Author's response to reviews

Title: Food choice motives including sustainability during purchasing are associated with a healthy dietary pattern in French adults

Authors:

Benjamin Allès (b.alles@eren.smbh.univ-paris13.fr)
Sandrine Péneau (s.peneau@eren.smbh.univ-paris13.fr)
Emmanuelle Kesse-Guyot (e.kesse@eren.smbh.univ-paris13.fr)
Julia Baudry (j.baudry@eren.smbh.univ-paris13.fr)
Serge Hercberg (s.hercberg@uren.smbh.univ-paris13.fr)
Caroline Méjean (c.mejean@uren.smbh.univ-paris13.fr)

Version: 1 Date: 26 Jul 2017

Author's response to reviews:

Reviewer #1:

Article of "Sustainable food choice motives during purchasing are associated with a healthy dietary pattern in French adults" (NUTJ-D-17-00089).

This article investigated the association between Sustainable food choice motives during purchasing and a healthy dietary pattern in French adults because sustainability has become a greater concern among consumers that may influence their dietary intake, however, only a few studies investigated the relationship between sustainable food choice motives and diet and they focused on specific food groups.

The article demonstrated that individuals were more likely to have a "healthy diet" when they were more concerned by not buying a food for environmental concerns, ethics and environment, absence of contaminants, local production in women and innovation in men, and when they were less concerned by price. Individuals were also less likely to have traditional or western diets when they gave importance to food choice motive dimensions related to sustainability. Individuals, especially women, having higher concerns about food sustainability dimensions such as ethics and environment and local production, appear to have a healthier diet.

These findings provide evidence for policy making of public health and awareness of general population. However, some questions need to be clarified were listed below:
Q1: Study sample is including a greater proportion of women and participants with higher education. Those characteristics that have been previously reported as demographic predictors of greater concerns for health and sustainability. Thus, individuals with greater concerns for health and sustainability may be over-represented in this sample.

➔ As the reviewer has highlighted this element of the discussion, the discussion has been clarified by adding some information:

- Page 18 lines 379-402:

“Those characteristics that have been previously reported as demographic predictors of greater concerns for health and sustainability (29,56,57). Indeed a previous study among older adults reported that individuals with higher income and higher level of educations were more likely to report health related motives (56). Another studies highlighted that women were more likely to exhibit higher concerns for the environment, whereas individuals with lower levels of educations are less environmentally sensitive (57). Women seemed to also report higher importance for local production and sustainable foods in a previous study among young adults (29). Thus, individuals with greater concerns for health and sustainability may be over-represented in this sample. However, it may be difficult to estimate how it could have biased our study sample, as no data from studies using random samples in the general population are available. To prevent this bias, statistical models were stratified by sex and adjusted for education. Secondly, a previous study assessed the representativity of the Nutrinet-Santé cohort study comparing the distribution of sociodemographic and economic characteristics to statistics from the French census data (58). Notable differences were reported concerning gender and educational level. Thus, women and individuals with higher level of education are over-represented in our sample from the Nutrinet-Santé study as they are more likely to participate in voluntary-based health and epidemiological studies in many epidemiological fields (58). A high interest in nutrition could also lead to this overrepresentation (58,59).

Finally, a comparison study about dietary intake was conducted comparing the Nutrinet-Santé study cohort to a representative sample of the French population (60). The authors reported a low magnitude of differences in food intakes between those studies, except for fruit and vegetables.”

Q2: Volunteers were invited to complete an optional validated questionnaire on food choice motives on the "Nutrinet-Santé" website, how to control the quality of the questionnaires is very important. Please clarify the quality control of the data collection.

Q3: The questionnaire included 63 items divided into 9 dimensions scores, the reliability and validity of the questionnaire need to be detected.

➔ Following these two comments from the reviewer dealing with quality control and validation of our questionnaire, we added information about the quality of the questionnaire, the control of the data collection and the reliability assessment that was performed before collecting this data in the manuscript. We completed the methods section as follow:
Briefly, the final questionnaire included the 63 most relevant items, and was divided into 9 dimensions scores obtained by first-order analysis (…). Four intercorrelated dimensions (ethics and environment, local and traditional production, health and absence of contaminants) formed a second-order factor interpreted as healthy and environmentally friendly consumption, corresponding to a sustainability dimension in food choices for consumers (33). The other five uncorrelated dimensions do not directly relate to sustainable food choice motives.

To control the quality of the data collected through such a questionnaire, feasibility, internal validity and reliability were assessed in 637 randomly selected subjects participating in the Nutrinet-Santé cohort study (33). Feasibility was measured by assessing specific questions on the perceived complexity and difficulty of filling in the questionnaire, and whether the questionnaire was too long and redundant, using the same 4-point Likert scale from « I strongly disagree » to « I strongly agree » (33). The feasibility assessment revealed that only one third of the sample found the questionnaire redundant before it was shortened. The shorter version used for this study may be even more feasible.

The underlying structure of the questionnaire was determined by exploratory factor analysis and then internally validated by confirmatory factor analysis. Reliability was also assessed by internal consistency of selected dimensions and test–retest repeatability. The model demonstrated excellent internal validity (adjusted goodness of fit index=0.97; standardized root mean square residuals=0.07) and satisfactory reliability (internal consistency=0.96, test–retest repeatability coefficient ranged between 0.31 and 0.68 over a mean 4-week period).

Also, to improve quality of data collected, controls were implemented in the web-based questionnaire to avoid missing values implying that individuals had to fill in every question. In addition, at the end of the questionnaire, participants had access to all questions and given answers to check if their answers were right and had the possibility to modify them eventually.

We also complete the discussion section as followed pages 19-20 lines 417-429:

Food choice motives were assessed using a validated questionnaire specifically designed for the French population (33). As food choice motives were self-reported some difficulties may have appeared when participants completed it by themselves (33). As the answers from the questionnaire were based on self-reporting, the reliability and validity of the questionnaire could be questioned. However, reliability tests were performed (33) and showed that both internal consistency for each factor and repeatability for most of the items were satisfying. In addition, the model demonstrated excellent internal validity. However, external validity may be limited because this questionnaire was developed in a French cultural setting and cross-cultural adaptations may be required before submitting it to other cultures (24). To our knowledge, this is the first study using such a validated food choice motives questionnaire with a specific focus on sustainability. Indeed, additionally to an increasing number of items investigated compared to previous studies, this questionnaire also covered new themes such as local production and environmental limitations for example.
Reviewer #2:

Although food sustainability, sustainable diet and food choice motives were sequentially used in Introduction, you concretely establish the relationship among those terms.

Why is it necessary to explain food choice motives and dietary intake?

➢ To clarify how food choice motives and dietary intake could be related, we modified our hypotheses in the introduction adding the following part, page 3 Lines 43-54:

“Consumers can be considered as the main stakeholders in nutritional public health policies (7). Public health strategies aiming at encouraging healthy and environmentally friendly food choices need to better understand consumer motives when purchasing. However, little is known about the relationship between their food choice motives including those related to sustainability and dietary intake. Previous studies suggest that the motivation to behave sustainably is frequently found among consumers, while its translation into actual sustainable food choices and consumptions seems more difficult (8–13). Previous researches about dietary behaviors have indicated that food choice motives may play a mediating role between personal norms and values and dietary behaviors (14,15). Indeed some types of concerns (e.g.: health, environment, etc.) may be explained by a combination of values that could influence dietary behaviors such as purchases and food choices and thus diet quality (15).”

What is the difference between food choice motives and sustainable food choice motives?

➢ We thank the reviewer for this helpful comment. We totally agree with the reviewer about the fact that the difference between food choice motives and sustainable food choice motives is not clearly defined. We apologize for the lack of clarity in the previous version of the paper.

The validated tool used in this study to measure overall food choice motives was including a large focus on sustainability. Previous studies used questionnaires based on the 9 dimensions Food Choice Questionnaire (FCQ) developed in 1995 by Steptoe et al and its complementary scales. However, those questionnaires were not including environmental items for specific foods and did not take into account the food products with strong environment effects (see Sautron et al 2015). Additionally, the social dimension of these questionnaires did not take into account fair trade or other items included in the dimension of “local and traditional production”. This is why a new questionnaire included all those aspects of sustainability (as defined by FAO) was developed. Also, in the validation study of this questionnaire by Sautron et al., four intercorrelated dimensions (ethics and environment, local and traditional production, health and absence of contaminants) formed a second-order factor interpreted as healthy and environmentally friendly consumption, corresponding to a sustainability dimension in food choices for consumers. Thus, the other 5 uncorrelated dimensions may not directly relate to sustainable food choice motives.

This is why, to avoid confusion, we have improved all sentences that might seem tendentious and modified the title of the manuscript as follow:
“Food choice motives including sustainability during purchasing are associated with a healthy dietary pattern in French adults”

The following sentence in the introduction was also modified page 4 lines 59-61:

“Although sustainability is a rising concern in consumers, to date, only a few studies (23,25–29) have investigated food choice motives covering all the dimensions of sustainability as defined by the FAO (1).”

The methods section was also completed:

- page 5 lines 102-104:

“As no study has simultaneously and thoroughly explored all dimensions of sustainability as defined by FAO (1), in consumer food-buying motives, in particular social dimension,, a new questionnaire including all aspects of sustainability has been developed (33).”

- page 6 lines 117-121:

“Four intercorrelated dimensions (ethics and environment, local and traditional production, health and absence of contaminants) formed a second-order factor interpreted as healthy and environmentally friendly consumption, corresponding to a sustainability dimension in food choices for consumers (33). The other five uncorrelated dimensions do not directly relate to sustainable food choice motives.”

You should examine the representativeness of internet-using adult volunteers for the total of French population.

➢ The representativeness of internet-using volunteers compared to the French population has been previously assessed in two studies. We completed our discussion about the representativeness acknowledging these two studies page 18 lines 392-402:

“Secondly, a previous study assessed the representativity of the Nutrinet-Santé cohort study comparing the distribution of sociodemographic and economic characteristics to statistics from the French census data (58). Notable differences were reported concerning gender and educational level. Thus, women and individuals with higher level of education are over-represented in our sample from the Nutrinet-Santé study as they are more likely to participate in voluntary-based health and epidemiological studies in many epidemiological fields (58). A high interest in nutrition could also lead to this overrepresentation (58,59).

Finally, a comparison study about dietary intake was conducted comparing the Nutrinet-Santé study cohort to a representative sample of the French population (60). The authors reported a low magnitude of differences in food intakes between those studies, except for fruit and vegetables.”
Following another reviewer’s suggestion, we also completed the discussion about overrepresentation of women and individuals with higher education page 18 lines 378-391:

“Our results may not be generalizable to the general population. First, our study sample includes a greater proportion of women and participants with higher education. Those characteristics that have been previously reported as demographic predictors of greater concerns for health and sustainability (29,56,57). Indeed a previous study among older adults reported that individuals with higher income and higher level of educations were more likely to report health related motives (56). Another studies highlighted that women were more likely to exhibit higher concerns for the environment, whereas individuals with lower levels of educations are less environmentally sensitive (57). Women seemed to also report higher importance for local production and sustainable foods in a previous study among young adults (29). Thus, individuals with greater concerns for health and sustainability may be over-represented in this sample. However, it may be difficult to estimate how it could have biased our study sample, as no data from studies using random samples in the general population are available. To prevent this bias, statistical models were stratified by sex and adjusted for education.

What is the reason that you compared food choice dimension between sexes in Table 2?

授予 We apologize that this element was not clearly explained in the methods and that the reviewer did not understand why we conducted separate analyses between sexes. In fact, as it is presented in the methods - statistical analyses section, a statistically significant interaction between sex and the food choice motives lead to stratified analyses by sex. We have presented also mean food choice motives dimensions scores separated by sex to give the readers additional statistical information for interpretation of the results. To enhance the comprehension of the methods section, we have moved the sentence explaining this point at the end of Statistical analyses section page 10 Lines 217-220 in the methods section and modified it as follow:

“Mean scores of the nine dimension scores of food choice motives were also computed by sex to describe their ranking in stratified analyses. Mean dimension scores were compared between men and women using t-tests.”

Moreover, why did you conduct factor-analysis in men and women together, although you showed sex differences in Table 2? Did you conduct factor-analysis by sex?

授予 We chose to derive the dietary patterns by factor-analysis among the whole sample as, to our knowledge, no hypothesis from previous studies using this method justified to separate analyses by sex. Also, in the Nutrinet-Santé study, dietary patterns between men and women do not seem to differ consistently and therefore justify the need to perform factor analysis separately. This is why we have conducted factor analysis with men and women together.

However, you examined dietary pattern by sex in Table 3 and 4. So, was there sex differences in dietary pattern?

授予 You should confirm sex difference in dietary pattern and re-examine sex difference in the relationship between sustainable food choice motives.
We are sorry for this confusion. We did not examine dietary patterns by sex in table 3 and 4 but we stratified our analysis by sex because of an interaction between sex and food choice motives dimension scores in the models assessing associations with dietary pattern scores (not between sex and dietary pattern scores). Moreover a significant interaction between sex and food choice motives means that sex has a modifying effect in the relationship between food choice motives and diet, independently from the relationship between sex and diet. Thus, it does not seem necessary to re-examine sex differences as the results are already presented and discussed separately according to sex.