A Systematic Review of the Impact of Malocclusion on the Quality of Life among Young Adults

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Abstract
Among young adult patients, persistent but untreated malocclusions may have psychological and social impacts on the individual's quality of life. The objective is to gain knowledge of malocclusions and its impact on oral health-related quality of life (OHRQOL) in young adults. Five databases (PubMed, Web of sci, Cochrance, CINAHL, Google scholar and DOS) were searched. The search produced 601 titles and abstracts. Based on pre-established criteria, the full-text versions of 46 articles were obtained, 10 of which satisfied the inclusion criteria. All ten were of cross-sectional design, seven studies reported that orthodontic treatment need was associated with OHRQoL. Two studies stated that increased orthodontic treatment need had a negative impact on OHRQoL. In addition, six studies revealed that malocclusions predominantly affected the dimensions of self-esteem, social disability, psychological discomfort. Two studies indicated that dental aesthetics have a significant effect on perceived OHRQoL. In conclusion, the scientific evidence was considered strong since seven studies reported that orthodontic treatment need was associated with OHRQoL. Two studies reported that malocclusions in the aesthetic zone have negative effects on OHRQOL.

In conclusion, six studies indicated that malocclusion effect predominantly in the dimensions of psychological discomfort.

Keywords: Malocclusion, Oral Health-related Quality of Life (OHRQOL), young adult.


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Introduction
The World Health Organization (WHO) also defines quality of life as “an individual's perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns. It is a broad ranging concept affected in a complex way by the person’s physical health, psychological state, personal beliefs, social relationships and their relationship to salient features of their environment.”¹

The assessment of quality of life (QoL) has become more important in clinical studies because quality of life reflects happiness of the patients. Thus, it can be either a tool to help medical service providers identify insight of chief complaint of the patients or another indicator of successful treatment. Health-related quality of life is an individual's happiness with the aspects of quality of life that is relevant to an individual's health. We can classify instruments of health-related quality of life into two groups: (1) generic measures, which provide a summary of health-related quality of life and sometimes generate a single index measure of health or (2) condition-specific measures, which focus on a particular condition, disease, population or problem and are potentially more responsive to small, but clinically important, changes in health.²

Malocclusion is a public health concern with high prevalence in different populations, causing physical and psychological implications, influencing oral health-related quality of life. The impact of malocclusion on both individuals and populations has been explored extensively. Malocclusion could be one of the factors influencing many dental diseases such as an increase in caries, periodontal disease.³ However, it is now recognized that the impact of malocclusion is beyond the health but quality of
life such as psychosocial domains. FDI suggested latest definition of oral health-related quality of life is that “it is multifaceted and includes the ability to speak, smile, smell, taste, touch, chew, swallow, and convey a range of emotions through facial expressions with confidence and without pain, discomfort, and disease of the craniofacial complex.” Further attributes of oral health are (1) It is a fundamental component of health, physical and mental wellbeing. It exists along a continuum influenced by the values and attitudes of people and communities. (2) It reflects the physiological, social, and psychological attributes that are essential to the quality of life. (3) It is influenced by the person’s changing experiences, perceptions, expectations, and ability to adapt to circumstances. The definition acknowledges the multifaceted nature and attributes of oral health that are beyond the oral cavity.

One systematic review, which included studies until December 2014, reported a moderate association between malocclusion/orthodontic treatment need and OHRQOL in adolescents, and children. Since then, a number of new studies have been conducted among different populations in order to gain knowledge of malocclusions and their impact on OHRQOL. There was no systematic review in this topic with young adult before. Due to the activities and lifestyles of young adult, there are several aspects that different to adolescents, and children. It is important to update current knowledge on the topic, providing a solid evidence base for clinical practitioners to rely on, and so a systematic evaluation of more recent knowledge seems motivated. Therefore, the aim of this study was to conduct a systematic review of quantitative studies for evidence regarding the influence of malocclusions on OHRQOL in young adult.

Materials and methods

The literature review was systematically conducted according to Goodman’s model, which comprises the following steps: 1. Definition of the research question, 2. formulation of a plan for the literature search, 3. literature search and retrieval of publications, and 4. data extraction, interpretation, and evaluation of evidence from the literature retrieved.

Definition of the research question

It is reasonable to assume that malocclusions have a psychological and social impact on the individual. The question to be addressed in this review was: Do malocclusions have an impact on OHRQOL in young adult?

Formulation of a plan for the literature search

A literature search was conducted to identify all studies evaluating impact of malocclusions on OHRQOL. Six electronic databases (PubMed, Web of sci, Cochrance, CINAHL, Google scholar and DOS) were searched for articles published between 1960 and January 2020. The following search syntax was used: ‘quality of life’ (MeSH term) OR ‘self concept’ (MeSH term) OR ‘patient satisfaction’ (MeSH term) OR ‘patients’ satisfaction’ (MeSH term) OR ‘personal satisfaction’ (MeSH term) OR ‘well-being’ (text word) OR ‘wellbeing’ (text word) AND ‘malocclusion’ (MeSH term). A filter for ‘young adult (21–25 years)’ was applied. The computerized search was accomplished with the assistance of a specialist in informatics at the Walailak University, Thailand.

Literature search and retrieval of publications Prior to reading the retrieved titles, abstracts, and articles, consensus was reached on the following inclusion criteria:

- Young adult study population
- Healthy study participants without syndromes such as cleft lip/palate or severe illness
- No previous or ongoing orthodontic treatment among participants
- A focus on malocclusions and quality of life
- Controlled or sub grouped categorization according to malocclusions/no malocclusions
- Self-assessed OHRQOL estimated using validated questionnaire instruments
- Full-text articles written in English only

Two independent researchers determined eligibility of potential studies. The titles and abstracts of all potentially relevant studies were independently reviewed, and then full-text articles corresponding to the selected abstracts/titles were retrieved. An article was ordered in full text if at least one of the two reviewers considered it to be relevant, or if the title and abstract did not provide sufficient information. In case of interexaminer, conflicts each article was reread and discussed until consensus was reached. The reference lists of articles deemed eligible were also manually searched for additional articles.
Results

General results
The search of electronic databases produced 601 titles and abstracts; see Figure 1 for the PRISMA-compliant selection process. Based on the initial inclusion criteria, the full-text versions of 46 articles were analyzed, following this, 10 articles remained for the final quality analysis. Articles excluded due to the reason ‘not following the objective of the review’ did either not cover malocclusions related to OHRQOL, dealt with orthodontic patients under or after treatment, focused on children or adolescent populations or specific groups such as patients undergoing orthognathic surgery or combinations.

Malocclusion or treatment need was assessed in eight studies, and with the dental health component and/or aesthetic component of the Index of Orthodontic Treatment Need (IOTN), 24, 28, 26, 28, 36, 37, 39, 54. Other two studies use “three malocclusion traits” 43 and “diagnosed with Class II and Class III” 33 as a malocclusion assessment. OHRQOL was evaluated with the Oral Health Impact profile (OHIP-14) in seven studies. 24, 28, 36, 37, 39, 43, 54 In addition, in one study perform Rosenberg self-esteem scale, Personality traits Clijmans, Lemiere, Fieuws, Willems 37 One study chose OHIP-short form, Rosenberg Self-Esteem Scale and General Hospital Depression Scale to evaluate OHRQoL Frejman, Vargas, Rössing, Closs 33 While one study perform Social appearance, Facial disapproval, and Dental self-confidence. 18 Condition-specific oral impacts on daily performances (CS-OIDP) in the final study. 26

Impact of malocclusion on OHRQOL
Seven studies reported that orthodontic treatment need was associated with OHRQOL 24, 28, 36, 37, 39, 54 Two studies stated that increased orthodontic treatment need had a negative impact on OHRQoL 39, 54 In addition, six studies revealed that malocclusions predominantly affected the dimensions of self-esteem, social disability, psychological discomfort, 26, 33, 36, 37, 39, 43 Two studies indicated that dental aesthetics have a significant effect on perceived OHRQoL 18, 43

Discussion
This systematic review, including a full analysis of ten cross-sectional studies, found that severe malocclusions in the aesthetic zone have an impact on OHRQOL in young adult, predominantly in the dimensions of psychological discomfort. These findings are new and describes more in detail the relationship between malocclusions and OHRQOL in young adult compared with the systematic review by Dimberg, Arnrup, Bondemark 56 who come to the conclusion that malocclusions have negative effects on OHRQoL, predominantly in the dimensions of emotional and social well-being.

The literature search initially revealed 601 publications, but only 11 quantitative studies were qualified for evaluation in this review. Such an outcome is not unusual when systematic reviews are assessed since the literature search initially and intentionally was designed to include
as many articles as possible in order not to inadvertently miss or disregard any article. The selection was performed systematically as described in the Materials and Methods section.

A systematic review presented in 2015 concluded that four studies with high level of quality reported that malocclusions have negative effects on OHRQOL.\(^6\) Our review found that severe malocclusions, especially in the aesthetic zone (anterior crowding, diastema, increased overjet), have negative effects on OHRQOL in young adult. Six of ten studies showed predominantly effect of malocclusion in the dimensions of self-esteem, social disability, psychological discomfort.\(^{26, 33, 36, 37, 39, 43}\)

When assessing the impact of malocclusions on OHRQOL, it is important to also consider untreated subjects with different malocclusions and level of treatment need, in order that the results will be comparable on group and individual levels, as well as ensuring that confounders to malocclusions are taken into consideration. However, the recent studies focused on specific conditions such as Autism\(^57\), Down Syndrome\(^58\), Dental Anxiety.\(^59\) Studies with longitudinal design following an untreated group are preferred but are lacking. Probably, the reason for the shortage of longitudinal studies is ethical; it may be ethically questionable to longitudinally follow a group of patients with pronounced malocclusions, without performing any orthodontic treatment.

Moreover, if future studies utilize consistent methods and comparable groups as well as being conducted with greater geographical spread, meta-analysis can also be performed. The restrictions concerning language and to some extent number of databases when searching the literature might imply that some studies were not identified.

### Conclusions

The scientific evidence was considered strong since seven studies reported that orthodontic treatment need was associated with OHRQoL. Two studies reported that malocclusions in the aesthetic zone have negative effects on OHRQOL. Six studies indicated that malocclusion effect predominantly in the dimensions of psychological discomfort.

### Declaration of Interest

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

### References

<table>
<thead>
<tr>
<th>References, country</th>
<th>Study design</th>
<th>Study population</th>
<th>Age</th>
<th>Assessment of OHRQOL</th>
<th>Assessment of malocclusions or treatment need</th>
<th>Conclusions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hassan, Amin (^{55}), Saudi Arabia, Egypt</td>
<td>Cross-sectional</td>
<td>366 (153 men, 213 women)</td>
<td>21-25</td>
<td>OHIP-14</td>
<td>IOTN-DHC</td>
<td>These findings emphasize the impact of malocclusion on oral health-related quality of life of young adult.</td>
</tr>
<tr>
<td>Liu, McGrath, Hligg (^{52}), Hong Kong</td>
<td>Cross-sectional</td>
<td>273</td>
<td>16-30</td>
<td>OHIP-14, OHQoL-UK</td>
<td>IOTN-AC, IOTN-DHC, ICON</td>
<td>Orthodontic treatment need was associated with OHRQoL. The magnitude of the statistical difference between those with and without an orthodontic treatment need was larger when OHRQoL was assessed using OHQoL-UK compared to OHIP-14. DHC and ICON were more useful indices in identifying greater differences in OHRQoL with respect to orthodontic treatment need.</td>
</tr>
<tr>
<td>Klages, Bruckner, Zentner (^{59}), Netherlands</td>
<td>Cross-sectional</td>
<td>148</td>
<td>18-30</td>
<td>OHRQoL: Social appearance, Facial disapproval, Dental self-confidence</td>
<td>IOTN-AC</td>
<td>The findings of the study suggest that minor differences in dental aesthetics may have a significant effect on perceived OHRQoL. This effect was more significant in subjects with high self-consciousness.</td>
</tr>
<tr>
<td>Frejman, Vargas, Rósaing, Class (^{31}), Brazil</td>
<td>Cross-sectional study compared 2 groups (experimental vs control)</td>
<td>68 individuals (34 in each group)</td>
<td>Mean 27.50</td>
<td>OHIP-short forms Rosenberg Self-Esteem Scale, General Hospital Depression Scale</td>
<td>Patients seeking dental evaluation and diagnosed, with Class II and Class III</td>
<td>Patients with dentofacial deformities had a more negative oral health-related quality of life and a lower self-esteem compared with controls. No association was observed between dentofacial deformities and depression.</td>
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</table>

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Table 1. Summary of OHRQOL studies included in the quality assessment, listed in reverse order of publication.

<table>
<thead>
<tr>
<th>Study</th>
<th>Design</th>
<th>N</th>
<th>Age Range</th>
<th>QoL Measure</th>
<th>Domain</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>Choi, Kim, Cha, Hwang</td>
<td>Cross-sectional study</td>
<td>429 (328 men, 101 women)</td>
<td>18-32</td>
<td>OHIP-14, IOTN-DHC</td>
<td>Malocclusion is a key factor associated with poor quality of life caused by limited oral function, pain, and social disability in young adult.</td>
<td></td>
</tr>
<tr>
<td>Mu, Zhi-Cai, Xue, Zheng-Ming, Bin, Da-Wei</td>
<td>Cross-sectional study</td>
<td>190</td>
<td>18-25</td>
<td>OHIP-14</td>
<td>IOTN-DHC</td>
<td>Malocclusion has a significant negative impact on OHRQoL. This is greatest for the psychological discomfort and psychological disability domains. The orthodontic treatment of malocclusion improves OHRQoL of patients.</td>
</tr>
<tr>
<td>Delaie, Behnaz, Khodabakhshi, Hosseinpour</td>
<td>Cross-sectional study</td>
<td>126</td>
<td>18-25</td>
<td>OHIP-14</td>
<td>IOTN-AC, IOTN-DHC</td>
<td>The results showed negative impact of malocclusion severity on the QoL. This study highlighted the importance of individual assessment of orthodontic patients.</td>
</tr>
<tr>
<td>Clijmans, Lemiere, Fieuxes, Willems</td>
<td>Cross-sectional study</td>
<td>189 (55 males and 134 females)</td>
<td>17 or older (mean age 31.3 years)</td>
<td>OHIP-14, Rosenberg self-esteem scale, Personality traits</td>
<td>IOTN-AC, IOTN-DHC</td>
<td>There was a significant association between orthodontic treatment need and OHRQoL. Moreover, a significant association can be found between SE and OHRQoL, as well as certain personality traits and OHRQoL. No evidence was found that SE or personality traits moderate the association between OHRQoL and treatment need.</td>
</tr>
<tr>
<td>Masood, Suominen, Pietila, Lahti</td>
<td>Cross-sectional study</td>
<td>4711</td>
<td>≥30</td>
<td>OHIP-14</td>
<td>IOTN-DHC</td>
<td>Three malocclusion traits (increased overjet, crossbite/scofferbite, and increased overbite/open bite)</td>
</tr>
</tbody>
</table>

References

10. Tuominen ML, Tuominen RJ, Nyström ME. Subjective orthodontic treatment need and perceived dental appearance among young Finnish adults ≥30 years. Other malocclusion traits were not associated with OHRQoL. However, all three malocclusion traits were associated with either physical or psychological or social disability domains of the OHRQoL.
Andrade Oliveira PGdS, Rodrigues Tavares R, Curado de Palomares
assessed using the Oral Health Impact Profile (OHIP-14). Evidence-Based Dentistry 2015;16(2):57-8.


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psychology and personality characteristics and treatment options for adult patients with skeletal malocclusion. Hua Xi Kou Qiang Yi Xue Za Zhi 2020;38(3):308-13.


