience more stress compared to men, men do not seem to experience the same level of stress or more unless they are obese [9]. Elevated stress could be detrimental since a meta-analysis suggests that, stress shows positive associations with BMI, and waist circumference (central obesity) [13].

In adults with higher self-reported body weight, perceived stress was higher when their trust in physicians was lower in the present study. While women had less trust in their physicians compared to men, trust in their physicians was a significant mediator of the association between gender difference and perceived stress. Similar to the present study, it has been previously reported that women are less likely to trust their physicians compared to men [8]. There could be several reasons to have lower trust in physicians. Physicians seem to spend less time with patients with obesity than with thinner patients [4]. In addition, patients with higher body weight may perceive that they do not deserve medical attention, or that there are minimal health risks associated with being overweight, especially if their doctors discuss their weight infrequently. In addition, incorrect assumptions that the patient is not trying to lose weight, or attributing that all symptoms are due to high body weight may result in misdiagnosis by the physicians [6]. Other reasons that could lower the trust in physicians are negative perceptions regarding the healthcare system and experiences at healthcare facilities [8]. This research highlights the importance of fostering trust between doctors and patients, particularly among those who may feel stigmatized or mistreated by the medical community. Interventions aimed at increasing trust in medical professionals among those with higher weights are likely to be beneficial for all but may be particularly beneficial for women.

Perceived weight discrimination was higher in women than in men in this study. Perceived weight discrimination was positively associated with stress and negatively associated with weight loss desire. Furthermore, perceived weight discrimination was one of the mediators of the association between gender differences and stress in the present study. Weight bias is common in society, and weight bias in healthcare providers can negatively impact their care [4]. The way patients with higher body weight get treated may vary from being patronizing to disrespectful when their healthcare provider is weight-biased [2]. Some patients may perceive that their doctors assume that their symptoms stemmed from being overweight without examination or history [6]. When patients with higher body weight experience poor care or expect poor care, it can cause stress, avoidance of healthcare, poor adherence, and reduced trust in doctors [5,22]. In addition, weight bias internalization is associated with stress due to negative body image, low self-esteem, depression, anxiety, dysregulated eating behaviors, social event avoidance, and avoidance of physical activities [1]. Addressing weight stigma in the context of medical visits is particularly important because if patients feel they are experiencing bias in this domain they are less likely to return or seek the treatment the need, thus exacerbating possible health issues both related to and unrelated to their weight.

Women in the present study had lower body affirmation compared to men and body affirmation showed negative associations with stress and weight loss desire. Body affirmation was also another significant mediator for the association between gender and stress. According to a meta-analysis, individuals with obesity are more dissatisfied regarding their bodies than those with lower-weight bodies. Furthermore, aligned with our study the meta-regressions showed that women have a higher body dissatisfaction than men [17]. Similarly, women with higher body weights were more dissatisfied regarding their body weight than men in the United States [23]. It has been reported that the proportion of women with a healthy body weight who perceive that they are overweight is higher compared to men [24]. Some studies report that men are less likely to have an accurate perception regarding their body weight but are less likely to have body dissatisfaction and weight loss attempts com-

pared to women [23]. In contrast, the desire for weight loss was not significantly different between men and women in the present study. Body affirmation has previously been found to be associated with better general health, greater life satisfaction, and self-esteem among higher-weight individuals [25]. Conceptualizing body weight as something positive rather than negative can have a positive impact on an individual's well-being.

Our study has several strengths. This is a large-scale study consisting of 1716 participants in the United States and included only participants who self-identified as having a higher body weight. We studied the gender differences (men vs. women) since gender identity is more associated with psychosocial and cultural factors than sex identity which is more related to biological differences [26]. However, this study has several limitations. Because this is a cross-sectional study, making causal inferences is not possible. The study population was less diverse and 78% were white Caucasians while only 28.7% were men. Furthermore, we excluded individuals who mentioned their gender as other than men or women. While it may be important for further exploration, we are not able to study the associations in gender minority populations given our limited sample size. While we used previously validated surveys, these are self-reported data. Thus, the question interpretation along with participants changing their responses due to social desirability bias is possible. Furthermore, this is a secondary analysis where the participants underwent a weight framing manipulation. However, there were no significant differences in any of the outcomes due to that intervention (see OSF for data and associated syntax). Furthermore, we studied only a few variables, but there could be more that are associated with perceived stress.

Increased stress can result in health complications [12,13] and our study adds to this literature by identifying factors that may increase patient stress, particularly in women. It highlights the importance of building trust in the physicians and reducing weight bias. Weight stigma can cause harm both physically and psychologically, patients with higher body weight are less likely to receive quality care [4]. The 2020 consensus statements on the stigma of obesity have provided recommendations at the general public, media, healthcare, research, and policy levels [4]. Considering obesity as a disease by physicians is associated with lower weight bias and lower negative negativity toward individuals with obesity [27]. Successful weight loss is more likely if the primary care provider discusses weight loss without the patient perceiving that they are being judged [28]. Positive perceptions regarding the healthcare system may help to improve trust in physicians, improve adherence, and reduce stress in patients with higher body weight [5,8,22]. Since weight discrimination is prevalent in society, education about weight stigma is also needed [4].

## 5. Conclusions

In this exploratory study of adults with self-reported higher body weight, women reported more perceived stress than men. It was identified that body affirmation and trust in physicians were negatively associated with perceived stress, while perceived weight discrimination was positively associated with perceived stress. Trust in physicians, perceived weight discrimination and body affirmation mediated the association between gender and perceived stress. These findings highlight the importance of increasing trust in physicians and body affirmation and reducing weight discrimination, particularly in women with higher body weight. Interventions aimed at increasing trust in physicians and reducing feelings of weight stigmatization among higher-weight individuals may be critical for addressing the health and well-being needs of this population, particularly for women. Further studies are needed to confirm the causal processes to understand what is driving these gender differences and how they may be attenuated.

**Supplementary Materials:** The following supporting information can be downloaded at: https://www.mdpi.com/article/10.3390/obesities3040023/s1, Survey questions.

**Author Contributions:** Conceptualization, N.N.W. and J.D.W.; Methodology, N.N.W. and J.D.W.; Software J.D.W.; Validation, N.N.W. and J.D.W.; Formal Analysis, J.D.W.; Interpretation, N.N.W. and J.D.W.; Data Curation, J.D.W.; Writing—Original Draft Preparation, N.N.W., J.D.W. and K.T.; Writing—Review & Editing, N.N.W., J.D.W. and K.T.; Visualization, N.N.W. and J.D.W.; Supervision, N.N.W. and J.D.W.; Project Administration, N.N.W. and J.D.W.; Funding Acquisition, N.N.W. and J.D.W. All authors have read and agreed to the published version of the manuscript.

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**Institutional Review Board Statement:** The study was conducted according to the guidelines of the Declaration of Helsinki, and approved by the Institutional Review Board of the University of Mississippi (protocol #21x-164 and the date of approval was 2 February 2021).

**Informed Consent Statement:** Not applicable.

**Data Availability Statement:** All data, syntax, copy of all measures and output for mediation analysis can be found on Open Science Framework https://osf.io/bxru5/.

**Conflicts of Interest:** The authors declare no conflict of interest.

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