Author’s response to reviews

Title: Influence of Sense of Coherence on adolescents' self-perceived dental aesthetics; a cross sectional study

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Version: 1 Date: 05 Mar 2017

Author’s response to reviews:

BMC Oral Health

Editor Designate

Chun-Hung Chu

Dear Dr Chun-Hung Chu

Thank you for your letter. We would like to thank the reviewers for the detailed and important comments. After carefully analysing the comments and suggestions from the referees, we dealt with them all and believe that, as a result of these changes, the manuscript is significantly stronger.

I am resubmitting the revised manuscript OHEA-D-16-00443, as well as the list detailing where the reviewer comments or suggestions were addressed on behalf of the authors.
If any further information is required, please let me know and I will provide it promptly.

Yours sincerely,

Nicola Innes

(on behalf of Aline Cavalcanti da Costa, Fabrícia Soars Rodrigues, Priscila Prosini da Fonte, Aronita Rosenblatt and Mônica Vilela Heimer)

Manuscript OHEA-D-16-00443

In accordance with the suggestions and comments from the reviewers, the following changes have been made in the manuscript. Our responses follow each of the reviewers' comments.

Reviewer 1

In general, the English is sometimes difficult to understand (e.g. line 34-35, 83-84, 86-87, 88). Some grammar error should be modified.

• The language has been completely revised throughout the paper by the native English speaker within the group and we believe it to be of an appropriate standard now.

Abstract:

1. The aim of this study is to see "whether SOC influences the self-perception of dental aesthetics". But the author wrote in result as "adolescents had a negative self-perception of their dental aesthetics had a lower SOC …". Please keep the consistency of causality.

• The whole paper has been re-written to correct this error and the aims have been changed to clarify the relationships and direction of the investigation:
“The aim of this study was to investigate whether SOC levels were related to self-perception of dental aesthetics against assessed normative orthodontic treatment need among adolescents.” (Lines 104-106)

• The results section has been completely rewritten to keep consistency with the aims and direction of causality that was theorized (Lines 187 - 215).

M&M:

1. Cross-sectional study should follow the STROBE statement. Please check it.

• The STROBE statement was followed, but some details were omitted because of the article word limit. However, the requested information has now been added.

2. How were the subjects chosen from selected schools? Please specify. (line 90)

• The text now says “To ensure sample representativeness, simple random drawing was performed for each of the six administrative political regions, totaling 20 schools. In a second round of random selection, the subjects were chosen from the list of names from each school.” (Lines 117-119).

3. The sample size calculation was based on the prevalence of malocclusion. But the aim of this study is to investigate the association between SOC and self-perception of dental aesthetics.

• This is a good point and since we don’t have studies that can be used as reference to sample size calculation, we used the reference of 50%. The text now reads

“The sample size was calculated for the 13,750 students in this age range (from the Municipal Secretary of Education List), with an outcome prevalence of 0.50, a confidence interval of 95% and error margin of 5%. Taking into account a design effect equal to 1.5 and possible losses (20%), the sampled consisted of 674 students. Incomplete questionnaires were considered losses and represented 8.8% of the sample, resulting in a final sample of 615 students. (Lines 120-125).
4. Why "individuals with anterior tooth loss that hindered evaluation of malocclusion" were excluded? As all the missing teeth should be recorded for DAI. Please specify.

- According to DAI, missing teeth are expressed by the number of incisors, canines and premolars. The molars are not scored. In our sample, from the few adolescents who presented with tooth loss, the teeth lost were molars, therefore, they were not excluded as this did not affect the DAI score. The following text clarifies: “Since the eight components of the DAI require the anterior teeth for evaluation, individuals with loss of anterior teeth that hindered the evaluation of malocclusion were also excluded. (Lines 163-165).

5. The Kappa value of clinical examination is 0.74. Please address it.

- We have added the following explanatory text: “The calibration process was performed prior to the survey in a group of 30 children, 12 to 15 years old. Theoretical and clinical training and calibration exercises were arranged under the supervision of one benchmark examiner. The kappa value for intraexaminer reproducibility was 0.74.” (Lines 153-156):

6. According to the DAI grade, there should be a Grade 4 as total score > 35. Please specify why the author combined Grade 3 and 4 together.

- The text has now been changed and read: “weighting and the resulting DAI scores categorized as: Grade 1 (≤ 25 points) – little or no orthodontic treatment need; Grade 2 (26 to 30 points) – elective orthodontic treatment need; Grade 3 (31 to 35 points) - highly desirable orthodontic treatment need and Grade 4 (≥36 points) mandatory orthodontic treatment need.” (Lines 158-162).

7. The author set the median of OASIS and SOC as the cut-off point for positive and negative self-perception. Please specify whether the median was included in the positive or negative part.

- We have now included this information “As there is no standardized cut-off point for categorizing high or low SOC, in common with standard methodology for handing SOC data, values above or equal to the median were considered as high SOC and below the median were considered as low SOC [23,24]” (Lines 136-139) and “The median was set as the cut-off point.
The values above or equal to the median were considered negative self-perception, and the values below the median were considered positive self-perception [26].” (Lines 145-147).

Result:

1. The result of DAI+OASIS in Table 1 and 3 was not consistent. Please double check all the numbers.

   - Apologies, there were some typographical errors in the tables, the numbers have been checked and corrected and we have altered the appearance of the table slightly to make it easier to read.

2. Please specify what (A) (B) and (AB) in Table 4 means.

   - In the application of the Kruskal-Wallis test, it is detect that if there is a difference between the groups, but this does not mean that all are different, therefore "a posteriori" tests are applied (after the main test ) to know which pairs of groups differ from each other. The letters indicate which pairs differ from each other. This has now been clarified in the footer of Table 4, and has been added to the Methods section: “The Kruskal-Wallis test was used for comparisons between categories of numerical variables, with multiple-comparison tests employed in cases of significant differences. Different letters in parenthesis denote statistically significant differences between corresponding analyses.” (Lines 179-181).

3. What does the IOTN stand for in Table 5? Please check the format in Table 5 (the location of *).

   - Table 5 has now been corrected by removing the words IOTN stand and correcting the location of *

Discussion:

1. Please justify the methodology in discussion.
• We have now included this information: “This study used a cross-sectional design to verify the association among several variables at the same time with little or no additional cost. However, in interpreting the outcome of this type of study design, it is important to take into account its limitations. Due to the cross-sectional design used, it is possible only to demonstrate associations and hypothesis directions of relationships based on the theory we have adopted. It is not possible to demonstrate causality. Longitudinal studies are needed to identify the direction and strength of the relationships identified. Another limitation was the use of the Dental Aesthetic Index (DAI) which does not represent all occlusal traits. It should be stressed, however, that the participants sampled for this research were representative of a population of 13,750 students between 12 and 15 years of age and validated instruments were used.” (Lines 307-316).

2. Some information not related to the aim or the major outcome should be shortened. Duplicate information should be deleted.

• We have taken on board this point and the paper has been shortened and, we believe, better focused on the main aim and findings.

3. Please specify the limitation of this study.

• The Discussion section now has the following text: “This study used a cross-sectional design to verify the association among several variables at the same time with little or no additional cost. However, in interpreting the outcome of this type of study design, it is important to take into account its limitations. Due to the cross-sectional design used, it is possible only to demonstrate associations and hypothesis directions of relationships based on the theory we have adopted. It is not possible to demonstrate causality. Longitudinal studies are needed to identify the direction and strength of the relationships identified. Another limitation was the use of the Dental Aesthetic Index (DAI) which does not represent all occlusal traits. It should be stressed, however, that the participants sampled for this research were representative of a population of 13,750 students between 12 and 15 years of age and validated instruments were used.” (Lines 307-316).
Reviewer 2

This cross-sectional analytic study aimed to investigate the association between SOC and self-perceived dental aesthetics and whether SOC influences the self-perception of dental aesthetics. The manuscript could benefit from more conceptual clarity, both in terms of the concepts under study and the relationships between them. It also looks like it's a rewrite of a manuscript about malocclusion.

• This is a valid point and we have now justified the conceptual model that was followed, explained our theoretical basis for the hypothesis and improved clarity around the direction of causality throughout the paper.

1. Overall this study could benefit from greater conceptual clarity. Few of the concepts discussed are defined (e.g. self-perceived dental aesthetics, quality of life, self-perception of dental aesthetics, negative self-perception) and in other cases might be expressed better. For example, on life 58 when the authors write of a good perception of their health, do they really mean ‘perceive their health to be good’? This means something quite different.

• We agree that this paper was not as clear as it should have been. We have now justified the conceptual model that was followed and explained our theoretical basis: “The Wilson-Cleary conceptual model [19] (Figure 1) provides a construct for thinking about how individual factors (such SOC), biological clinical variables (dental aesthetics), health perceptions and quality of life (QoL) are linked. Considering the strong effect that SOC can have on oral health related quality of life (OHRQoL) [2], we hypothesized that SOC might contribute to individuals’ perception of
their aesthetics. Adapting the Wilson-Cleary model to demonstrate our hypothesis, we theorized that individual factors (in this case SOC), against the background of biological clinical variables (orthodontic treatment need), would influence oral health perception (self-perceived dental aesthetics). A low SOC, even the absence of normative orthodontic treatment need, would increase perceived orthodontic treatment need (Figure 2). Ultimately, this may influence orthodontic seeking behavior (although we did not assess this).

Therefore, the aim of this study was to investigate whether SOC levels were related to self-perception of dental aesthetics against assessed normative orthodontic treatment need among adolescents.” (Lines 93-106).

- We have now checked through the manuscript to ensure that we have been clear about always referring to them perceiving their health to be good/poor etc. These changes have been made throughout the manuscript.

- We agree and the meaning has been clarified by changing the sentence to read: “a good perception of their health” has been changed to “perceive their health and quality of life to be good” (line 82).

2. Having sorted the definitions the authors will need more careful recourse to theory to hypothesise relationships between the concepts. At the moment there are large leaps of logic in the introduction that are not well documented. At the most fundamental level a more comprehensive background section is needed.

For example data are needed to support the assertion in line 64, that self-perception of dental aesthetics is the main factor that drives seeking orthodontic treatment.

- We have clarified our hypothesis that low SOC influences individuals’ perceptions of the dental aesthetics to be negative even when there is no normative (clinically assessed) orthodontic need. Our model uses Wilson-Cleary conceptual model that links clinical variables with health related quality of life (see also response to question 1 above and Lines 93-106)
The references that support the assertion have now been added and the text clarified: “However, outwith the normative measures, self-perception of dental aesthetics seems to be the main factor that drives seeking orthodontic treatment [10-12] even where there is no clinically assessed (normative) treatment need.” (Lines 62-64)

There is also experimental evidence that SOC influences OHQoL that should be cited.

This has been included: “Furthermore, the influence of SOC on OHRQoL has been tested in a school-based cluster randomized control trial investigated an intervention comprising seven sessions designed to improve child participation and feeling of empowerment [18]. They tested the intervention’s effect on SOC and, using the Wilson-Cleary model [19] theorized that it influenced the children’s OHRQoL. The intervention enhanced SOC and improved OHRQoL.” (Lines 84-88)

Likewise, the relationship between self-esteem and receipt of orthodontic care needs more thought; there is a long-term cohort study (from Cardiff I think) that showed that better self-esteem predated and predicted receipt of orthodontic treatment and better long term outcomes.

We have re-written this section and added this important study –thank you for drawing our attention to it: “Several studies have shown the link between psychosocial factors and normative oral health/disease measures. In a long-term cohort study, in Cardiff, UK, self-esteem in adulthood was more strongly predicted (65% of the variance) by psychological variables such as: perception of quality of life; life satisfaction; self-efficacy; depression; social anxiety; emotional health and by self-perception of attractiveness. Only 8% of self-esteem was predicted by dental status [4]. A qualitative study of the effects of varying severities of developmental defects of enamel (DDE) with 10–15 years olds [5] found the presence of DDE to impact on individuals whose sense of self was defined by appearance and who depended on perceived approval from others about their appearance. Variations in the impact of DDE were related to defining aspects of sense of self rather than the enamel defects. Normative measures of malocclusion and treatment need have been shown to impact negatively on OHRQoL [6,7,8,9]. However, outwith the normative measures, self-perception of dental aesthetics seems to be the main factor that drives seeking orthodontic treatment [10-12] even where there is no clinically assessed (normative) treatment need. Individual’s perceptions of their need for orthodontic treatment are influenced by psychosocial factors including perceived norms of dental attractiveness [13].” (Lines 51-66)
3. In order to put so many diverse concepts together the authors will then need an explicit theoretical model of the sort expounded by Baker and Gibson's Epidemiology paper in CDOE (about 2011-12) and exemplified in Baker's studies on SOC.

- Thank you, we agree this is a very important point and should have been included from the start. In considering different theoretical models, we have found that the widely supported theoretical model of Wilson & Cleary conceptualizes the pathways between traditional clinical factors and health related quality of life, and fits well with our hypotheses. Their model proposes taxonomy of different measures of health outcomes at five levels: biological and physiological, symptom status, functional health, general health perceptions and overall quality of life. Each level is related to, and influenced by, characteristics of the individual and of the environment. Baker et al. (2010) follow this model and have verified that among the psychosocial factors, higher SOC predicted greater health perceptions and better quality of life. Along the same lines of theory, we have hypothesized that low SOC is likely to be an important factor that will influence individuals perceiving their dental aesthetics to be negative, even in the absence of orthodontic treatment need, and may ultimately drive seeking orthodontic treatment (Lines 93-103).

4. This is an analytic study so the sample size requires a power calculation based on the relationships being tested rather than a precision estimate for the prevalence of malocclusion.

- This is a good point and since we don’t have studies that can be used as reference to sample size calculation, we used the reference of 50%. The text now reads

“The sample size was calculated for the 13,750 students in this age range (from the Municipal Secretary of Education List), with an outcome prevalence of 0.50, a confidence interval of 95% and error margin of 5%. Taking into account a design effect equal to 1.5 and possible losses (20%), the sample consisted of 674 students. Incomplete questionnaires were considered losses and represented 8.8% of the sample, resulting in a final sample of 615 students. (Lines 120-125).

5. The point about conceptual clarity recurs in the methods. OASIS needs more careful introduction. What does it actually measure and how? E.g. Does it measure impact or perception?
• OASIS (Oral Aesthetic Subjective Impact Scale) is a scoring system to measure individual’s self-perception regarding their dental aesthetics. This is now explained as: Self-perceived dental aesthetics. The Oral Aesthetic Subjective Impact Scale (OASIS) [25] is composed of five questions addressing concerns and self-perception of dental appearance, and how dental irregularities negatively affect individual’s lives and their social relationships. Each question is scored on a one to seven Likert scale. The maximum score is 35 points, with higher scores denoting a more negative perception of dental aesthetics. The median was set as the cut-off point. The values above or equal to the median were considered negative self-perception, and the values below the median were considered positive self-perception [26].” (Lines 141-147).

6. A theoretical model would be helpful to guide the analytic strategy as it could be used to justify the direction and outcomes in the regression model.

The main aim of this paper wasn’t to test a theoretical model. However, the regression analysis was carried out to show the relationships between the variables rather than test a model. For the purposes of the reviewer, the equation is shown below for the theoretical model for SOC value as a function of the variables: age, sex and OASIS. We have not however, included this detail in the paper.

\[ Y_i = A + B.X_{1i} + C X_{2i} + D. X_{3i} + e_i \]

Where \( Y_i \) is the response variable (SOC) of person \( i \)

\( X_{1i} \): represents the age of person \( i \)

\( X_{2i} \): represents the sex of person \( i \) (0 = female and 1 = male)

\( X_{3i} \): represents the person's OASIS \( i \)
ei: represents the random error of person i.

For the model the estimated equation was:

\[ Y_{est}(i) = 73.30 - 1.103 \cdot \text{Age} + 0.903 \cdot \text{Sex} - 0.203 \cdot \text{OASIS} \]

7. The text could present results as if they were about people rather than numbers, as the tables present the data. So the text could be phrased something like 'Children with greater sense of coherence were more likely to perceive their . . .' This would make the results more accessible.

- We agree with this point and have rewritten parts of the text to make it more accessible.

8. The discussion needs substantial revision. The aim of the paper is not discussed until the 10th paragraph. Even then the results are merely repeated rather than their implications discussed. The discussion needs to consider why you have researched this topic and what the results mean.

- The discussion has been revised to consider the aims of the study and the conceptual model was followed. We have also re-ordered the paragraphs to reflect the aims and priorities of the research questions.

9.Whilst it is true that there are few studies investigating the relationship between SOC and perceived dental appearance, similar concepts have been studied. Marshman's qualitative study identified the looking-glass self as a possible predictor of concerns about fluorosis for instance.

- Thank you for pointing this out to us. This study has been included (56-59).

10. Towards the end I got the feeling that this was a revamped paper about malocclusion. There was the observation about the precision estimate, the DAI is the first variable described in the methods section and the early part of the discussion relates to these secondary outcomes. The paper needs more careful rewriting.
• The introduction, discussion and methodology have been restructured to make them more understandable and we have ensured that the investigation aims, theory and direction of causality have now all been carefully aligned.

11. The title and the abstract assume causality, which needs to be revised for a cross-sectional study.

• The title and abstract have been revised. The title is now “Influence of Sense of Coherence on adolescents’ self-perceived dental aesthetics; a cross-sectional study”. The abstract has been completely re-written.

Reviewer 3:

1 The principal confusion emanating from this paper is the lack of conceptual consistency.

The stated aim is to investigate the association between sense of coherence and self-perception of dental aesthetics and whether sense of coherence influences self-perception of dental aesthetics.

Several conceptual layers are presented in addition to sense of coherence. The way the paper is written it becomes difficult to distinguish which direction the analysis goes. Is sense of coherence the result of other self perceptions or does sense of coherence affect the other self perceptions? In addition, sense of coherence is described as strong-weak, but then also higher-lower or positive-negative. None of this is well explained. Some level of a theoretic model that can describe the hypothetical relationship may be of assistance.

Of course it needs to be recognized that a cross sectional study cannot really explain causal relationships, maybe that needs to be emphasized.

• Thank you, we agree these are very important points. We have used the widely supported theoretical model of Wilson & Cleary which conceptualizes the pathways between traditional clinical factors and health related quality of life. This fits well with our hypotheses and has allowed us to more clearly present and explain the study and its findings. Their model proposes taxonomy of different measures of health outcomes at five levels: biological and physiological, symptom status, functional health, general health perceptions and overall quality of life. Each
level is related to, and influenced by, characteristics of the individual and of the environment. Baker et al. (2010) follow this model and have verified that among the psychosocial factors, higher SOC predicted greater health perceptions and better quality of life. Along the same lines of theory, we have hypothesized that low SOC is likely to be an important factor that will influence individuals perceiving their dental aesthetics to be negative, even in the absence of orthodontic treatment need, and may ultimately drive seeking orthodontic treatment (Lines 93-103).

• To address some of these points, and to make the paper more understandable, it has been re-written throughout and restructured.

• The whole text has been reviewed and strong or weak SOC has been changed to high or low SOC, respectively.

Reviewer 4:

1. Sense of coherence (SOC) is important for everyone. The authors tried to explore the association between SOC and adolescents' self-perceived dental aesthetic. However, the authors used both DAI (clinical measure) and OASIS (self-report one). Those with no orthodontic treatment need scored had a negative perception of their aesthetics when having a weak SOC. For those with treatment need, SOC did not seem to influence their perception of their dental aesthetics. The significant results seem to be very limited to those with no orthodontic treatment need. The authors need to clarify what is the implication for those with no ortho treatment need, in terms of quality of life, understanding of patients perception, impacts on health systems etc.

• We agree that this has not been clear and the Introduction, Aims, Methods and Results have been re-structured to clarify the investigation. In addition, the Discussion section has been significantly re-structured and re-written with additional information included to clarify the implications of the study results. (Lines 190-219).