PEER REVIEW HISTORY

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ARTICLE DETAILS

<table>
<thead>
<tr>
<th>TITLE (PROVISIONAL)</th>
<th>The Effects of Fun-Seeking and External Locus of Control on Smoking Behaviour: A Cross-sectional Analysis on a Cohort of Working Men in Singapore</th>
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<tr>
<td>AUTHORS</td>
<td>Lee, Kar Fye Alvin; LEE, Eun Hee; ROBERTS, Adam; Car, Josip; Soh, Chee Kiong; Christopoulos, Georgios</td>
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VERSION 1 – REVIEW

| REVIEWER                     | Mzayek, F  
|                              | University of Memphis, Division of Epidemiology, Biostatistics and Environmental Health |
| REVIEW RETURNED              | 25-Feb-2022 |
| GENERAL COMMENTS             | Re: External Locus of Control and Smoking Behaviour: The Mediating Effect of Fun-Seeking |
|                              | The manuscript reports a study examining the association of two motivational constructs, the behavioral activation system (BAS) and the behavioral inhibition system (BIS) positive with tobacco smoking status. The study also examines whether the locus of control (internal vs. external) belief is associated with smoking behavior and whether BAS/BIS score, or one of its subscales, mediates that association. Overall, the manuscript is well-written, and the methodology appears appropriate. There are some points that need to be addressed, however. |
|                              | Introduction: |
|                              | 1. Page 8, paragraphs 1 and 2”…suggesting that our sample did not deviate from the behavioural patterns of previous studies” and “...after ensuring that our sample was similar to previous studies...”. I am not sure why it is important to ensure that the new study mirrors other studies findings in order to test a new hypothesis. |
|                              | Methods: |
|                              | 1. Page 9, 1st paragraph “ages ranging 21.94 – 66.54”. What does 0.94 and 0.54 of the year mean? |
|                              | 2. It will be helpful to provide the lowest and highest possible scores for each scale and subscale (maybe in the footnote of table 1) |
|                              | 3. A “Statistical analysis” subtitle should be added to methods and all information about models’ building, models’ descriptions, and models’ testing should be put in it instead of in the “Results” section. |
|                              | 4. It is not clear how multicollinearity did not exist in the BIS/BAS model when it included three subscales (dimensions) of the same construct. |
|                              | Results: |
|                              | 1. It is preferable to provide 95% CIs for the ORs instead of P. |
Discussion:
1. The underlying theory of mediation is that the mediator is an intermediate step in the causal pathway between the independent and the outcome variables. That is, the independent variable causes the mediator which causes the outcome partially or completely. This implies at least two requirements: the independent variable has occurred before the mediator, and there is a known mechanism (or, at least, a plausible mechanism) explaining the causal pathway between the three variables. While these requirements are difficult to confirm in psychological and behavioral research, the authors should be very careful not to imply an actual causal relationships between LOC, BAS, and smoking status based on statistical models of mediation. The authors failed to discuss other explanations of their findings, such as confounding. In fact, that LOC masked the association of fun-seeking with smoking status in the combined model may suggest, contrary to authors’ assertion, that it is more proximal to the outcome than fun-seeking. Another explanation could be that LOC confounded the association of fun-seeking with smoking status.

2. Related to (1), the authors’ recommendations for future anti-smoking interventions (last paragraph in page 20 and 1st paragraph in page 21) are not warranted because they are not supported by the findings from this study in terms of establishing a strong evidence of a causal pathway from LOC to smoking through BAS.

| REVIEWER | Lucchiari, Claudio  
| University of Milan, Philosophy |
| REVIEW RETURNED | 21-Apr-2022 |

GENERAL COMMENTS
The paper describes a study on 369 participants (107 smokers and 262 non-smokers, all males) who took part to a larger study on workspaces conditions. The authors studied the relationship between Locus of Control (internal vs external), BIS/BAS parameters and smoking status using regression models. They found that external locus of control predicts the smoking status (smoking vs. non-smoking) and that fun-seeking (measured as a subscale of the BIS/BAS scale) can play a modulating effect. The study in quite interesting as it supports the vision that tangle cigarette smoking needs a better knowledge of cognitive and motivational factors that can differently modulate the chose to initiate smoking and the inability to stop or to stay abstinent. However, I have some concerns that I think authors should pay attention and that deserve further work.

In particular:
1- The text would benefit from a language editing. Some sentences are not clear and other are too long and with many repetitions.
2- Aims and hypothesis should be better described. The authors report two preliminary hypotheses that they state to be already verified, then the main aim and two other hypotheses. I think that the main aim should be reported first and then the studies hypotheses that naturally are linked to the preliminary hypotheses (indeed, if there is no statistical relationship between the studied variables, no other analysis would make sense). Furthermore, the two main hypotheses about the unique prediction power of LOC and BIS/BAS should be better stated, putting in the text the specific technical use the of the words “unique” and “prediction” within the text. Finally, it’s not clear where hypothesis 2 comes from: some reference in the text should be provided. Probably, the
literature about the relationship between LOC, BIS/BAS and smoking should be better explored in the introduction.
3- In the first part of the introduction, authors report statistics about gender-related smoking distribution (pag 5, row 10) that are supported by any reference. I don’t think that reported figure can be applied to any cultures. In fact, different studies have found that now the number of female smokers is close to male’s. I think that they refer to their cultural context (Singapore), but this fact is very important, since their results could be linked to the specific cultural context of the study. These aspects should be discussed in the conclusion and limitation sections. Actually, Locus of control can be strongly influenced by the culture and so the modulating effect of BIS/BAS parameters. Also, BIS/BAS dimensions are linked to physiological characteristics that can be differently modulated in males and females. This aspect should be addressed too.
4- The authors used only self-report methods to assess the smoking status. Potential limitations of this method should be stated and discussed (e.g., Stelmach, R., Fernandes, F. L. A., Carvalho-Pinto, R. M., Athanazio, R. A., Rached, S. Z., Prado, G. F., & Cukier, A. (2015). Comparison between objective measures of smoking and self-reported smoking status in patients with asthma or COPD: are our patients telling us the truth?. Jornal Brasileiro de Pneumologia, 41, 124-132.)
5- Limitation about the statistical power of their analysis should be better addressed in the conclusion section. In fact, the subsamples are quite imbalanced, since most of the participants were non-smokers.

VERSION 1 – AUTHOR RESPONSE

Reviewer: 1

Introduction:
1) Page 8, paragraphs 1 and 2 “...suggesting that our sample did not deviate from the behavioural patterns of previous studies” and “...after ensuring that our sample was similar to previous studies...”. I am not sure why it is important to ensure that the new study mirrors other studies findings in order to test a new hypothesis.

We thank the reviewer for highlighting this point. Thus, further clarification has been made. We agree with the reviewer that our findings need not mirror previous studies to test the new hypothesis, and it was not our intention to come across this way. The reason we tested the two preliminary hypotheses was to take a step-by-step statistical model-building approach to examine the underlying relationship between the variables. Notably, reviewer 2 agrees with this preliminary step by stating that “indeed, if there is no statistical relationship between the studied variables, no other analysis would make sense“. In any case, we obviously did not explain this well and to make this point clearer (following recommendations by both reviewers), the text retained only the original two “main” hypotheses (reflected as the first and second hypotheses in the new manuscript). The previously labelled “preliminary” hypotheses are now part of the process for testing the first hypothesis on pages 7 and 8.

“The first hypothesis of the study states that BIS/BAS and LOC are unique predictors of the different categories of smoking behaviour. Based on previous research, it was predicted that BIS/BAS would be associated with the different categories of smoking behaviour.[7–11] Similarly, it was predicted that LOC would be associated with the different categories of smoking behaviour.[12–19] Lastly, it was predicted that both BIS/BAS and LOC would be uniquely associated with the different categories of smoking behaviour.
The second hypothesis states that the relationship between LOC and different categories of smoking behaviour is mediated by BIS/BAS. According to mediation analysis guidelines [29–31], it was predicted that BIS/BAS would remain a significant predictor of the different categories of smoking behaviour after controlling for the effects of LOC. It was also predicted that BIS/BAS would be associated with LOC. Finally, it was predicted that the direct pathway would be significant, while the indirect pathway would not be significant.

Methods:
2) Page 8, 1st paragraph “ages ranging 21.94 – 66.54”. What does 0.94 and 0.54 of the year mean?

We would like to clarify that the decimal place was calculated from the date of birth to the date of data collection. However, to avoid confusion, this has been removed. Only whole numbers are reported for the age range. This amendment can be seen on page 8.

“The final sample consisted of 369 males, with ages ranging from 21 to 66 years (M = 39.06, SD = 11.05).”

3) It will be helpful to provide the lowest and highest possible scores for each scale and subscale (maybe in the footnote of table 1)

Indeed, this is a great suggestion. Thus, we have included the lowest and highest possible scores for each scale in the footnote of Table 1 on page 11. In addition, we noticed that we did not include the possible range of scores for BIS/BAS in the methods section as well. Hence, we have also included it on page 9.

“The BIS (range: 7-28) scale and the reward responsiveness (range: 5-20), fun-seeking (range: 4-16), and drive (range: 4-16) subscales have different ranges of possible scores.”

“Possible ranges of scores (Inhibition, 7-28; Reward Responsiveness, 5-20; Fun-Seeking and Drive 4-16; Internal and External Locus of Control, 0-28).”

4) A “Statistical analysis” subtitle should be added to methods and all information about models’ building, models’ descriptions, and models’ testing should be put in it instead of in the “Results” section.

As recommended by the reviewer, we have added a new subheading “Statistical Analysis” in the methods section on page 10 and described the model building, description, and testing details.

“Statistical Analysis
All statistical analyses were conducted in RStudio.[36] Given the categorical nature of the outcome variable, multinominal logistic regressions (using the mlogit package) were conducted to examine the effects of BIS/BAS and LOC on the different categories of current smoking status. The first model included BIS/BAS as the predictors. The second model included internal and external LOC as the predictors. The third model included BIS/BAS and internal and external LOC as the predictors to examine their unique contributions. Bonferroni correction was applied within each model to account for multiple comparisons across the various categories of the outcome variable when compared to the reference level (α = .016). Prior to examining the mediation effect of BIS/BAS on the relationship between LOC and current smoking status, two key criteria were examined. First, BIS/BAS had to remain as a significant predictor of current smoking status after controlling for LOC. Second, LOC had to be associated with BIS/BAS. Thereafter, the mediation effect would then be examined through a natural effect model (using the medflex package)."
5) It is not clear how multicollinearity did not exist in the BIS/BAS model when it included three subscales (dimensions) of the same construct. Indeed, and not surprisingly, there is some correlation amongst predictors in the BIS/BAS model. However, as indicated in footnote 3, the variance inflation factors ranged from 1.16 to 1.88. This is well within the cut-off point of < 10 as recommended by Hair, Black, Babin, & Anderson (2014), and, hence, satisfies the assumption of no multicollinearity for the purposes of conducting a regression model. We have further clarified this point in footnote 2 by stating the cut-off point.

"The variance inflation factors (VIF) ranged from 1.16 to 1.88, which is within the guidelines (VIF < 10) stipulated by Hair, Black, Babin, & Anderson.[39]"


Results:
6) It is preferable to provide 95% CIs for the ORs instead of P.

This is a great recommendation. We have included 95% confidence intervals for all odds ratio statistics from pages 13 to 18.

Discussion:
7) The underlying theory of mediation is that the mediator is an intermediate step in the causal pathway between the independent and the outcome variables. That is, the independent variable causes the mediator which causes the outcome partially or completely. This implies at least two requirements: the independent variable has occurred before the mediator, and there is a known mechanism (or, at least, a plausible mechanism) explaining the causal pathway between the three variables. While these requirements are difficult to confirm in psychological and behavioral research, the authors should be very careful not to imply an actual causal relationships between LOC, BAS, and smoking status based on statistical models of mediation. The authors failed to discuss other explanations of their findings, such as confounding. In fact, that LOC masked the association of fun-seeking with smoking status in the combined model may suggest, contrary to authors’ assertion, that it is more proximal to the outcome than fun-seeking. Another explanation could be that LOC confounded the association of fun-seeking with smoking status.

We agree with the reviewer that LOC masking the association of fun-seeking with smoking status is indicative of LOC being a mediator. We would, first, like to clarify that our initial rationale for testing fun-seeking as a mediator was predominantly theoretically driven. In particular, we formulated our hypothesis based on the theory of planned behaviour. We have further clarified this point on pages 6 and 7.

"In contrast to the motivational systems, LOC is thought to have relatively less proximal influence on our behaviour along the causal pathway according to the theory of planned behaviour.[22–24] Hence, LOC has been suggested to play a part in influencing one’s behaviour through its indirect effects on one’s motivational systems.[23,24] Indeed, previous meta-analysis has provided some empirical evidence supporting this theory in the context of smoking.[25] Specifically, the meta-analytic structural equation model revealed that smoking is a result of one’s motivation to engage in such behaviour, and this motivation is driven by antecedent psychological processes, such as perceived behavioural control. In addition, previous research has shown that internal LOC was positively correlated with BAS.[26,27] By contrast, a recent study found that external LOC was positively associated with BIS.[28] Furthermore, when examining BAS at the dimensional level, this study found that external
LOC was also positively associated with fun-seeking. Considering LOC’s lesser proximal influence on behaviour and its relationship with BIS/BAS, it appears that the influence of LOC on smoking behaviour may be explained by BIS/BAS. That is, one’s perception of control may influence the regulation of one’s appetitive motivations, which may then have an indirect impact on one’s smoking behaviour. Hence, the second aim of this study was to examine the indirect influence of LOC on the different categories of smoking behaviour through BIS/BAS.

However, given the masking effect of LOC that the reviewer rightly brought up, we agree with the reviewer that it is more appropriate to test the mediation effect of LOC. We have included the analysis with LOC as the mediator on pages 17 and 18.

“While we hypothesised that the relationship between LOC and the different categories of smoking behaviour is mediated by BIS/BAS, as can be seen in Table 4, fun-seeking was no longer a significant predictor in distinguishing daily smokers from non-smokers after the inclusion of internal and external LOC in the third model. Hence, the first key criterion that the mediator had to be associated with the outcome variable after controlling for the predictor was not met.[29–31] By contrast, external LOC remaining as the only significant predictor in the third model satisfied this criterion, indicating its potential as a mediator. That is, the relationship between fun-seeking motivation and smoking behaviour may be explained by external LOC. Hence, contrary to our initial hypothesis, the mediating effect of external LOC on the relationship between fun-seeking and smoking behaviour was examined. Notably, fun-seeking was found to be a significant predictor of external LOC, B = 0.44, SE = 0.14, p = .001, which satisfied the second key criterion of a mediation analysis. Hence, a mediation logistic regression analysis was performed to examine the potential mediating effect of external LOC on the relationship between fun-seeking and current smoking status (daily smoking vs non-smoking) while controlling for other predictors, namely inhibition, reward responsiveness, drive, and internal LOC. Given that the outcome variable in our mediation model was binary, using traditional ordinary least square methodology may result in biased estimates.[41] Hence, we adopted the natural effect model for more robust estimates of the direct and indirect pathways.[42,43] The direct pathway was not significant (Odds ratio = 1.20, B = 0.18, SE = 0.09, p = .058, 95% Confidence Interval = 0.99-1.44). However, the indirect pathway was found to be significant (Odds ratio = 1.04, B = 0.04, SE = 0.02, p < .050, 95% Confidence Interval = 1.00-1.08). Overall, the mediation analysis indicated that, indeed, there was a mediation effect of external LOC on fun-seeking in predicting daily smokers from non-smokers.”

Furthermore, the interpretation of this model has been added to the discussion section on pages 18 to 19.

“The present study investigated the relationships between BIS/BAS, LOC, and current smoking status. First, we examined the hypothesis that BIS/BAS and LOC are unique predictors of the different categories of smoking behaviour. Fun-seeking, a component of BAS, was found to be associated with current smoking status (daily smoking vs non-smoking) after controlling for BIS and other aspects of BAS (reward responsiveness and drive). This is consistent with similar research previously conducted in other adult populations.[8,9] Similarly, external LOC was also found to be associated with current smoking status (daily smoking vs non-smoking), controlling for internal LOC. This finding also corroborates previous research conducted in a younger population.[12–15] However, we found that the combined inclusion of BIS/BAS and LOC in the third model demonstrated that only external LOC remained a significant predictor of current smoking status (daily smoking vs non-smoking) when controlling for BIS/BAS and internal LOC. By contrast, fun-seeking was no longer a significant predictor in this model. Next, we examined the mediation hypothesis. Given that the relationship between a mediator and an outcome must remain significant after controlling for the effects of a predictor prior to conducting a mediation analysis, the examination of fun-seeking as a mediator was no longer justified. By contrast, external LOC remaining as a significant predictor was indicative of its
potential as a mediator. Indeed, further mediation analysis revealed that the predictive effect of fun-seeking on distinguishing daily smokers from non-smokers was mediated by external LOC.

Overall, these findings suggest that greater levels of fun-seeking motivation were indirectly associated with greater odds of being a daily smoker than a non-smoker through its effects on increased levels of external LOC. This is contrary to the notion that motivational systems are proximally closer to behavioural outcomes as compared to belief systems and that generic belief systems play a part in influencing behaviours through their effects on the motivational systems.[22–24] Hence, it appears that there may be other pathways towards smoking behaviour besides the one proposed by the theory of planned behaviour.[24] Arguably, the reasoned action processes as described in the theory of planned behaviour may not be the only pathway towards smoking behaviour. For instance, other researchers have proposed an alternative pathway towards smoking behaviour that is driven by spontaneity and reactivity towards social situations.[44,45] Given that fun-seeking is a motivational approach primarily driven by novelty and spontaneity,[4] our findings appear to be more in line with this alternative pathway in explaining smoking behaviour. Hence, these novel findings further our understanding of the potential antecedent processes of smoking behaviour by providing some empirical evidence indicating that external LOC has a mediating effect on how fun-seeking influences smoking behaviour. In other words, a motivation system that is predominantly driven by novelty and spontaneity may lead to an individual believing that one’s future outcomes in life are mainly due to chance rather than one’s own action, which in turn may then lead to an increased risk of being a daily smoker. Overall, this study provides some indicative evidence to support the notion that external LOC belief may underlie the relationship between fun-seeking motivation and smoking behaviour, which indicates that the relationship is more complex than previous research has suggested.”

In addition, we agree that there might be other confounding variables that should be considered. These points have been further clarified on page 22.

“It should be emphasised that there are potential confounding variables, such as gender and cultural differences, that this study did not take into consideration. For instance, multiple studies have found that locus of control was influenced by gender and nationality.[52–55] In addition, there is also empirical evidence from functional and structural neuroimaging studies indicating gender differences in BIS/BAS.[56,57] Hence, the complex nature of culture and gender on BIS/BAS, LOC, and smoking behaviour should be considered in future research. In addition, given the potential confounding effects between external LOC and fun-seeking on smoking behaviour, our findings should be further tested in future research through a double randomisation design by experimentally manipulating the predictor and mediator in two separate experiments to ascertain the direction of the relationship and, consequently, provide more concrete evidence of the mediation effects observed in this study.[58]”

8) Related to (1), the authors’ recommendations for future anti-smoking interventions (last paragraph in page 20 and 1st paragraph in page 21) are not warranted because they are not supported by the findings from this study in terms of establishing a strong evidence of a causal pathway from LOC to smoking through BAS.

We agree that our mediation model does not demonstrate strong evidence of causality. Our findings only demonstrated some support for the mediation model. Hence, we have suggested the use of a double randomisation experimental approach to ascertain our mediation model findings as a logical next step for future research. In light of the reviewer’s comments, we have toned down our language regarding the mediation findings and associated implications on pages 19, 22, and 23.

“Hence, these novel findings further our understanding of the potential antecedent processes of smoking behaviour by providing some empirical evidence indicating that external LOC has a mediating effect on how fun-seeking influences smoking behaviour. In other words, a motivation
system that is predominantly driven by novelty and spontaneity may lead to an individual believing that one’s future outcomes in life are mainly due to chance rather than one’s own action, which in turn may then lead to an increased risk of being a daily smoker. Overall, this study provides some indicative evidence to support the notion that external LOC belief may underlie the relationship between fun-seeking motivation and smoking behaviour, which indicates that the relationship is more complex than previous research has suggested.”

“Our findings may have implications on the strategies involved in the prevention and treatment of smoking behaviours. Specifically, treatments might benefit by placing more emphasis on changing the belief that one’s future health outcomes are mainly dependent on luck and fate, which is beyond one’s control. For instance, motivational enhancement therapy has been previously found to be effective in smoking cessation.[59] This therapy is a client-oriented approach directed at enhancing a patient’s intrinsic motivation to change their maladaptive behaviours by giving structured feedback, providing clear advice and alternative options, expressing empathy, and focusing on the client’s self-efficacy, optimism, and personal responsibility.[60] The focus on personal responsibility and self-efficacy is closely related to the notion of shifting from a predominantly external LOC to an internal LOC. Indeed, previous research has demonstrated that both LOC and self-efficacy were predictors of smoking cessation.[61] Overall, our findings highlight the importance of giving external LOC beliefs greater consideration over fun-seeking motivations in smoking cessation therapy. Future research should consider experimentally manipulating external LOC beliefs and fun-seeking motivations and examine prospective changes in smoking behaviour.”

Reviewer: 2
1) The text would benefit from a language editing. Some sentences are not clear and other are too long and with many repetitions.

We thank the reviewer for highlighting this issue. We have checked through and edited the manuscript accordingly. In addition, we will also be sending the manuscript for proofreading prior to publication.

2) Aims and hypothesis should be better described. The authors report two preliminary hypotheses that they state to be already verified, then the main aim and two other hypotheses. I think that the main aim should be reported first and then the studies hypotheses that naturally are linked to the preliminary hypotheses (indeed, if there is no statistical relationship between the studied variables, no other analysis would make sense). Furthermore, the two main hypotheses about the unique prediction power of LOC and BIS/BAS should be better stated, putting in the text the specific technical use of the words “unique” and “prediction” within the text. Finally, it’s not clear where hypothesis 2 comes from: some reference in the text should be provided. Probably, the literature about the relationship between LOC, BIS/BAS and smoking should be better explored in the introduction.

Again, we thank the reviewer for this comment. We have restructured the introduction by first stating the main aims, followed by the main hypotheses/predictions. In addition, we have also explained the technical terms, such as “unique contribution” and “prediction”, within the text. Finally, we have also emphasised the literature regarding the proximity of the different psychological constructs with respect to smoking prior to stating the second aim for clarity. These changes are made on pages 6 to 8.

“Given that there is empirical evidence supporting the notion that both BIS/BAS and LOC may underlie smoking behaviour, the first aim of this study was to examine the unique contribution of BIS/BAS and LOC on predicting the different categories of smoking behaviour. Prediction refers to the degree to which one or more predictors may explain the outcome variable. Unique contribution refers to the effect of one predictor on the outcome variable after controlling for the effects of other
predictors in the model. In contrast to the motivational systems, LOC is thought to have relatively less proximal influence on our behaviour along the causal pathway according to the theory of planned behaviour.[22–24] Hence, LOC has been suggested to play a part in influencing one’s behaviour through its indirect effects on one's motivational systems.[23,24] Indeed, previous meta-analysis has provided some empirical evidence supporting this theory in the context of smoking.[25] Specifically, the meta-analytic structural equation model revealed that smoking is a result of one’s motivation to engage in such behaviour, and this motivation is driven by antecedent psychological processes, such as perceived behavioural control. In addition, previous research has shown that internal LOC was positively correlated with BAS.[26,27] By contrast, a recent study found that external LOC was positively associated with BIS.[28] Furthermore, when examining BAS at the dimensional level, this study found that external LOC was also positively associated with fun-seeking. Considering LOC’s lesser proximal influence on behaviour and its relationship with BIS/BAS, it appears that the influence of LOC on smoking behaviour may be explained by BIS/BAS. That is, one’s perception of control may influence the regulation of one’s appetitive motivations, which may then have an indirect impact on one’s smoking behaviour. Hence, the second aim of this study was to examine the indirect influence of LOC on the different categories of smoking behaviour through BIS/BAS.

The first hypothesis of the study states that BIS/BAS and LOC are unique predictors of the different categories of smoking behaviour. Based on previous research, it was predicted that BIS/BAS would be associated with the different categories of smoking behaviour.[7–11] Similarly, it was predicted that LOC would be associated with the different categories of smoking behaviour.[12–19] Lastly, it was predicted that both BIS/BAS and LOC would be uniquely associated with the different categories of smoking behaviour.

The second hypothesis states that the relationship between LOC and different categories of smoking behaviour is mediated by BIS/BAS. According to mediation analysis guidelines [29–31], it was predicted that BIS/BAS would remain a significant predictor of the different categories of smoking behaviour after controlling for the effects of LOC. It was also predicted that BIS/BAS would be associated with LOC. Finally, it was predicted that the direct pathway would be significant, while the indirect pathway would not be significant.'
In addition, cultural and gender influences have also been discussed on page 22 as recommended by the reviewer.

“It should be emphasised that there are potential confounding variables, such as gender and cultural differences, that this study did not take into consideration. For instance, multiple studies have found that locus of control was influenced by gender and nationality.[52–55] In addition, there is also empirical evidence from functional and structural neuroimaging studies indicating gender differences in BIS/BAS.[56,57] Hence, the complex nature of culture and gender on BIS/BAS, LOC, and smoking behaviour should be considered in future research. In addition, given the potential confounding effects between external LOC and fun-seeking on smoking behaviour, our findings should be further tested in future research through a double randomisation design by experimentally manipulating the predictor and mediator in two separate experiments to ascertain the direction of the relationship and, consequentially, provide more concrete evidence of the mediation effects observed in this study.[58]"

4) The authors used only self-report methods to assess the smoking status. Potential limitations of this method should be stated and discussed (e.g., Stelmach, R., Fernandes, F. L. A., Carvalho-Pinto, R. M., Athanazio, R. A., Rachied, S. Z., Prado, G. F., & Cukier, A. (2015). Comparison between objective measures of smoking and self-reported smoking status in patients with asthma or COPD: are our patients telling us the truth?. Jornal Brasileiro de Pneumologia, 41, 124-132.)

We appreciate the reviewer for highlighting this methodological limitation. We agree that there are limitations to using self-report methods. Hence, this point has been discussed on pages 21 to 22.

“A key methodological limitation pertaining to this study is the use of self-report as an assessment of current smoking status. Notably, previous research comparing self-report and objective assessments of smoking behaviour has shown that a high proportion of asthma and chronic obstructive pulmonary disease patients that were smokers falsely reported themselves as non-smokers.[48] Another study also found that self-reported assessment underestimated the prevalence of smoking in Georgian adults, particularly women, as compared to objective assessment.[49] A similar pattern of results was also observed in Korean adolescents.[50] By contrast, a study conducted on the Canadian population found that the prevalence of smoking based on subjective assessment approximated those derived from objective assessment.[51] Overall, it appears that the accuracy of self-report as an assessment of smoking behaviour may be dependent on factors, such as gender, situation, or culture. Hence, our findings should be interpreted with caution and should only be generalised to Singapore. Future researchers should consider comparing subjective and objective assessments of smoking in the context of the Singapore population. Alternatively, objective measures of smoking, such as urinary cotinine concentration, could be adopted in future studies.”

5) Limitation about the statistical power of their analysis should be better addressed in the conclusion section. In fact, the sub-samples are quite imbalanced, since most of the participants were non-smokers.

We thank the reviewer for this point. Theoretically speaking, imbalance is not that big of an issue with logistic regression (rather, the statistical assumption is related to the absolute number of cases in the smallest category). With that said, this limitation has been elaborated on and highlighted as a future research direction on page 21.

“LOC and BIS/BAS, however, did not predict the differences amongst other categories of current smoking status (i.e., occasional smoking and ex-smoking relative to non-smoking). This is likely due to the relatively smaller number of observations within each of the two categories of current smoking status (e.g., in the full model, occasional smoking, n = 22, & ex-smoking, n = 43), which is another limitation of the study. Indeed, Jong and colleagues have suggested that models with ten or fewer
observations per predictor in the smallest category of the outcome variable, particularly in models with small total sample sizes, are likely to have poor predictive performance.[47] Hence, it appears that our sample size may not be sufficient to provide robust estimates for the occasional smoking and ex-smoking categories in the multinomial logistic regression models. To increase the statistical power of these models, future research should consider increasing the total sample size through greater recruitment effort or adopting stratified sampling across the different categories of current smoking status.”

**VERSION 2 – REVIEW**

<table>
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<th>REVIEWER</th>
<th>Lucchiarì, Claudio</th>
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<td>University of Milan, Philosophy</td>
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<td>REVIEW RETURNED</td>
<td>20-Aug-2022</td>
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<tr>
<td>GENERAL COMMENTS</td>
<td>I feel the authors did a good job and the paper is much improved.</td>
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