Author's response to reviews

Title: Social Interactions of Eating Behavior among High School Students: A Cellular Automata Approach

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Author's response to reviews: see over
Dr Noori Akhtar-Danesh
Editor in Chief
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Dear Sir

Please find enclosed the revised version of our manuscript, “Social Interactions of Eating Behavior among High School Students: A Cellular Automata Approach”.

The reviewers’ comments have been very constructive and helped us a lot to improve the quality of our research work. We have prepared three separate letters (attached below) in response to their concerns which they have raised. All changes and addition of new text have been highlighted in blue color for easy readability.

Thank you.

Yours truly

All Authors
We would like to thank you for your comments. All the changes in the paper have been highlighted using blue color. Your original comments are presented in conjunction with our replies below:

**Reviewer**: Laurent Pezard

**Issue a)**: No numerical values are given for the parameters (alpha, beta, Gamma).

**Response**: We have introduced a new subsection “Parameter Settings”, on page 8, to resolve this issue. We also added new text in the second paragraph, under subsection, “Impact of purchasing power and positive social influence”, on page 9.

**Issue b)**: Gamma parameters are not defined.

**Response**: Please refer to the second paragraph of subsection, “Parameter Settings”, on page 8-9.

**Issue c)**: Social influence denoted P and N in the results section do not appear in the model description.

**Response**: They are now introduced in subsection, “Parameter Settings”. Please refer to the second paragraph of page 9.

**Issue d)**: Purchase power is denoted P_s, then P (in transition rules and this can be confounded with positive social influence, later on) and then PP.

**Response**: This error has been removed, and for consistency, PP_s is used in the whole manuscript.

**Issue e)**: In the transition rules, which counter is taken into account if both conditions are fulfilled?

**Response**: In the “Transition Rules” subsubsection, on page 7, we mentioned how this can be performed. Please refer to **Note** which is added just after Case IV, on page 8. Also in the first paragraph of section “Simulation and Results”, page 9, we added the way we have performed it.

**Issue f)**: The size of the model (i.e. number of cells), the time scale of one simulation step are not explicitly stated (although they can be inferred from the y and x labels of figure 2).

**Response**: The required information is now given in the caption of Table 2, page 11, and in the first paragraph of subsection “Impact of purchasing power and positive social influence, on page 9.

**Issue g)**: What are the boundary conditions?
Response: This semantic error has been removed from the text (explicitly from Abstract, page 1; and the second paragraph of subsection “Eating behaviour model”, on page 5). Some sentences have also been rephrased.

Issue h): (Change in the increase of purchasing power...) The difference between the three purchasing power (PP) scenarios is not obvious on the snapshots. Some quantification (such as spatial correlation) of a set of simulations could demonstrate the effect of PP.

Response: The title of this subsection has been changed, “Impact of purchasing power and positive social influence”. We have added more information in the caption of Table 2 caption, on page 11. Considering your suggestion of showing results using quantitative data, we added a paragraph on page 12 in the subsection, “Impact of social influence on healthy eating”. Although, same information can be captured for simulations presented in the subsection, “Impact of purchasing power and positive social influence”, but we presented our results using intermediate snapshots of simulation runs as we wish to present the clustering of students who share same eating patterns. The second snapshots in column are also revised. Previously, they were presenting students eating behavior captured at 6 months, now they present eating behavior after 3 months.

Issue i): (Change in the increase of healthy impact) Does the results corresponds to only one simulation run or an average over several different initial conditions? The second solution with standard deviation is certainly preferable.

Response: The heading is changed to “Impact of social influence on healthy eating”. The results shown in Figure 2 are not related to a single simulation run, instead they are different under different parameter values. The horizontal axis shows the timeline (1000 days for all cases). We have added this information in the caption of Figure 2. The new information, in the form of Figure 3 on page 13, and second paragraph under subsection, “Impact of social influence on healthy eating”, aptly responds to your concern.

Issue j): (Phase diagram) Same question: is this the result of only one simulation run? What is PM in the figure title?

Response: The Phase diagram, Figure 4, is not an output of a single simulation run, instead it summarizes how the system behaves when we keep $P=0.01$ and varies $N$ between 0.004 to 0.016. This information has also been added in the caption of the figure on page 14. The ‘PM’ has been replaced with ‘purchasing power’.

Issue k): Notations:
Parameter alpha, beta and Gamma are numbered (1, 2, 3, 4). For alpha and beta, it corresponds to BH, BU, PH, PU. This could be explicit in the notation.

Response: Equations (1) and (2), on page 7, have been modified to resolve these issues.

Issue l): Table 2: (Isn’t it a figure?)

Response: These are the snapshots of different simulations aggregated in a table.
**Issue m)**: Since $N=0.01$ is constant over all the simulations, its appearance for each snapshot is confusing.

**Response**: We have removed “$N=0.01$” from the table and mentioned its relevance in the caption.

**Issue n)**: Only clearly different snapshots are of interest.

**Response**: Snapshots presented in column 2 (6 months) have been replaced with the snapshots taken after 3 months.

**Issue o)**: Moore neighborhood is not usually described as a boundary condition. A boundary condition describes the behavior of the cells at the limit of the model.

**Response**: We endorse your point and the statement is the text has been rephrased. We also added the topological structure of our CA, on page 5, paragraph 3.

**Issue p)**: Figure 1: The "Purchase Healthy" in the red circle should be "Purchase Unhealthy"

**Response**: The revised version of the image has been incorporated on page 6.

**Issue q)**: Is the MatLab code available?

**Response**: In the last sentence of first paragraph of section “Simulation and Results”, we mentioned that the interested readers can ask us for executable code or the source code.

**Issue r)**: What are the effects of initial conditions?

**Response**: The three different simulation cases elaborate the effect of changing initial conditions on the system. To allow us to see the impact of social parameters, we assumed same population from same distribution. Please refer to the last paragraph of page 12.
We would like to thank you for your comments. All the changes in the paper have been highlighted using blue color. Your original comments are presented in conjunction with our replies below:

Reviewer: Andac Hamamci

Issue 1: It is not clear how the parameters alphas, betas, ... are chosen. In case, there does not exist real data (as indicated in Discussion section) to choose these parameters, the parameters used to obtain the presented results should be provided, for repeatability. It would also be useful to include constraints on choosing the parameters (if any) and the sensitivity to the parameters can be discussed.
Response: Please refer to page 7. Equations (1) and (2) have been revised to reflect the whole mechanism and also we have added a new subsection “Parameter settings”, on pages 8-9, to respond to your other concerns.

Issue 2: In introducing "Purchasing Power" why did you set the BPs parameter to the value: 1? Since the BPs defined in eq.1 is incremental, is it limited to any interval (such as a maximum of 1)?
Response: It is not necessary to set the BPs parameter to the value 1. The sentence “Effectively the BPs value is set to 1 at each iteration.” has been removed. The sentence is originally on page 7 in the second paragraph under subsection “Model update with purchasing power”.

Issue 3: Please give the mathematical formula for Negative and positive social influence parameters (P and N).
Response: The variables P and N have been defined in a new subsection “Parameter settings” on page 9.

Issue 4: How did you assign the time scale? (for example months in table 2)
Response: Second sentence of the subsection, “Impact of purchasing power and positive social influence” on page 9 is introduced to resolve this concern.

Issue 5: In defining Moore Neighborhood, the neighborhood is referred as "boundary". Is it a mistake? The boundary is usually referred as the edges of the whole cellular map. Could you also provide the boundary conditions used? (periodic, fixed etc.)
Response: Yes, it was a mistake and we have revised our statement in the abstract, page 1, methods section, as well as in the subsection, “Eating behaviour model”. More detailed information is given in the second paragraph, on page 5.
**Issue 6:** Same initial condition chosen randomly is used in experiments. How much are the results sensitive to initial condition?

Response: We have summarized the system’s behavior under the different initial parameter values in section, “Transition between healthy and unhealthy eating”, on page 13. The value of P is fixed at 0.01 and we varied 0.004<=N<=0.016 to demonstrate the healthy and unhealthy eating behavior trends. As mentioned in the new subsection, “Parameters settings”, on pages 8-9. We would also like to highlight that the initial population is the same for all the experiments and the distribution of individual types, (BH, BU, PH, PU) has been kept uniform, 25% in each category. During experimentation, we just changed the social influence parameter (i.e., P and N).

**Issue 7:** How are the results sensitive to the transition rules? i.e., choosing other mathematical forms considering same reasoning.

**Response:** The core of the transition rules is the most commonly used relational operators in cellular automata theory. Similar rules were reported in our previous works too [34, 35].

**Issue 8:** In Figure 1: There are two "Purchases Healthy" balloon but no "Purchases Unhealthy". Is there a mistake?

**Response:** Yes, it was an error and we have changed the image on page 6. Moreover, colors are now consistent with the images reported in Table 2, page 11.

**Issue 9:** In Table 2: Please include a legend that indicates the labels for the colors (or type in the description text above the table).

**Response:** Description of colors has been added in the Table 2 caption, page 11.
We would like to thank you for your comments. All the changes in the paper have been highlighted using blue color. Your original comments are presented in conjunction with our replies below:

Reviewer: Mahshid Dehghan

**Issue 1:** Abstract: In result section explicitly report your finding instead of “our first simulation showed how the population responded to…….”
**Response:** The results section in Abstract has been rephrased.

**Issue 2:** Introduction: This section is too long and needs to be shortened and focus on related issues to the objective of present study.
**Response:** The Introduction section has been edited to focus more on the core issues of the study. The first paragraph highlights the issue of obesity in developing and developed countries; the second and third paragraphs outline the importance of peers on eating behavior in a school environment; the fourth paragraph emphasizes the importance of modeling approaches; and the last paragraph deals with the modeling technique that we’ve applied in this study.

**Issue 3:** Discussion section: Please indicate how finding of this study assist health policy makers and health professionals for combating childhood obesity.
**Response:** We have added a few statements in the Conclusion section on page 17 to address the implications of our study to other research disciplines and public health professions.

**Issue 4:** Comments in document
**Response:** We have incorporated all the changes mentioned in the supplementary document.