

# Scoping review on the role of social media in oral health promotion

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**Abstract. – OBJECTIVE:** This review was conducted to assess the role of social media in oral health promotion by reviewing the perspectives and evaluation methods of previous related studies.

**MATERIALS AND METHODS:** The preferred reporting items PRISMA checklist was used to structure this review. Key search terms were identified to examine databases including PubMed, Web of Science and Embase. Manual searches in relevant journals and materials were also conducted in the meantime.

**RESULTS:** A total of 640 articles were identified after multi-source screening and duplicates removing, and finally 19 original studies published before April 2020 met the inclusion criteria. These studies mainly cover the fields of dentistry education and research, clinical treatment, and preventive dentistry. Both traditional and new-type social media have advantages and focuses, as well as biased information. Detailed assessment methods and indicators are classified into several groups, which could be selected to use in future research.

**CONCLUSIONS:** The application of social media in oral health promotion is becoming popular with the development of information technology. The broader use in the future, covering dentistry, mass health education, both long-term and short-term treatments of additional clinical content, requires further evaluation and supervision in online information sharing process. The reasonable selection of methods and indicators according to different topics and preference is of great importance.

*Key Words:*

Social media, Traditional media, New-type media, Oral health promotion.

## Introduction

Along with the arrival of new interpersonal communication era arising from recent development of new media technology, some social applications and websites are playing more and more important roles in the field of medicine, and there is no exception for dental medicine. The growing presence of various platforms, such as Twitter<sup>TM</sup>, Facebook<sup>TM</sup>, and YouTube<sup>TM</sup>, in health care is well recognized<sup>1,2</sup>. An increasing number of independent developed applications and web forums are emerging in medical practice, thus becoming an important part of health education and wider health promotion<sup>3</sup>. Social media (SM) brings a new dimension to health care because they offer a platform where the public, patients, and health professionals communicate about various health issues, thereby changing the nature and speed of health care interaction between individuals and health organizations<sup>4,5</sup>. The use of social media in public health promotion has been increasing due to its ability to overcome physical barriers that traditionally hinder access to healthcare resources and support.

The growing prevalence of oral health problems poses significant challenges for healthcare and education systems globally. Promotion of oral health and prevention of oral diseases is important to address this problem. More people frequently utilize social media and the internet to seek information about oral health problems. Social media appears to have potential to promote positive oral health, and this presents new opportunities for oral health promotion (OHP). Given the bright future of media in health promotion

and dental education among tutor-student and dentist-patient relationships<sup>6</sup>, there are benefits and challenges to using social media in this way. The purpose of this study was to assess the role of social media in oral health promotion by reviewing the perspectives and evaluation methods of previous related studies.

## Materials and Methods

Considering various forms of media, the definition of SM should be clarified firstly. It enables users to create and share content or to participate in social networking. According to the related guidance given by General Dental Council, SM covers a number of internet-based tools including, but not limited to, blogs, internet forums, content communities and social networking sites such as Twitter, YouTube, Facebook, LinkedIn, GDUK, Instagram and Pinterest. Professional social networking websites targeted at dental professionals are also forms of SM<sup>7</sup>. SM can be divided into two types: 1) traditional SM: represented by different social networking sites (like Facebook and the Internet Dental Forum), microblogs (like personal blogs or Twitter), picture- or video-sharing websites (like YouTube). Most of them can also be used on mobile devices nowadays; 2) new-type SM: Unlike traditional websites, these new software are social networking platforms, which are represented by applications or forums developed and popularized by skilled professionals in recent years<sup>8</sup>. The main difference from traditional SM is that they generally have their own specific features, from theme preference to functional module design, such as individualized smartphone applications targeting patients of different types or dental students from diverse majors.

We started with a preliminary experiment through retrieving several topic keywords in PubMed to have a rough understanding about number and matching degree of the results. It was found that abundant and detailed studies are conducted separately on SM and OHP. However, there are limited research concentrating on their relevance, as a result of which we further expanded the searching keywords and subdivided SM into more forms. After referring to a series of previous articles, the modified search formula was discussed to be (social media OR social networking site OR social software OR online website OR online community) AND (oral health care OR oral health promotion).

Several inclusion and exclusion criteria were used in this review. First, OHP should be the focus of study instead of general health condition. Based on this, SM is the major intervention taken to promote oral public health or dental education among dentist-patient and tutor-student relationships, rather than a general approach to collect information. Second, not just plain cases reports, detailed analysis or evaluation of intervention effect between SM and OHP is necessary, whose methods and indicators are relatively instructive and worth of consideration.

## Statistical Analysis

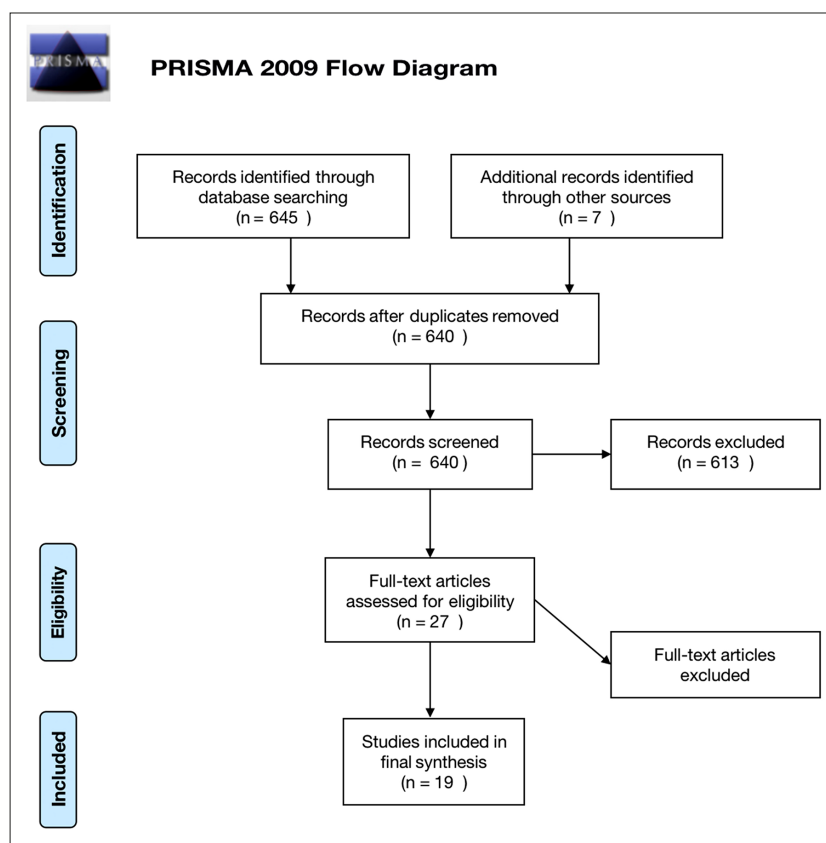
Data involved were analyzed with SPSS software (version 16.0; SPSS Inc., Chicago, IL, USA). Statistical comparison was performed using Students' *t*-test when calculating the Cohen's  $\kappa$ -value for inter-rater agreement.  $p < 0.05$  was considered statistically significant.

## Results

Formal database searching process began in November 2019, when above formula was translated and run in three databases: PubMed, Web of Science, and Embase. Newly published articles were retrieved and monitored until April 2020. After multi-source screening and duplicates removing, there were 640 related articles remain. 613 of them were excluded via screening records and identifying relevance to our study aims. 27 articles were retained for full-text assessment, 8 of which were eliminated after full-text scanning due to their irrelevant topic contents. Finally, 19 were assessed as qualified in total. All the resulting articles were assessed independently for eligibility by two operators, who evaluated titles and abstracts according to the above inclusion criteria. Cohen's  $\kappa$ -value for inter-rater agreement on the methodological quality was 0.84. Disagreements were generally caused by slight differences in interpretation and were easily resolved in a consensus meeting. The workflow throughout the scoping review is summarized in Figure 1.

The identified 19 original research studies that meet the preceding standards remained for data extraction. The extracted items, including health and SM topic, population, methods, and evaluation indicators, and the main findings (detailed associations or no associations for descriptive studies; positive, negative, or mixed results for pilot and qualitative studies; significant or non-es-

**Figure 1.** Articles selection process for scoping review, using PRISMA flow diagram.

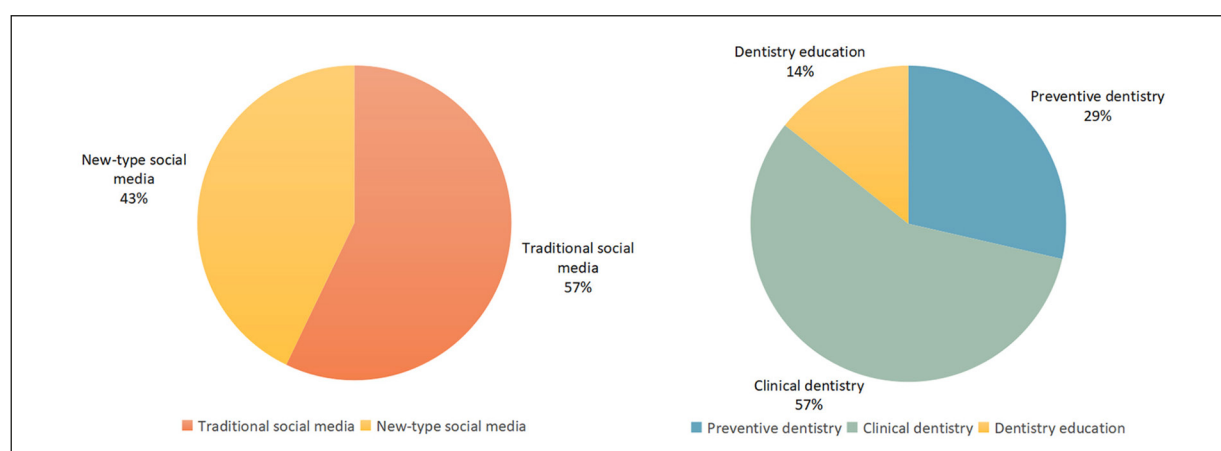


sential findings for controlled studies and randomized controlled trial [RCT]) are summarized and shown in **Supplementary Table I**.

**Topic Sequence**

As seen in **Supplementary Table I**, the health topics, or the application field of SM, can be mainly summarized into the following aspects: (1) dental education and research: professional

education, case discussion, and academic communication among dentists, dental practitioners, and students<sup>9-11</sup>; (2) clinical treatment: diagnosis, treatment, surveillance, and other stages of clinical practice in specific oral diseases, assisting dentists without adequate clinical experience to make optimal patient care decisions<sup>1,12-17</sup>; (3) preventive dentistry: improving people’s oral health knowledge, attitudes, and daily behaviors; pro-



**Figure 2.** Application fields of social media (divided into two categories).

moting regular examination and early treatment of common oral diseases<sup>18-25</sup>. The detailed features are shown in Figure 2.

Although many successful examples in the field of dental public health promotion and research can be found through retrieval, most of them contribute to summarizing their own experience and introducing detailed cases<sup>26</sup>. Only limited studies conducted systematic evaluation on effectiveness of SM interventions. The latter two application topics constitute a large percentage. This result is in line with current dental clinical practice. Dentists regard their profession as more stressful than other health care professions and as one that possesses sufficient attention and effort<sup>27</sup>.

When further divided into two subgroups according to the type of media (traditional media or new-type media), these studies show their respective preferences. On the strength of a relatively larger users' group and wider content coverage, traditional interactive media are playing a significant role in clinical and preventive fields<sup>28</sup>. Almainan et al<sup>19</sup> collected the replies of 2,652 Twitter users to a web-based self-administered questionnaire. After conducting a statistical analysis of the questionnaire results, they concluded the need and importance of supporting the content of SM. Related resources on oral care of stem cell transplant patients and dental trauma have also been proven to be abundant<sup>1,16</sup>. However, only a limited number of posts contain suitable information on prevention and immediate management of dental trauma<sup>1</sup>. Traditional media platforms typically offer more samples for researchers than new-type media platforms do.

By contrast, new-type media have superior specialization and are more suitable than traditional media for highly professional and targeted work. Health 2.0 tools make it possible for dental students to learn more about how to provide patient-centered communications online<sup>11</sup>. A smart-

phone application called WhiteTeeth, which was designed on the basis of health action process approach theory, targets adolescents who use fixed orthodontic appliances. WhiteTeeth was developed to improve teenagers' oral health care ability and hygiene level through individualized guidance<sup>25</sup>. Oral cancer (OC) survivors have high non-adherence rates regarding self-management after OC. After assessing the qualitative needs of patients with OC and their relatives, researchers designed a personalized forum that covers resources on daily oral health care after OC and gives a start to caregiver-specific support groups<sup>5</sup>. These social applications designed by professionals aim to solve practical everyday-life problems for particular patients. Thus, they always have an advantage over traditional media in technicality and individuality, thereby providing powerful assistance with treatment and prevention of a series of dental diseases. The number of new-type SM is sharply increasing due to the rapid development and innovation of technology. However, each application has only a few users by far. Given the increasing need of users, these specialized niche forums or applications have enormous potential<sup>13,29</sup>.

### ***Analysis of Evaluation Methods and Indicators***

Original clinical research can be divided into observational study and experimental study. Our search results are mainly concentrated on cross-sectional study and RCT, which are respectively included in the abovementioned two categories (Table I).

Following evidence-based medicine grades, a randomized controlled study is recommended to rigorously evaluate where the SM intervention was imposed<sup>30</sup>. Scheerman et al<sup>25</sup> carried out pre- and post-tests on oral health-related indicators (psychosocial variables/toothbrushing behavior/Visual Plaque Index/Community Periodontal In-

**Table I.** Analysis of evaluation methods.

<b>Method</b>	
<b>Randomized controlled trial</b>	<b>Cross-sectional study</b>
Carrying out clinical tests on oral health-related indicators before and after the intervention of social media Analyzing significant outcomes in pre- and post-tests High-level evidence according to evidence-based medicine grading	Conducting information retrieval to summarize existing researches Distributing feedback questionnaires to collect current opinions from social media users Easy to perform but relatively insufficient

dex) to assess how effectively Telegram™ was able to improve the oral hygiene behavior of targeted Iranian adolescents. Some theoretical factors, such as knowledge and attitudes, are often tested through questionnaires and scales, and the changes of these scores can be significant.

By comparison, a cross-sectional study shows relatively insufficient evidence. Some studies simply gathered different suggestions and requirements of users and then conducted primary analysis. Furthermore, reviewers graded messages or videos according to several criteria via keyword search to collect related data from social networking sites. The score criteria were mainly borrowed or adapted from existing successful research models,<sup>13</sup> and a minority lacked a theoretical basis. Professional reviewers could comprehensively evaluate the correctness and accuracy of targeted information. For example, López-Jornet et al<sup>16</sup> found that 22 of 50 (44%) reviewed YouTube™ videos about oral health care for patients who underwent organ and hematopoietic stem cell transplant were misleading, and 12 (24%) videos reported patients' personal experiences rather than professional key points.

The indicators selected by the researchers varied and can be separated into two groups (Table II). Indicators in group 1 focus on media, which chiefly include sense of engagement and experi-

ence. Engagement is one of the basic metrics used in website assessments. It contains indices of communication pattern (e.g., types and sources) and popularity (e.g., likes/dislikes and comments/replies)<sup>31,32</sup>. Sense of experience covers subjective indicators, such as attractiveness, intuitiveness, and learnability, which are usually investigated by users' grading. Items were rated on a five-point Likert type scale with 1 = strongly disagree and 5 = strongly agree in the experiment of Badr et al<sup>13</sup>. After these, individual scale scores were summed up and multiplied by 4 to obtain a total usability rating score out of 100.

Indicators in group 2 concentrate on the users themselves. (1) Demographic data: Hanna et al<sup>21</sup> offered a related detailed framework. (2) SM usage: It consists of Internet and media access, usage frequency, media type preference, and users' information identification skills. To explore participants' ability to identify high-quality online information, Seymour et al<sup>11</sup> designed related tests and concluded that providing patients with Internet guidance may be an opportunity to improve knowledge on the third molars. (3) Oral health-related information: These indices are often chosen as targeted evaluation indicators in tests and questionnaires of RCTs, especially objective oral health-related indicators. Zotti et al<sup>17</sup> included 80 adolescent patients scheduled to start

**Table II.** Analysis of evaluation indicators.

Indicator	
Social media	Users
Engagement	Demographics
Type (message/video/post)	Age
Source	Gender
Length/duration	Language
Topic/content	Level of education
Likes/dislikes	Income
Comments	
Composite indicator	Social media usage
Interaction index	Access
(likes-dislikes/total no of viewings * 100)	Frequency
Viewing rate	Preference
(number of views/number of days since Upload * 100)	Information identification skills
Sense of experience	Oral health-related information
Attractiveness	Knowledge/attitude/behavior
Intuitiveness	Dental experience
Learnability	Oral condition
Efficiency	Plaque index
Reliability	Gingival index
	Community periodontal index
	White spots
	Caries presence

orthodontic multibracket treatment and randomly divided them into two groups of 40. Unlike the control group, the study group was allowed to conduct media communications. Plaque index (PI), gingival index (GI), white spots (WS), and caries presence were recorded in all participants throughout the research period. After 1 year, the study group patients, who engaged in regular and active participation, had significantly lower PI and GI and a lower incidence of new WS and caries than the control group. Evidently, the integration of new social technologies in a standard oral hygiene motivation protocol effectively improves adolescent patients' compliance and their oral health condition during treatment<sup>17</sup>.

Overall, the above evaluation methods and indicators should vary in different studies based on their own topics. Among these factors, RCTs and objective indicators are recommended given their scientific rigor. However, some limitations still exist, particularly in traditional SM. Checking every video and monitoring posts are difficult for website managers, indicating that the quality of videos cannot be guaranteed within such a wide content coverage<sup>33-37</sup>. The content on these sites is dynamic, given that videos, posts, and messages are uploaded and deleted all the time. Therefore, the findings might vary according to the search date and time<sup>1,12,16,38</sup>. A potential limitation is that the probability of bias, such as social desirability bias, could occur because the data on oral health behaviors and psychosocial factors are self-reported. For example, the exact brushing duration or other behaviors of an individual may not correspond to the self-reported data<sup>25</sup>. These factors may present obstacles in the assessment research approach.

## Discussion

In the process of public health promotion, SM offers a potent platform that allows knowledge acquisition and dissemination among students, dental practitioners and researchers, breaking the restriction of time and space and allowing cooperative resource sharing<sup>39-41</sup>. It is necessary to build up more professional media platforms based on the summary of existing experience during future development process, like updated e-learning databases<sup>42</sup>. These would make online learning more flexible and efficient, especially under the current urgent appeal for staying at home because of COVID-19<sup>43,44</sup>. A media platform which

allows self-registration and free communication could offer more direct accesses.

Current media also provides a new approach to popularizing dental care knowledge to the public, which is widespread, individualized, fast to diffuse, and easy to reach. For the future, we not only need to take advantage of those social networking sites with a larger number of users, but also should input more to develop and promote some specialized applications for public oral care education under the guidance of professionals<sup>45,46</sup>.

This is the first review to evaluate effectiveness of SM interventions on oral health promotion. Limited to the choice of digital full-text databases and retrieval methods, this research was insufficient to acquire more comprehensive researches which were underway or completed but undisclosed. The ongoing studies may provide more efficient ways to incorporate more types of media into clinical and educational support. Meanwhile, we still have found some issues need to be urgently solved under current circumstance. Clinical application of interactive media tends to be limited during long-term treatment and requires stronger doctor-patient cooperation in situations such as maintaining oral hygiene during orthodontic treatment, oral care of organ or as hematopoietic stem cell transplant patients, and self-management of patients after OC<sup>2,25,40</sup>. Some short-term treatment processes such as teeth extraction and scaling are rarely involved and are influenced by features of oral diseases and appropriate therapies. Thus, guidance needs to be provided during long-term treatment, where SM could play their full role. The rapid development of economics and technology indicates that the era of united health care and e-health is coming<sup>47,48</sup>. Under the premise of privacy protection, a complete and comprehensive health record could be established for each patient and include daily health care to possible postoperative maintenance. Such a record can help dentists have a complete understanding of patients' routine protection, medical history, and treatment stages. Additional applications or online consulting platforms directed by evidence-based medicine can also be developed to provide personalized instructions on oral health, with patients as a center and with continuity care as a direction<sup>49</sup>.

A recognized and well-organized evaluation structure should be formed and popularized. SM sites and applications that pass professional as-

assessments can play a unique role in daily oral care, even in other fields of health<sup>50</sup>. In this process, one of the key points is to monitor the quality of media information. Abundant space should be given to ensure communication and resource sharing among people. Necessary monitoring procedures also need to be established<sup>1,19</sup>. Both sides have a symbiotic relationship. Related valuable experience has been gathered from recent public health events, whether or not media successfully transmitted essential and accurate messages among people. Those facts indicate the direction of improvements, thereby strengthening our confidence that users' information seeking skills improved. Professionals from all walks of life are also increasingly joining social platforms; thus, they help refute unreliable and misleading statements quickly<sup>51</sup>.

## Conclusions

With the development of social information technology, the use of SM in oral disease treatment and dentistry education is becoming popular. Both traditional and new-type applications have their advantages and focus. Despite the improved speed and range of dental related information transmission, some resources shared among Web users contain obvious mistakes and misleading or biased information; this issue should be given considerable attention by website managers. The broad use of SM in the future, covering dentistry education, mass health education, both long-term and short-term treatments of additional clinical content, also requires further evaluation and supervision to monitor the online information sharing process. The reasonable selection of methods and indicators according to different topics and preference is of great importance.

### Conflict of Interest

The Authors declare that they have no conflict of interests.

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### Authors' Contribution

Shuo Chen, Xin Xing, Wei Zhang and Zhi Li contributed to conception and design of the study, acquisition of data, and interpretation of data; Shuo Chen and Xin Xing drafted the

article; Wei Zhang and Zhi Li checked and revised the text. Shuo Chen, Xin Xing and Wei Zhang led the final editing stages of the manuscript. All authors read and approved the final manuscript.

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### Data Availability

All data generated or analyzed during this study are included in this published article (and its supplementary information files).

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