Author’s response to reviews

Title: Perceived Stress, Unhealthy Eating Behaviors, and Severe Obesity in Low-Income Women

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Author’s response to reviews:

EDITOR: Your manuscript "Increased Stress May Lead to Poor Eating Behaviors and Severe Obesity in Low-Income Women" (NUTJ-D-15-00023) has been assessed by our reviewers. Based on these reports, and my own assessment as Editor, I am pleased to inform you that it is potentially acceptable for publication in Nutrition Journal, once you have carried out some essential revisions suggested by our reviewers.

AUTHOR RESPONSE: Thank you for your consideration and we are pleased that our manuscript is potentially acceptable for publication once we carry out essential revisions. We greatly appreciate this opportunity to revise this manuscript and would like to thank the reviewers for their constructive comments. We have thoughtfully considered the reviewers concerns, and our responses are detailed below.

Reviewer #3: The manuscript entitled “Increased Stress May Lead to Poor Eating Behaviors and Severe Obesity in Low-Income Women” is very interesting and well structured. I think that the paper could be improved with attention to following details:

1. I suggest changing the title of the manuscript. My proposition is “Association Between Perceived Stress And Unhealthy Eating Behaviors And Severe Obesity In Low-Income Women.”

AUTHOR RESPONSE: Thank you for your suggestion; we revised the title.

Methods – study population
Reviewer #3: 1. The authors should clarify did any proposed participant refuse to take part in the study (response rate)?

AUTHOR RESPONSE: Information on the number of women who were asked to participant in the study but declined was not recorded so we are unable to calculate a response rate. We revised the methods section to add this statement.

Reviewer #3: 2. The participant characteristics should be described in more detail (mean age, mean BMI) Results

AUTHOR RESPONSE: We added mean BMI to the results section and Table 1 as a footnote. With respect to age we are limited by the survey design. Respondents were asked which category their age fell in: 18–24, 25–29, 30–34, or 35–44, so we are unable to calculate a mean age. We revised the Methods to clarify the survey question.

Reviewer #3: In Figure 1 the authors should replace the term “obesity” with “moderate obesity” (please see “Anthropometry”, p. 6)

AUTHOR RESPONSE: Thank you for noting the inconsistent terminology in Figure 1. We changed “obesity” to “moderate obesity.”

Reviewer #3: Discussion Lines 58 (page 10) and 4-7 (page 11): It is not clear how the authors come to the conclusion that “improving stress coping strategies may not only improve dietary behaviors but also reduce severe obesity in low-income women, independent of diet.” Discussion would be needed.

AUTHOR RESPONSE: We agree this point about how improving stress coping strategies could reduce severe obesity needed more discussion. We revised the Discussion with the following:

“This suggests that non-diet-related behaviors (e.g., physical activity) or physiologic mechanisms (e.g., cortisol) associated with high levels of perceived stress may also contribute to severe obesity. Thus, improving stress coping strategies to help low-income women feel less stressed may improve stress-induced nondietary behaviors and physiologic responses that underlie severe obesity.

Reviewer #3: Lines 24-29, page 12: The authors claim that “Our findings highlight the fact that dietary behaviors are complex and, thus, it is important to understand underlying mechanisms that drive stress-induced unhealthy dietary behaviors to tailor stress coping strategies” How can this sentence be explained? Discussion would be needed.

AUTHOR RESPONSE: This is a great point. As written, this sentence was not clear. We revised this sentence with the following:
“Our findings highlight the fact that the effect of perceived stress on dietary behaviors and obesity is complex. Although stress can induce unhealthy eating behaviors, high levels of stress may also affect nondietary factors that increase the likelihood of being severely obese. Thus, it is important to understand and disentangle stress-induced dietary versus nondietary mechanisms to effectively tailor stress coping strategies to reduce severe obesity.”

Reviewer #3: Lines 48-51, page 12: In the present study “perceived stress was not associated with diet quality.” In my opinion, authors have not discussed this result in depth.

AUTHOR RESPONSE: This sentence was misplaced, so we deleted it.

Reviewer #3: Lines 34-36, page 13: It is not clear how the authors come to the conclusion that “there are other mechanisms that we did not measure, such as physical activity, that link stress with severe obesity.” Discussion would be needed.

AUTHOR RESPONSE: We expanded on our conclusion:

“We simultaneously tested associations 1) between perceived stress and severe obesity through dietary behaviors (unhealthy eating behaviors and diet quality) and 2) between perceived stress and severe obesity. We observed a direct and positive association with high levels of perceived stress and severe obesity, independent of the associations through unhealthy eating behaviors. Our study is cross-sectional, so we may miss longtime dietary behaviors that contribute to weight gain. Thus, the direct association between perceived stress and severe obesity may reflect longtime obesogenic dietary behaviors. In contrast, other non-diet-related factors may be associated with high levels of stress and severe obesity. For example, low-income women with high levels of stress may not have time for physical activity. In this case, the direct association between high levels of perceived stress and severe obesity may reflect associations with a lack of physical activity that we were not able to include in our model.

Conclusion

Reviewer #3: Lines 46-48, page 14: It should be written: “Our results show that low-income mothers are disproportionately burdened with stress and severe obesity.”

AUTHOR RESPONSE: Thank you. We have revised this sentence per your suggestion.

Reviewer #3: A more detailed discussion should be presented. The authors should express an opinion about the practical implications of the findings as well as they should give a more detailed outlook on the continuation of the study considering their results.

AUTHOR RESPONSE: We regret omitting discussion about the potential practical implications of our findings. We revised text in the Discussion as follows:
“The women in our study have children enrolled in WIC, through which they receive food vouchers, nutrition and health education, and health referrals. Integrating stress coping counseling into the WIC services could complement nutrition education. However, WIC would need increased financial resources to hire trained staff and to expand their services, but the multiple benefits to participants’ mental, physical, and eating behaviors could outweigh the costs.”

Reviewer #3: The authors claim that “Our findings highlight the fact that dietary behaviors are complex and, thus, it is important to understand underlying mechanisms that drive stress-induced unhealthy dietary behaviors to tailor stress coping strategies.” How can this sentence be explained? Discussion would be needed.

AUTHOR RESPONSE: This comment appears to repeat a comment previously addressed above.

First set of reviewer reports:

Reviewer #3: My only concern with this manuscript was that many of the references used were more than 10 years old, which perhaps may not reflect current research or perceptions on the topic. Was it a case of no new research had been done in a particular area or that the particular subject had not been updated with new research findings? In any case, authors may want to update a number of references.

AUTHOR RESPONSE: Thank you for your attention to our references. We have updated our manuscript throughout with new references. In addition to the references suggested by reviewer 4, we added the following citations.


- Lee & Fried. The glucocorticoid receptor, not the mineralocorticoid receptor, plays the dominant role in adipogenesis and adipokine production in human adipocytes. Int J Obes 2013


Please note, we do continue to cite seminal work that initiated this line of research. For example, Greeno and Wing and Stunkard and Messing were some of the first to investigate eating behaviors in response to external stimuli.

Reviewer #4: The manuscript "Increased Stress May Lead to Poor Eating Behaviors and Severe Obesity in Low-Income Women" is very important. Although it uses local data, which is not representative, and although the sample size is not high, the approach and findings are relevant. Only a few comments for improvement of the paper:

AUTHOR RESPONSE: Thank you for appreciating our study’s relevance.

Reviewer #4: 1- Eating behaviors are only one of the mechanisms by which stress causes obesity among women who live in poverty. So, the lack of full mediation makes sense. This should be discussed clearly. What are the other possible explanatory factors?

AUTHOR RESPONSE: This is a great point, and we regret we did not discuss in more detail other explanatory factors. We revised our discussion with the following text:

“We simultaneously tested associations 1) between perceived stress and severe obesity through dietary behaviors (unhealthy eating behaviors and diet quality) and 2) between perceived stress and severe obesity. We observed a direct association between high levels of perceived stress and severe obesity, independent of the associations through unhealthy eating behaviors. Our study is cross-sectional, so we may miss longtime dietary behaviors that contribute to weight gain. Thus, the direct association between perceived stress and severe obesity may reflect longtime obesogenic dietary behaviors. In contrast, other non-diet-related factors may be associated with high levels of stress and severe obesity. For example, low-income women with high levels of stress may not have time for physical activity. In this case, the direct association between high levels of perceived stress and severe obesity may reflect associations with a lack of physical activity that we were not able to include in our model.”

Reviewer #4: 2- Ethnicity and other contextual factors may modify the complex associations between actual obesity, perceived obesity, body image, eating, being on diet, intention to reduce weight. This could be a part of the discussion, particularly because the sample is local, and not representative. Please consult these papers for some of the examples of the ethnic variation in the above associations.

2-a) Gender and Ethnic Differences in the Association between Obesity and Depression among Black Adolescents, J Racial Ethnic Health Dispar. 2015. 2 (1): 1-13,


AUTHOR RESPONSE: Thank you for these great references. We agree it’s important to consider race/ethnicity and gender as potential contextual moderators. We did expand our discussion with respect to race/ethnicity; however, we did not discuss gender because our sample is only female and the issue is not as relevant to our study. We added the references below and the following text:

“Our sample was relatively small, which prohibited subgroup analyses by race/ethnicity that could underlie different dietary behaviors in response to stress. Race/ethnicity could play a role in perceived weight and behaviors to control weight (Assari & Moghani Lankarini, 2015). Findings from a recent study in a large nationally representative sample of adults suggest that among obese adults, blacks intended to lose weight less frequently than whites (Assari & Moghani Lankarini, 2015). Race/ethnicity also moderated associations between obesity and depression (Assari, J. Racial and Ethnic Health Disparities 2014) and between the additive effects of anxiety and depression on BMI (Assari, Int Cardiovasc Res J 2014). As perceived stress relates to mental health and as intention to lose weight relates to dietary behaviors, race/ethnicity could also be an important contextual determinant of how women’s perceived stress relates to BMI through dietary behaviors. This research question warrants attention in future studies with larger sample sizes.”


Reviewer #4: 3- Interestingly, the study (figure 2) has shown differential paths of eating (as a potential mediator of stress) to obesity based on the severity of obesity. This should be discussed in more detail. Is it a power issue, or the theory supports this finding? Is it a moderation of level of obesity?

AUTHOR RESPONSE: Thank you. We have expanded our discussion with the following:
“We observed associations for eating behaviors, diet quality, and severe obesity but not for eating behaviors, diet quality, and overweight or moderate obesity. More women in our sample were overweight and moderately obese than severely obese, so it is unlikely that the lack of associations is due to low sample size and power. The difference in associations suggests that different mechanisms may be operating between stress and moderate obesity than between stress and severe obesity.”

Reviewer #4: 4- Although figure 2 only suggests that the effect of stress on diet score exclusively passes through eating (sounds reasonable to me), figure 1 also proposes a direct path from stress on diet, which does not pass through diet quality. This needs further explanation. How can stress change diet through paths other than eating?

AUTHOR RESPONSE: We regret omitting our rationale for the direct path of stress of diet quality that does not pass through eating behaviors. We now include the following explanation in our Methods:

“We included in our model the three constructs of eating behaviors (emotional, uncontrolled, and cognitive restraint). Although these eating behaviors are salient to our research question, we acknowledge that they do not represent the full universe of eating behaviors. For example, stress-induced food cravings could affect diet quality without necessarily being one of the three eating behaviors we modeled. Therefore, we includes the direct pathway from stress to diet quality to capture pathways from stress to obesity through unmeasured dietary behaviors that we cannot model with these data.”

Reviewer #4: 5- In the statistical note, authors mention:

We addressed confounding of associations between perceived stress and weight status by controlling for income, age, race/ethnicity, whether the dietary recall day was a typical day, and if the respondents had one or two 24-hour dietary recalls.

However, the models do not show SES factors. I understand that all women are low income. Still income has a distribution, which makes a difference. Socioeconomic factors and age should be included in the model. Marital status needs to be addressed too.

AUTHOR RESPONSE: We regret we did not describe the additional SES confounders we included (marital status and income). We did not include education because we ran a version of the model controlling for education and it did not change the associations between perceived stress and weight status. We added a footnote to both Figures 1 and 2 to reflect the confounders we controlled for:

“We controlled for the following confounders along the perceived stress to weight status pathways: income, age, race/ethnicity, whether the dietary recall day was a typical day and if the respondents had one or two 24-hour dietary recalls, marital status, and income.”
6- Summary of the models (path estimates, standard errors, p values) should be shown in a table. More details of the modeling strategies should be also added to the methods.

AUTHOR RESPONSE: We agree adding a summary table with all of the path estimates, standard errors, and p-values will clarify our modeling strategy. We added Table 2 to present these estimates. In addition, we regret that our submission lacked the details of our structural equation model results. We have added the following to our Results:

“Model fit for the SEM presented in Figure 2 was good (X2 p = 0.17, RMSEA = 0.04, CFI = 0.93, TLI = 0.89). Perceived stress was directly and positively associated with severe obesity (β = 0.26, p = 0.007), emotional eating (β = 0.50, p < 0.001), and uncontrolled eating (β = 0.38, p < 0.001). Counter to our hypothesis, we did not observe an indirect pathway from perceived stress to weight status through eating behaviors and diet quality. Higher cognitive restraint was associated with higher diet quality (β = 0.43, p < 0.001). However, women with a higher diet quality score were more likely to be severely obese (β = 0.25, p = 0.007) than women with a lower diet quality score. We present a summary of all parameter estimates in Table 2.”