Author’s response to reviews

Title: Comparison of oral health behaviour between dental and non-dental undergraduates in a university in southwestern China—exploring the future priority for oral health education

Authors:
Mingming Li (434357021@qq.com)
Zhiwu Wu (1437486000@qq.com)
Rui Zhang (1498491279@qq.com)
Lei Lei (leilei@scu.edu.cn)
Siqi Ye (670669842@qq.com)
Ran Cheng (chengran@scu.edu.cn)
Tao Hu (hutao@scu.edu.cn)

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Author’s response to reviews:

Dear Editor:

We would like to thank you and all the reviewers for the valuable comments regarding our manuscript entitled “Comparison of oral health behaviour between dental and non-dental undergraduates in a university in southwestern China—exploring the future priority for oral health education”.

We have revised the manuscript and responded point by point to the comments of reviewers and highlighted the amendments in the revised manuscript.

We would like to submit this revised manuscript to BMC Oral Health and hope it is acceptable for publication in the journal.

Looking forward to hearing from you soon.

With kindest regards,

Yours Sincerely

Prof. Ran Cheng
Corresponding author:
Ran Cheng
Department of Preventive Dentistry, State Key Laboratory of Oral Diseases, West China Hospital of Stomatology, Sichuan University, Chengdu, Sichuan, China; Tel: 86-28-85503486; E-mail: chengran@scu.edu.cn
and
Tao Hu
Department of Preventive Dentistry, State Key Laboratory of Oral Diseases, West China Hospital of Stomatology, Sichuan University, Chengdu, Sichuan, China; Tel: 86-28-85503486; E-mail: hutao@scu.edu.cn

Reply to reviewers

Reviewer 1:

1. The authors confirmed in the text that their paper corroborated the work of Park et al in 2008 in that the dental students performed better than the non-dental students with regard to aspects of OHE. So, what does this paper offer in addition?
Response: Thank you very much for your invaluable question.
The article from Park et al is comparably ancient. We replaced it by a more recent article [Jeong M-K, Kim Y-M, Hong S-Y. A study on the oral health behavior of some dental hygiene students and other majors. Journal of Korean society of Dental Hygiene. 2011; 11(5):615-627]. (Discussion section, Page 12, Line 4-5)
The results of Jeong’s study indicated that dental hygiene students strongly recognized the importance of self-care behaviors towards oral health compared to other college students. It suggested that regular educational programs for the college student population should be implemented to increase their concern for oral issues and to improve their oral health status.
The differences of our study include the following items: 1) The OHE course in this survey was based on the etiology of oral diseases and the content was focused on specific direction of oral health behavior, which were different from other surveys (traditional education programs). 2) Furthermore, non-dental students had the same course in the part of “behavioral direction” as dental students. Although relatively professional education was more difficult for non-dental students than usual, it was helpful for students to understand the etiology-based knowledge and might be helpful for behavioral education as well. 3) According to the guideline of WHO, Chinese national survey haven’t included the undergraduate group. Their oral health behavior was unknown for years. 4) We explored the role of OHE focused on oral health behavior in both dental and non-dental students. More importantly, we used the dental group as a reference to identify the differences or gaps in oral health behavior between the two groups, aimed to identify some important problems, and to provide advice for future OHE (such as the use of new media and the correct use of Chinese herbal toothpaste).
The title of the paper says that it will "explore the future priority for oral health education". The paper correctly identified that new medias; TikTok, WeChat, and Taobao may be a way of improving OHE to the younger generations who use these media frequently. Suggestions about how these media could be used to promote better OHE should be included in an expanded discussion.

Response: Thank you very much for your invaluable suggestion. We have a supplementary discussion at the end of the discussion section.

Revise: In addition to traditional classes, WeChat groups, WeChat public accounts and Moments can be used for regular OHE, to be a reminder of flossing and to update new knowledge that is not included in textbook. Taobao links can provide vivid information about oral hygiene products, making OHE much more convenient and cost-effective. (Page 15, Line 11-15)

How will this research change Dental Student Teaching at the University? For instance, will new media applications be included?

Response: Thank you very much for your invaluable question. In the study, we found that dental students had overlooked flossing, which should be emphasized in the future. Some new media applications, WeChat group, WeChat public accounts and Moments (function of the new media “WeChat”) could be used to be a reminder of flossing and update new knowledge that is not included in textbooks. Moreover, some surveys showed that text messages can improve oral health behaviors [Hashemian TS, Kritz-Silverstein D, Baker R. Text2Floss: the feasibility and acceptability of a text messaging intervention to improve oral health behavior and knowledge. J Public Health Dent. 2015; 75(1):34-41]. It is possible that WeChat, which is widely used, can achieve the same or better results.

Revise: In addition to traditional classes, WeChat groups, WeChat public accounts and Moments can be used for regular OHE, to be a reminder of flossing and to update new knowledge that is not included in textbook. (Page 15, Line 12-13)

How will this research change General Health advice given to all students attending the University?

Response: Thank you very much for your invaluable question. Through the study, we found that students, especially non-dental students, were not good at oral health behavior or care in some aspects. It reminded us that health education should not only focus on health knowledge, but more importantly on health behavior. It would be more effective to give them the right methods and keynote points directly. These could be applied to general health education as well.

I thought Figure 5 was an excellent way to give a lot of information

Response: Thank you so much for your appreciation.
Reviewer 2:

General comment:

1、Overall the premise of this study is based on the old and outdated principles of health education which are shown to be ineffective in changing behavior.
3、The paper adds no new knowledge.
Response: Thank you very much for your invaluable suggestion. Your review comments are a great motivator for our research and this article. In view of the three aspects (old and outdated principles, ineffective in changing behavior and add no new knowledge), we have conducted in-depth thinking and consulted new literatures about OHE. Our answers are as follows:

Health education and oral health education (OHE) have a long history and have been a part of disease prevention. However, many surveys have shown that OHE is ineffective in improving oral health behavior or just has short-term effect [1-3]. Yevlahova et al. found that among various oral health promotion interventions, level of evidence was found to be strongest in studies of 1) counselling interventions, followed by 2) motivational interviewing interventions, models-based interventions, and lastly, 3) clinical prevention and health education model. Clinical prevention and health education interventions using standardized messages have been described as palliative in nature, ignoring the underlying factors that create poor oral health. Hence, they have failed to achieve sustainable improvements in oral health, especially in behavior [1]. The review of Elizabeth Kay et al. partly supported this idea. This review focused specifically on oral health promotion efforts and interventions within the context of a dental practice but not about legislative, regulatory or fiscal change, or community development. It suggested that verbal oral health promotion by dental professionals had a positive effect on patient knowledge, behaviour and gingival health, but the effect was short-term and insufficient [2]. The study from Ghaffari et al. supported the effectiveness of all oral health education and promotion interventions, but in short-term outcomes [3].

Some barriers (especially psychological factors) of these interventions included patients’ motivation and beliefs; sender’s belief in the credibility and effectiveness of oral health promotion; lack of appropriate resources (knowledge, staff, time and space). Hence, the reviews suggested that the psychology of behaviour change is the key to oral health promotion and greater emphasis on teaching oral health professionals about health psychology would make oral health promotion in the dental surgery more effective [1, 2].

In recent years, researchers have been studying the application of psychological intervention in oral health. It is pleased to find its advantages in promoting individual’s oral health behavior of toothbrushing [4]. Motivational interviewing (MI) is one of the most studied forms of psychological intervention recently. The reviews form Elizabeth Kay et al. supported that MI technique had potential for helping patients with poor oral health [5]. And Alqarni et al. approved MI had been effectively used to promote oral health behavior [6].
However, Gao et al. showed that its application in dental health care, especially in improving periodontal health, remained controversial [7]. The review of Frost et al. has identified clear gaps in the evidence in support of most of the interventions (e.g. oral health behaviour, weight loss programmes for obesity) [8]. In the review of Cascaes et al., four studies reported positive effects of MI on oral health outcomes whereas another four showed null effect. Additionally, it’s worth noting that individual models for health prevention alone may not be enough to achieve sustainable improvements in health at a population level (MI was developed to promote individual changes in a clinical setting) [9]. Similarly, counselling interventions and models-based interventions were based on clinical setting or individual service as well. In China, due to the large population, the lack of dentists, dental hygienists and medical resources, we may not think MI and these interventions are the most cost-effective way.

2) Considering the results of the above studies and the actual situation of China, OHE might be the most cost-effective method at present. Recent study of Menegaz et al. suggested educational interventions carried out by health professionals in the context of their practice still have the potential to promote oral health behaviour in the population [10]. Computer-aided, video-assisted, text-message-assisted and quantitative light-induced fluorescence technology-based learning in OHE were shown to have positive impacts on knowledge, attitude, behavior, and oral health recently [11-14]. In our clinical and teaching work, we do find that oral health education focused on behavior is effective in improving behavior. Thus, we still have capacity to improve the OHE approaches that suits for our current situation.

3) How to improve the current OHE?
Firstly, we regarded undergraduates as the best candidates for OHE. Inspired by Elizabeth Kay et all [2] that “the greater the difference between the ‘sender’ of an oral health promotion message and the ‘receiver’, the less likely the oral health promotion is to be effective”, we thought undergraduates have a high educational level and they are more capable of accepting OHE. Undergraduates can also assume triple roles as individuals, parents (or teachers) and children, to act as OHE assistants, to improve all people’s oral health behavior. (background section, page 5 line9- page 6 line 18)

Secondly, several studies have analyzed the difference of oral health behavior between dental and medical students. Yao et al. suggested that both of them need to improve their knowledge, behavior and status of oral health [15]. For non-medical undergraduates, who make up the majority of the university population, they may have more oral health problems to address. However, few studies have explored oral health problems among non-medical undergraduates. Additionally, according to the guideline of WHO, Chinese national survey haven’t included the undergraduate group. Their oral health behavior was unknown for years.
Lastly, the course was etiology-based and focused on the guidance of oral health behavior, which might be different from other studies or courses. Regarding the introduction of periodontal diseases and the guidance of oral health behavior, non-dental students received the same content as dental students. Although the relatively-professional education was more difficult than usual, it was helpful for students to understand the etiology-based knowledge and might be helpful for behavioral education as well.
Our research may not be very distinctive in the field of OHE research. However, it revealed the oral health behavior of dental and non-dental university students. In this study, some shortage of oral health behavior was investigated, suggestions were provided for OHE and interventions in the future. For example, we consider the new-media-assisted OHE as the promising method to improve people’s behavior in China.

Thank you again for your professional and invaluable suggestion, which fostered us a deeper understanding of oral health promotion and OHE. We will keep up with the cutting edge of relevant studies and keep improving.

References:


2. The manuscript is poorly structured.
Response: Thank you very much for your invaluable suggestion. We feel sorry to hinder your reading because of the unclear structure. We have made a moderate adjustment to the structure.
Revise:
1) Background: We dissertated the issues step by step/layer upon layer.
a. Oral disease is a worldwide epidemic and has imposed a huge burden. OHE is one of the most cost-effective methods to prevent oral diseases.
b. OHE had not improved people’s behaviour with the pace of knowledge and attitudes in China. We need to investigate the current status of the oral health behaviour of Chinese, identify existing problems and provide solutions for future OHE.
c. Children and undereducated elderly people often fail to do well in oral health. Adults, who assume triple roles as individuals, parents (or teachers) and children, may be able to act as OHE assistants, to improve all people’s oral health behaviour.
d. In-school undergraduates are young adults and ideal candidates to improve people’s oral health behaviour.
Research purpose: Therefore, in this survey, we compared the differences in oral health knowledge and behaviours between dental and non-dental students at Sichuan University with the aim of identifying key problems and providing advice on OHE to help undergraduates better perform the role of OHE assistants.
2) Results: Our contents was mainly divided into four parts: oral health care frequency, toothbrushing method, the types and replacement frequency of toothbrushes, and students’ considerations when selecting toothbrushes and toothpaste. We presented the results parallelly.
3) Discussion: We had a point-to-point discussion of the results section. For each discussion section, we used the form of “summarize first, then explain” and compared and discussed the results of dental and non-dental students.

4. In short, this paper is conceptually weak and poorly written. English language revision is highly required.
Response: Thank you very much for your invaluable suggestion.
This manuscript has been reviewed by English language editing service, American Journal Experts. We have included the certification.
Specific comment:

1、Poor and unclear title: Comparison of oral health care?? [KNOWLEDGE, BEHAVIOUR??] between….
Response: Thank you very much for your invaluable suggestion. We have revised the title.
Revise: Comparison of oral health behaviour between dental and non-dental undergraduates in a university in southwestern China——exploring the future priority for oral health education.
(Title section, Page 1, Line 1-3)

2、There is a huge potential to improvise the abstract for clarity. Needs a complete rewrite.
Response: Thank you very much for your invaluable suggestion. We’ve rewritten the abstract.
Revise: (Page 2)
Abstract
Background: Based on a national survey in 2015, people’s oral health knowledge and attitudes in China have greatly improved after decades of oral health education (OHE). However, dental caries and periodontal disease are still serious oral problems. People’s oral health behaviour has not kept up with the pace of knowledge and attitudes. The objective of this study was to determine undergraduates’ oral health behaviour status and existing problems by comparing dental students and non-dental students at Sichuan University. We hope to provide some suggestions for future OHE.
Methods: A quasi-experimental study designed with a pre-test and a post-test group was conducted. A total of 217 dental students and 135 non-dental students were enrolled. They were given a course of OHE focused on oral health behaviour. A survey about oral health behaviour and knowledge was conducted before and after the course.
Results: According to the pre-course survey, dental students surpassed non-dental students in terms of toothbrushing frequency, method, time and flossing. Unfortunately, flossing was overlooked by all the students. After the course, both dental and non-dental students showed strong willingness to improve their oral health behaviour. More non-dental students than dental students were willing to use toothpicks and Chinese herbal toothpaste before and after the course.
Conclusions: OHE focused on behaviour plays a positive role for university students. Future OHE and interventions should focus on flossing, toothbrushing methods, toothpicks, Chinese herbal toothpaste and modifications to adopt new media.

3、The background is conceptually weak. It provides very little evidence to make a strong case for the purpose of the study and also lacks clarity in organisation.
Response: Thank you very much for your invaluable suggestion. We have reorganized the structure and added some evidence.
Revise:
1) Organisation/Structure: we dissertated the issues layer upon layer.
a.Oral disease is a worldwide epidemic and has imposed a huge burden. OHE is the most cost-effective methods to prevent oral diseases.
b.OHE had not improved people’s behaviour with the pace of knowledge and attitudes in China. We need to investigate the current status of the oral health behaviour of Chinese, identify existing problems and provide solutions for future OHE.
Children and undereducated elderly people often fail to do well in oral health. Adults, who assume triple roles as individuals, parents (or teachers) and children, may be able to act as OHE assistants, to improve all people’s oral health behaviour.

In-school undergraduates are young adults and ideal candidates to improve people’s oral health behaviour.

Research purpose: Therefore, in this survey, we compared the differences in oral health knowledge and behaviours between dental and non-dental students at Sichuan University with the aim of identifying key problems and providing advice on OHE to help undergraduates better perform the role of OHE assistants.

2) Added evidence:
Additionally, teacher-led OHE in school is equally effective as dentist-led OHE in improving the oral hygiene status of adolescents. (Page 5, Line 16-18)

4. The methodology adopted in this paper is unclear and not informed by scientific evidence. The data collection methods and the analysis lack robustness.
Response: Thank you very much for your invaluable suggestion. To make the methodology clear, we listed the experimental method, data collection method and data analysis method and explained the reasons for their use.
1) Experimental method: Due to the limitation of education and ethic consideration, randomized controlled trials or cluster-randomized controlled trial could not be conducted. Instead, a pre- and post-quasi-experimental studies was applied [16, 17, 18, 19].
2) Data collection method: “Questionnaire Star” is a professional online survey, measurement and voting platform (https://www.wjx.cn). We used it to distribute and collect the questionnaire. All the students finished the questionnaires by cell phone or by computer through “Questionnaire Star”.
3) Data analysis method: According to the characteristics of the data, we used corresponding statistical methods (the Wilcoxon signed-rank test, chi-square test and Fisher’s exact test) for statistical analysis with SPSS 16.0. The methods were validated by a statistical expert.
References:

5. Results are not trustworthy and are superficial.
Response: Thank you very much for your invaluable suggestion. The results were analyzed based on the available data. We had discussions with public health experts. Additionally, we have reviewed the literature extensively and conducted discussions
about the results. In the future, we will increase long-term follow-up and further excavate the results.

6. The discussion fails to make a strong argument, there is lack of discussion of literature (in support/against) and is unorganised. Several claims such as using a toothpick or herbal toothpaste improves oral health is flawed and not well supported by evidence. Often the authors use outdated references (&gt;10 years old) to support their study findings. The paper lacks critical sections of research and policy implications and strengths of the study.
Response: Thank you very much for your invaluable suggestion.
1) According to your suggestion, we have adjusted the discussion to show support or against some ideas of literatures. For example:
   a. We supported Jeong et al. that oral health knowledge and behaviour of dental students were better than non-dental students. We thought preclinical education and practice can enhance dental students’ knowledge and behaviour of oral health. (Reference 26, Page 12, Lin 4-17)
   b. We partly supported Cheng et al. that Chinese herbal toothpaste had some effects in alleviating gingival inflammation and preventing caries. But the correct use of it was not mentioned. Hence, we wrote in this paper that “Chinese have partiality for Chinese herbal toothpaste. Its correct usage should be addressed in future courses on OHE; for example, when facing gingival bleeding caused by periodontitis, relying on herbal toothpaste instead of scaling may worsen the disease.” (Reference 34, 35, Page 14, Line 13-20)
2) The claims about toothpicks and Chinese herbal toothpaste have been amended.
   Revise:
   a. OHE on avoiding the use of toothpicks should be strengthened to minimize periodontal damage caused by improper use. (Page 13, Line 19-20)
   b. Chinese have partiality for Chinese herbal toothpaste. Its correct usage should be addressed in future courses on OHE; for example, when facing gingival bleeding caused by periodontitis, relying on herbal toothpaste instead of scaling may worsen the disease. (Page 14, Line 17-20)
3) The majority of the outdated references have been replaced.
   Revise:

4) We have made some modest adjustments to the structure and content in order to highlight our critical section and strengths more clearly.

The critical section of this research was to find out the problems existing in oral health behaviours of dental and non-dental undergraduates, analyze the causes and provide suggestions for future OHE. Our results and discussion sections revolved around this point.

As for strength, the course was etiology-based and focused on the guidance of oral health behavior, which might be different from other studies or courses.

At the same time, we added some policy-related content.

Revise:
Since 2016, several oral-related policies have been published in China. One policy clearly states that we have to promote OHE in preschool and primary school [8]. In addition, as China is facing the aging population and upcoming social-economic burden resulted from elderly, it’s urgent to pay more attention on elderly people’s OHE. (Page 5, Line 9-13)

7、Conclusions currently seem vague.
Response: Thank you very much for your invaluable suggestion. We have amended the conclusion section.

Revise: According to the pre-course survey, dental students significantly surpassed non-dental students in terms of toothbrushing frequency, method, and time and floss use. Floss was overlooked by all the students. After the course, both dental and non-dental students showed strong willingness to improve their oral health behaviour. Future OHE should focus on flossing, toothbrushing methods, toothpicks, Chinese herbal toothpaste and modifications to adopt new media. (Page 16, Line 11-16)

Reviewer 3:
1. Title: According to the article, this survey was conducted among undergraduates in Sichuan University. Do they reflect the situation of students in Southwestern China, or in the whole China?
Response: Thank you very much for your invaluable question. We only surveyed students at Sichuan University. This study may not be the representative of the southwestern China or the whole China. We have amended the title.

Revise: Comparison of oral health behaviour between dental and non-dental undergraduates in a university in southwestern China——exploring the future priority for oral health education. (Page 1, Line 1-3)

2. Introduction: You mentioned that 'Here we aimed to figure out the oral health status of undergraduates'. Did you mean oral health education status?
Response: Thank you very much for your invaluable question. We feel sorry that we didn’t make it clear. Here, it mainly means “oral health behaviour status”, but also includes “oral health education status”.
Revise: The objective of this study was to determine undergraduates’ oral health behaviour status and existing problems by comparing dental students and non-dental students at Sichuan University. (Page 2, Line 5-8)

Method
3. Please specify the parameters in the calculator.
Response: Thank you very much for your invaluable suggestion. In our study, we use the formula “\( ((1+1/k)(\mu_\alpha+\mu_\beta ))^2 p(1-p)/\delta^2 \)” to calculate the sample size (difference test of rate comparison between two groups). A pre-test about toothbrushing frequency of dental and non-dental students was conducted. The results showed that the rates of the two groups were 0.97 and 0.86, respectively. According to this, the sample size was estimated to be more than 110 in each group.
Revise: A pre-test was conducted on the toothbrushing frequency of dental and non-dental students. In order to estimate the sample size, the method “difference test of rate comparison between two groups” was chose and the calculator \( ((1+1/k)(\mu_\alpha+\mu_\beta ))^2 p(1-p)/\delta^2 \) was applied \( (p=(p1+kp2)/(1+k), p1=0.97, p2=0.86) \). The sample size was estimated to be more than 110 in each group. (Page 7, Line 9-13)

4.5. Why the sample number of dental and non-dental students were different? Why the grades of dental and non-dental students were different? Does it influence the final results?
Response: Thank you very much for your invaluable question.
1) In our quasi-experimental survey, this course was a required course for dental students but an optional course for non-dental students. We enrolled all eligible students. The number of students in two groups was different, so the sample size of two groups was inconsistent.
2) Regard to grades, for dental students in Sichuan University, education for oral health started in their first year. Some clinical research or practice was open to them. Also, some of them had opportunities to get in touch with seniors and obtain information. The third-year is the first year in their professional dental education. The preclinical education and practice could enhance their knowledge and behavior about oral health. For non-dental students who had similar general education background as dental students, the difference might come from the preclinical oral health education. So, we chose dental students in grade 3 as a reference to find the differences or gaps of oral health knowledge and behavior between two groups. Our ultimate goal is to make the improved OHE applicable to students of all grades in the university. This course was open to non-dental undergraduates in grades 2-4. Nevertheless, even the non-dental students were from different grades, they aged between 20~23 years, which was similar to dental students.

6. The authors should specify the oral health education course. Was the oral health education course similar to others in universities of China or designed specifically for this survey? Was the OHE course in this survey representative of the oral health education conducted elsewhere? What is the advantage of the OHE introduced in the manuscript?
Response: Thank you very much for your invaluable suggestion and question.
In China, oral health education course for non-dental undergraduates was often simplified. The content always focused on oral health knowledge but not enough in behaviour. The course in our study was 1) etiology-based and focused on the specific guide of oral health behavior, which was different from other studies or courses. 2) Regard to the guide of oral health behavior, non-dental students had the same content and degree of difficulty as dental students. Although the
relatively-professional education was more difficult than usual, it was helpful for non-dental students to understand the etiology-based knowledge and might be helpful for behavioral education as well.
Revise: The content was designed based on the textbook “Preventive Dentistry” and focused on the aetiology of common oral diseases and specific oral hygiene measures with the aim of improving students’ oral health behaviour. Non-dental students had the same course in the part of “behavioural direction” as dental students. (Page 7, Line 22---Page 8, Line 4)

Discussion
7. Please explain why Chinese herbal toothpaste should not be substituted by scaling.
Response: Thank you very much for your invaluable suggestion.
Revise: Chinese have partiality for Chinese herbal toothpaste. Its correct usage should be focused on in the future OHE course, e.g., when facing gingival bleeding caused by periodontitis, relying on herbal toothpaste instead of basic periodontal scaling may worsen the disease. (Page 14, Line 17-20)

8. Please specify why floss is ignored among undergraduate students in China.
Response: Thank you very much for your invaluable suggestion.
Revise: However, floss is comparably difficult to use, which may limit its application. Moreover, toothpicks have a history of more than a thousand years in China and are deeply rooted in Chinese people’s minds (Page 13, Line 14-16)