SJIF Impact Factor 2022: 8.197| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 7 | Issue: 7 | July 2022 - Peer Reviewed Journal

# PSYCHOSOCIAL IMPACT OF MALOCCLUSION USING PIDAQ (PSYCHOSOCIAL IMPACT OF DENTAL ESTHETIC QUESTIONNAIRE) AMONG SCHOOL CHILDREN AND ADOLESCENTS: A SYSTEMATIC REVIEW

**Gousalya V[1], Prabu D[2], Raj Mohan M[3], , Bharathwaj VV[4], Sindhu R[4], Dinesh Dhamodhar[3], Elakiya S[1]**

[1]*Post graduate student, SRM Dental College and Hospital, Department of Public Health Dentistry, Ramapuram, Chennai, India*

[2]*Professor and Head, SRM Dental College and Hospital, Department of Public Health Dentistry, Ramapuram, Chennai, India.*

[3]*Reader, SRM Dental College and Hospital, Department of Public Health Dentistry, Ramapuram, Chennai, India.*

[4]*Senior Lecturer, SRM Dental College and Hospital, Department of Public Health Dentistry, Ramapuram, Chennai, India.*

***Corresponding Author: Prabu D,SRM Dental College, Ramapuram, Chennai.600089***

## ABSTRACT

***BACKGROUND***

*Malocclusion has been proven to impact periodontal health, increase the prevalence of dental caries, and induce temporo-mandibular joint disorders. Malocclusion is expected to influence a person psychosocially which can be evaluated using one of the questionnaire PIDAQ psychosocial impact of dental esthetic questionnaire. Since, then a number of cross sectional studies have been conducted by evaluating the psychosocial impact of malocclusion an esthetic defect using PIDAQ. A comprehensive examination of more recent knowledge appears justified, as it is necessary to update current understanding on the PIDAQ instrument, giving a solid evidence base for clinical practitioners to rely on it. As a result, the goal of this study was to conduct a systematic evaluation of cross-sectional studies seeking evidence on the psychosocial impact of malocclusion using PIDAQ among 12 to 22 yrs old adolescents.*

***MATERIALS AND METHODS*** *:Seven databases (PuBMed, Cochrane Library, CINAHL, OVID MEDLINE, EMBASE, Grey Literature, Wiley Online Library) were searched using specified indexing terms. PIO and PRISMA (Preferred reporting items for systematic review and metaanalysis) were used. MeSH terms used were were 'psychosocial impact'AND 'malocclusion' AND 'PIDAQ' OR 'psychosocial impact of dental esthetic questionnaire' AND 'dental esthetic defect'.*

***RESULTS:*** *Six cross-sectional studies were included in this systematic review for the quality assessment of psychosocial impact of malocclusion a dental esthetic defect using PIDAQ psychosocial impact of dental esthetic questionnaire among 12 to 22 yrs old adolescents. All six studies reported that there is a statistically significant ($p<0.001$)association between malocclusion and psychosocial impact.*

***CONCLUSION***

*This systematic review concludes that the dental esthetic defect malocclusion has positive effects on psychosocial impact using PIDAQ psychosocial impact of dental esthetic questionnaire with strong scientific evidence.*

**KEYWORDS:** *PIDAQ, Malocclusion, psychosocial, dental esthetic,*

## INTRODUCTION

A smile has a lot of power in our beauty-conscious society. When a patient's smile is ruined by dental illness, the effect is frequently a loss of self-esteem as well as harm to the patient's general physical and mental health.[1] In the past, the primary priority in dental therapy was the patient's functional needs. With the decrease in the occurrence of caries, the attention has switched to dental aesthetics.[2] The dental esthetics has various perspective comprising the facial perspective, dento-facial perspective, dental perspective, gingival perspective, psychological perspective. The term 'psychological perspective' refers to the idea of a psychological relationship between cerebral perception and

SJIF Impact Factor 2022: 8.197| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 7 | Issue: 7 | July 2022 - Peer Reviewed Journal

dentition.[3] Dental esthetic defect includes malocclusion[4], discolouration of tooth[5], enamel hypoplasia[6], maxillary midline diastema[7], excessive gingival display or gummy smile[8], gingival melanin hyperpigmentation[9], dental fluorosis[10]. In terms of discomfort, quality of life, and social and functional constraints, malocclusion has a significant influence on both individuals and society. Malocclusion is characterised as an occlusion in which the arches are malaligned in any plane or there are anomalies in tooth location, number, form, and developmental position of teeth that are outside of normal bounds. Malocclusion can be caused by genetic, environmental, or a combination of both factors, as well as local variables such as deleterious dental habits. Malocclusion has been proven to impact periodontal health, increase the prevalence of dental caries, and induce temporo-mandibular joint disorders. Its prevalence varies from nation to nation and between different age and sex groups. The desire to appear attractive, self-perception of dental appearance, self-esteem, gender, age, and peer-group norms; all influence in pursuing orthodontic treatment. The main benefits of orthodontic treatment include improved physical function, tissue damage prevention, and aesthetic component correction.[11] Psychosocial implications of malocclusion given by Helm S et. Al. First, the appearance of one's teeth, particularly malocclusion, has a significant impact on one's whole body image. Second, not just in adolescence, but also in adulthood, malocclusion can have a negative impact on body image and self-concept. Third, subjects with extreme maxillary overjet, extreme deep bite, and space anomalies are more likely to be dissatisfied with their own dental appearance and to be teased about their teeth.[12] PIDAQ (Psychosocial Impact of Dental Aesthetics Questionnaire) is a psychometric instrument that was created in 2006 by klages and is focused on orthodontic components of OHRQoL.[13] It has 23 items that were classified into four variables based on factor analysis: 1) Dental Self-Confidence (DSC); 2) Social Impact (SI); 3) Psychological Impact (PI); and 4) Aesthetic Concern (AC). The first is Dental Self-Confidence), which is made up of six items from the Self-Confidence Scale. The Social Impact factor incorporates eight revised questions (numbers 15 - 22) from the Orthognathic Quality of Life Questionnaire (OQLQ ). The Psychological impact is the third element, and it is comprised of six newly designed items that are primarily concerned with the psychological impact of dental aesthetics. The Aesthetics Concern from the Orthognathic Quality of Life Questionnaire's is the fourth factor (OQLQ). The patient must rate the items on a five-point Likert scale, with 0 indicating "not at all," 1 indicating "a little," 2 indicating "somewhat," 3 indicating "strongly," and 4 indicating "very strongly."[14] Since, then a number of cross sectional studies have been conducted by evaluating the psychosocial impact of malocclusion an esthetic defect using PIDAQ. A comprehensive examination of more recent knowledge appears justified, as it is necessary to update current understanding on the PIDAQ instrument, giving a solid evidence base for clinical practitioners to rely on it. As a result, the goal of this study was to conduct a systematic evaluation of cross-sectional studies seeking evidence on the psychosocial impact of malocclusion using PIDAQ among 12 to 22 yrs old adolescents.

## MATERIALS AND METHODS

The literature review was carried out in a systematic manner using Goodman's methodology[15], which includes the following steps: the research question, formulating a strategy for conducting a literature search, searching the literature and retrieving articles, data extraction, interpretation, and evaluation of evidence gathered from literature.

**PICO (Population, Intervention, Comparison, Outcome)**

**Population -**12 to 22 years old adolescents.

**Intervention-** PIDAQ psychosocial impact of dental esthetic questionnaire.

**Comparison-** None.

**Outcome-** association between malocclusion and psychosocial impact.

## RESEARCH QUESTION

Malocclusions are likely to have psychological and social consequences for the individual**.** The research question to be addressed in this systematic review was. Does PIDAQ instrument is effective in evaluating the psychosocial effect of malocclusion.

## FORMULATING A STRATEGY FOR CONDUCTING A LITERATURE SEARCH

A review of the literature was undertaken to find all studies that looked at the psychosocial impact of malocclusion using PIDAQ. Seven electronic databases (PuBMed, Cochrane Library, CINAHL, OVID MEDLINE, EMBASE, Grey Literature, Wiley Online Library) were used. The following MeSH terms used were **'**psychosocial impact'AND 'malocclusion' AND 'PIDAQ' OR 'psychosocial impact of dental esthetic questionnaire' AND 'dental esthetic defect'.

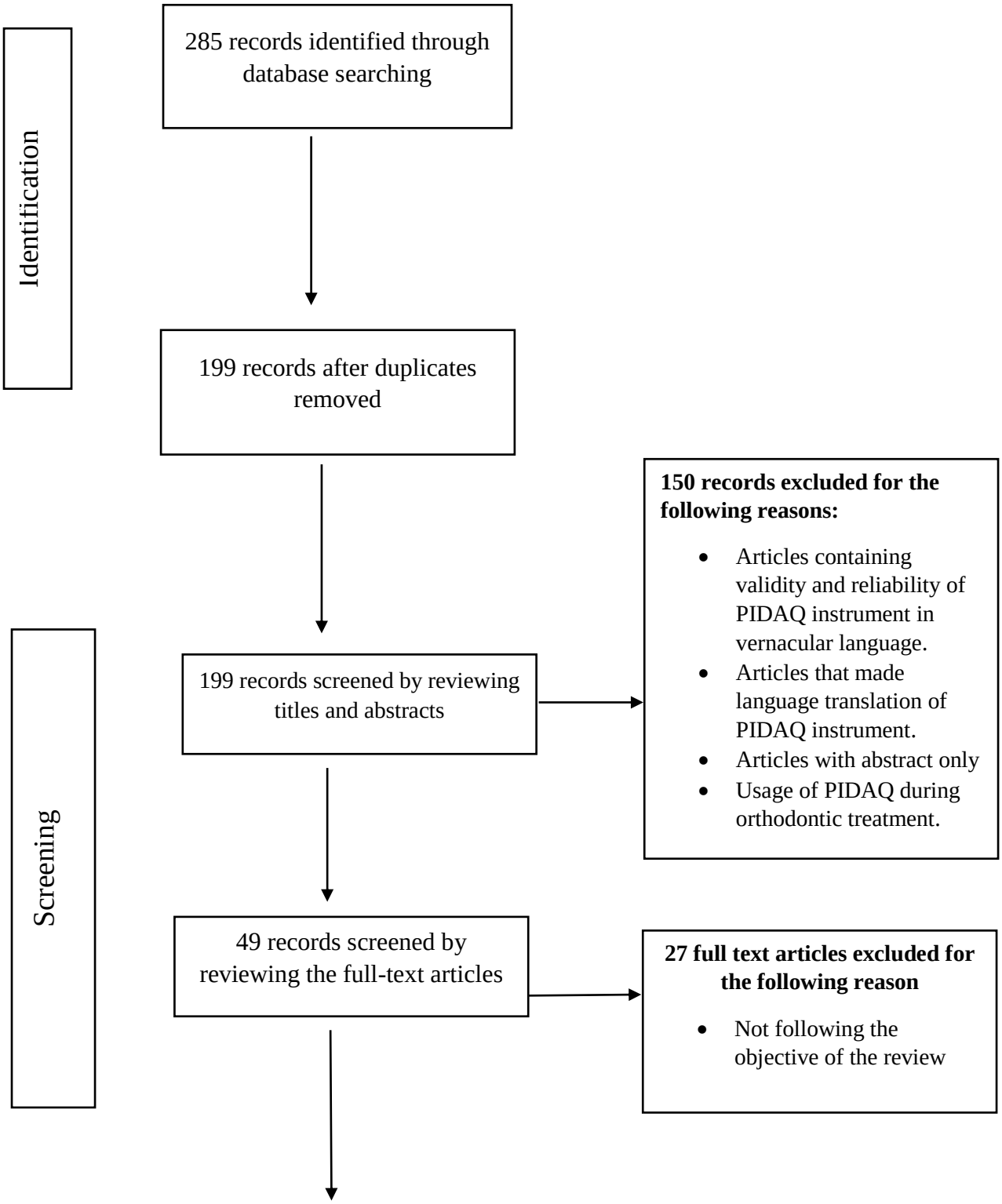
## SEARCHING THE LITERATURE AND RETRIEVING ARTICLES

Prior to examining the retrieved titles, abstracts, and articles, the following inclusion criteria were agreed upon:

- Psychosocial impact of dental esthetic questionnaire intruments for evaluating the psychosocial impact of the dental esthetic defect.
- Full-text articles written in English language.
- Children or adolescent study population.
- A focus on malocclusion and psychosocial impact.
- Cross sectional study with age group of 12-22 years old.
- Participants had no previous or continuing orthodontic treatment.
- Study participants who were healthy and did not have any disorders such as cleft lip/palate or serious sickness
- The dental esthetic effect evaluated using PIDAQ was malocclusion.

SJIF Impact Factor 2022: 8.197| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 7 | Issue: 7 | July 2022 - Peer Reviewed Journal

**RESULT**



SJIF Impact Factor 2022: 8.197| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 7 | Issue: 7 | July 2022 - Peer Reviewed Journal

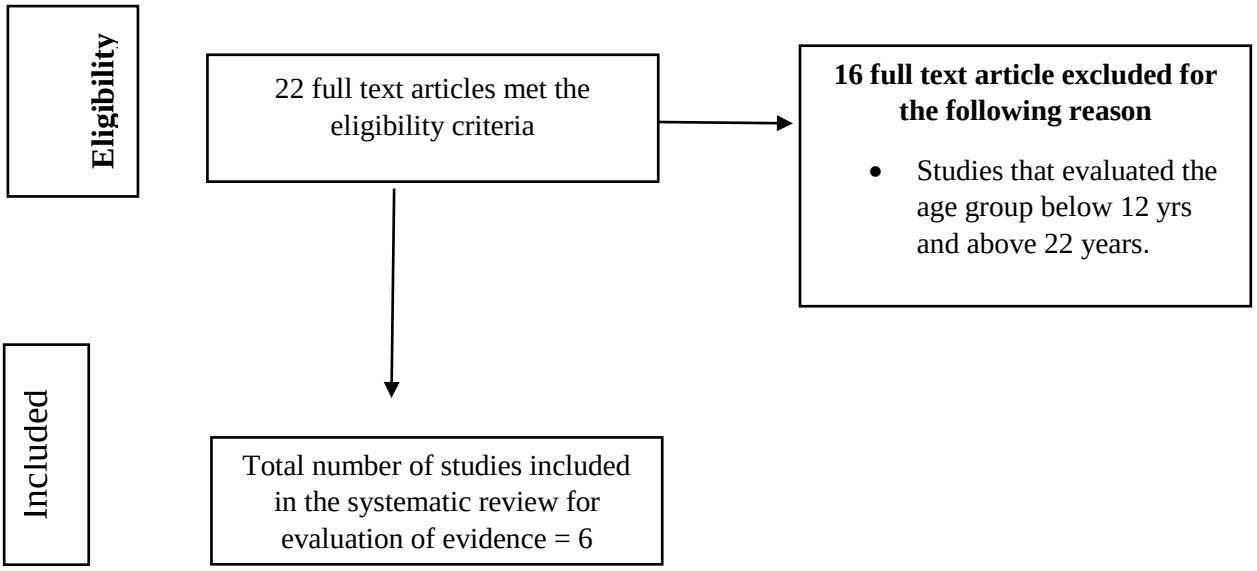



**TABLE:1 Studies that evaluated the psychosocial impact using PIDAQ**

| Author /country | Study design | Study population | Assessment of psychosocial impact using PIDAQ | Findings (Prevalence Of malocclusion) | Results |
|---|---|---|---|---|---|
| Fernanda Riveros Figueroa et al/ Hualqui, Chile[16] | Cross sectional study design | 14-18 years old | Responses for PIDAQ are given using a five-point Likert scale ranging from 0 (dental aesthetics have no negative impact on quality of life) to 4 (dental aesthetics have a severe impact on quality of life). | The overall prevalence of malocclusions was 63.8%, and reached 72.7% in 17-year-olds. The combined prevalence of severe and very severe malocclusion was 28.5% in 14-year-olds and 38% in 18-year-olds | There was a low direct correlation between the severity and psychosocial impact of malocclusion (Spearman's r = 0.21; Pearson's r = 0.014). |
| Chandrabhaga S et al/ India[17] | Cross sectional design | 13-15 years old | Every question had responses on a five-point Likert scale. The response options were as follows: 0 = Not at all; 1 = A little; 2 = Somewhat; 3 = Strongly; and 4 = Very strongly, each subscale score could be calculated separately and was obtained by summing the item scores. | Majority of the subjects (56.6%) had normal occlusion followed by definite malocclusion (24.8%), severe malocclusion (10.9%) and handicapping malocclusion (7.8%). | The mean PIDAQ score was significantly higher in severe forms of malocclusion compared to minor malocclusion. There was a positive correlation between DAI and PIDAQ scores (r= 0.240, P=0.01) |
| Delcides F. de Paula et al / Brazil[18] | Cross sectional study | 13 to 20 years | The subjects were asked to rate how much dental | Most students (49.8%) had no treatment need or | A broad range of adolescents' self-perceived impact of |

SJIF Impact Factor 2022: 8.197| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 7 | Issue: 7 | July 2022 - Peer Reviewed Journal

| | | | | | |
|---|---|---|---|---|---|
| | design | | esthetics exerted a positive or negative impact using a five-point Likert scale ranging from 0 to 4 (0 indicates not at all; 1, a little; 2, somewhat; 3, strongly; and 4, very strongly). | only a slight need (grade 1), and 10.3% (n=31) had very severe malocclusion (grade 4). | dental esthetics is influenced by severity of malocclusion, |
| Passent Ellakany et al. / Saudi Arabia. [19] | Cross sectional design | 12 to 17 yrs old | Standardized questionnaire measuring the (PIDAQ). Responses were scored as yes or no for PIDAQ items in the questionnaire | Tooth alignment and tooth color were the most cited reasons for adolescents' dissatisfaction about their smile, 34% and 33%, respectively, while 22% did not like the shape of their teeth<br>Most of the participants were satisfied (37.4%) or somewhat satisfied (42.5%) with their smiles compared to only 20% who were not satisfied with their smiles. | Females and participants' fathers' university education figured in a statistically significant way regarding higher PIDAQ and aesthetic concerns. |
| Xia Dahong et al./ Wuhan, China[20] | Cross sectional study design | 17 to 22 years old | Self reported questionnaire using PIDAQ with 4 domains: dental self confidence, social impact, psychological impact and aesthetic concern. | Generally, the four malocclusion groups ranked by scores in order from highest to lowest were Class III, Class II/1, Class II/2, and Class I. In all, 1404 subjects (16.0%) had individual normal occlusion, 3892 (44.3%) had Class I malocclusion, 2179 (24.8%) had Class II division 1 (Class II/1) malocclusion, 215 (2.4%) had Class II division 2 (Class II/2) malocclusion, and 1102 (12.5%) had Class III malocclusion. | Psychosocial impacts were different among the five groups for the four PIDAQ domains (P , .001 for all four domains). All four malocclusion groups had more severe psychosocial impacts than the normal occlusion group in the four PIDAQ domains. |

SJIF Impact Factor 2022: 8.197| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 7 | Issue: 7 | July 2022 - Peer Reviewed Journal

| | | | | | |
|---|---|---|---|---|---|
| Delcides Ferreira Paula et al / Brazil[21] | Cross sectional study design | 13 to 20 yrs | The self-completed questionnaire using the question coded into yes, no, or don't know. | (49.8%) had no treatment need or only a slight need (grade 1) and had an average smile line (60.5%). Dissatisfaction with dental appearance was revealed by 34.6% of the sample, and 98.3% of adolescents showed some level of psychosocial impact of dental esthetics | Total PIDAQ score (R2 5 0.37) and dental self-confidence (R2 5 0.37), psychological impact (R2 5 0.30), esthetic concern (R2 5 0.20), and social impact (R2 5 0.15). The excessive anterior teeth display during smiling may potentially influence the self perceived psychosocial impacts of malocclusion in adolescents depending on the severity level of malocclusion and the self-reported satisfaction with dental appearance |

**TABLE:2**
**QUALITY ASSESSMENT USING NEWCASTLE - OTTAWA SCALE (adapted for cross sectional studies)**

| Author | Representativeness of the sample | Sample size | Non respondents | Ascertainment of the exposure ( risk factor) | Comparability | Outcome |
|---|---|---|---|---|---|---|
| Fernanda Riveros Figueroa et al/ Hualqui, Chile[16] | - | - | - | - | - | - |
| Chandrabhaga S et al/ India[17] | - | - | - | - | - | - |
| Delcides F. de Paula et al / Brazil[18] | - | - | - | - | - | - |
| Passent Ellakany et al. / Saudi Arabia.[19] | - | - | - | - | - | - |
| Xia Dahong et al./Wuhan, China[20] | - | - | ? | - | - | - |
| Delcides Ferreira Paula et al / Brazil[21] | - | - | - | - | - | - |

The bias is assigned as low risk (-), high risk (+), and unclear (?)

## DISCUSSION

This systematic review, includes a full analysis of six cross-sectional studies that evaluated the psychosocial impact of malocclusion by PIDAQ (Psychosocial impact of dental aesthetic questionnaire). Fernanda Riveros Figueroa et al in 2017 evaluated the prevalence of malocclusion and its psychosocial impact in a sample of 130 adolescents (14-18 years) from Hualqui, Chile. Participants' dentition was evaluated using the Dental Aesthetic Index (DAI) and they also completed the Psychosocial Impact of Dental Aesthetics Questionnaire (PIDAQ). The result obtained by the author was overall prevalence of malocclusions was 63.8%, and reached 72.7% in 17-year-olds. The combined prevalence of severe and very severe malocclusion was 28.5% in 14-year-olds and

SJIF Impact Factor 2022: 8.197| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 7 | Issue: 7 | July 2022 - Peer Reviewed Journal

38% in 18-year-olds. There was a low direct correlation between the severity and psychosocial impact of malocclusion (Spearman's r = 0.21; Pearson's r = 0.014). In this study the psychosocial impact of malocclusion is less correlated because adolescents' are usually motivated to request orthodontic treatment by concern about their appearance or other psychosocial factors, rather than by concerns about dental functions such as chewing efficiency, correct articulation of words etc[16]. Chandrabhaga S Velangi et al in 2020 assessed the dental aesthetics and its association with psychosocial impact among 400 adolescents aged 13-15years old in Davanagere city. Participants were assessed for severity of malocclusion and psychosocial impact of dental aesthetics using Dental Aesthetic Index (DAI) and Psychosocial Impact of Dental Aesthetic Questionnaire (PIDAQ) respectively. The results obtained was the mean PIDAQ scores increased with the increasing DAI scores and the association was statistically significant (P =0.01) and concluded that there was a positive correlation between DAI and PIDAQ scores (r= 0.240, P=0.01). In this study the psychosocial impact of malocclusion increases with severity of malocclusion among adolescents.[17]

Delcides F. de Paula et al in 2009 tested the hypothesis that several dimensions of the self-perceived psychosocial impacts of dental esthetics are not associated with grades of malocclusion, oral health–related quality-of-life measures, and body self-image in adolescents among 301 adolescents. The Dental Aesthetic Index (DAI) was used for assessment of malocclusion and determination of orthodontic treatment needs. The Psychosocial Impact of Dental Aesthetics Questionnaire (PIDAQ) were used to measure the adolescent's self-perceived variables(psychosocial impact of dental esthetics). The results obtained was DAI correlated with PIDAQ (P <.001). Stepwise multiple regression analysis revealed significant associations (P<.001) of independent variables with the total score of PIDAQ ($R^2$ = 0.29) and dental self-confidence ($R^2$0.30), social impact ($R^2$ = 0.14), psychological impact ($R^2$ = 0.23), and esthetic concern ($R^2$ =0.13) and concluded that the hypothesis is rejected. A broad range of adolescent's self-perceived impact of dental esthetics is influenced by severity of malocclusion.[18]

Passent Ellakany et al determined the factors affecting adolescents dental self-confidence and satisfaction with dental appearance among 3500 students attending intermediate and high schools in Saudi Arabia. Data was collected from 2637 students using the translated Arabic version of the psychosocial impact of dental esthetics questionnaire (PIDAQ) in addition to questions about smile esthetics satisfaction and demographic variables including; gender, age, school grade, and parental level of education. Statistical analysis was performed by using logistic regression to assess the effect of demographical variables on PIDAQ and its domains at 5% significance level. The result obtained was about 80% of the participants were satisfied or somewhat satisfied with their smiles. Tooth alignment and tooth color were the most cited reasons for adolescents' dissatisfaction about their smile, 34% and 33% respectively. Females and participants' fathers' university education figured in a statistically significant way regarding higher PIDAQ and aesthetic concerns. Females were 70%, and those with fathers' university education were 22% more likely to have a negative psychological impact. Females expressed aesthetic concerns nearly two times more than males. Participants whose fathers possessed university education had an aesthetic concern 1.25 times more compared to those whose fathers had no school or limited school education. Females and those with mothers who had university education were less likely to have positive dental self-confidence. Most adolescents exhibited satisfaction with their own smiles. Smile dissatisfaction in the remaining participants was related to teeth alignment, color and shape. Females were more concerned with dental esthetics and smile satisfaction than males. This study concluded that the females and participants whose fathers had a university education exhibited higher psychosocial impact than males and those with or without school education. However, males showed greater self-confidence in their dental aesthetics.[19]

Xia Dahong et al evaluated the impact of the incisor position on the self-perceived psychosocial impacts of malocclusion among 1005 Chinese young adults aged between 17 to 22 years. The five groups of malocclusion represented were normal occlusion as well as incisor Class I, Class II/1, Class II/2, and Class III malocclusion. For clinical assessment, the incisor relationship was evaluated according to the British Standards Institute Incisor Classification, and the self-perception of dental esthetics was assessed using the Psychosocial Impact of Dental Aesthetics Questionnaire (PIDAQ). Statistical analysis involved the analysis of variance and Tukey multiple-comparison post hoc tests. The results obtained was the psychosocial impacts were different among the five groups for the four PIDAQ domains (P , .001 for all four domains. Statistically significant differences were found between four malocclusion groups. This study concluded that all four malocclusion groups had more severe psychosocial impacts than the normal occlusion group in the four PIDAQ domains.[20]

Delcides Ferreira Paula et al investigated the impact of the anterior teeth display during smiling (ATDDS) on the self-perceived psychosocial impacts of malocclusion among 16 years old 301 adolescents. Materials used were the Dental Aesthetic Index (DAI) and the Psychosocial Impact of Dental Aesthetics Questionnaire (PIDAQ). In addition, ATDDS was assessed in posing smiling, and adolescents' satisfaction with their dental appearance was investigated. The inference were statistically significant associations observed between independent variables (ATDDS, DAI scores, and satisfaction with dental appearance) and total PIDAQ score ($R^2$ = 5 0.37) and dental self-confidence ($R^2$ = 5 0.37), psychological impact ($R^2$ = 5 0.30), esthetic concern ($R^2$ = 5 0.20), and social impact ($R^2$ = 5 0.15).This study concluded that the excessive anterior teeth display during smiling may potentially influence the self perceived psychosocial impacts of malocclusion in adolescents depending on the severity level of malocclusion and the self-reported satisfaction with dental appearance.[21]

The quality of the study was assessed using Newcastle - Ottawa scale which was adopted for the cross sectional studies.[22] All six studies were evaluated for the

SJIF Impact Factor 2022: 8.197| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 7 | Issue: 7 | July 2022 - Peer Reviewed Journal

representativeness of the sample, sample size, non respondents, risk factor, assessment of the outcome and statistical test.

## CONCLUSION

This systematic review concludes that the dental esthetic defect malocclusion has positive effects on psychosocial impact using PIDAQ psychosocial impact of dental esthetic questionnaire with strong scientific evidence.

**CONFLICTS OF INTEREST:** None

## REFERENCES

1. *Ingber FK. You are never fully dressed without a smile. J Esthet Restor Dent 2006;18(2):59-60*
2. *Samorodnitzky-Naveh GR, Geiger SB, Levin L. Patients' satisfaction with dental esthetics. J Am Dent Assoc. 2007;138(6):805-808*
3. *Ahmad I. Anterior dental aesthetics: historical perspective. Br Dent J. 2005;198(12):737-742*
4. *Figueroa FR, Bancalari C, Cartes-Velásquez R, Sanhueza M, Palma C. Prevalence of malocclusion and its psychosocial impact in a sample of chilean adolescents aged 14 to 18 years old. Journal of International Dental and Medical Research. 2017;10(1):14.*
5. *Dudea D, Lasserre JF, Alb C, Culic B, Pop Ciutrila IS, Colosi H. Patients' perspective on dental aesthetics in a South-eastern European community. J Dent. 2012;40:e72-81*
6. *Ruschel VC, Araújo É, Bernardon JK, Lopes GC. Enamel hypoplasia: challenges of esthetic restorative treatment. Gen Dent. 2016 Sep-Oct;64(5):75-8*
7. *Abraham R, Kamath G. Midline diastema and its aetiology--a review. Dent Update. 2014 Jun;41(5):457-60, 462-4.*
8. *Dym H, Pierre R 2nd. Diagnosis and Treatment Approaches to a "Gummy Smile". Dent Clin North Am. 2020 Apr;64(2):341-349.*
9. *Bakhshi M, Rahmani S, Rahmani A. Lasers in esthetic treatment of gingival melanin hyperpigmentation: a review article. Lasers Med Sci. 2015 Nov;30(8):2195-203.*
10. *Abanto Alvarez J, Rezende KM, Marocho SM, Alves FB, Celiberti P, Ciamponi AL. Dental fluorosis: exposure, prevention and management. Med Oral Patol Oral Cir Bucal. 2009 Feb 1;14(2):E103-7*
11. *Chauhan D, Sachdev V, Chauhan T, Gupta KK. A study of malocclusion and orthodontic treatment needs according to dental aesthetic index among school children of a hilly state of India. J Int Soc Prev Community Dent. 2013;3(1):32-37.*
12. *Helm S, Kreiborg S, Solow B. Psychosocial implications of malocclusion: a 15-year follow-up study in 30-year-old Danes. Am J Orthod. 1985 Feb;87(2):110-8.*
13. *Klages U, Claus N, Wehrbein H, Zentner A. Development of a questionnaire for assessment of the psychosocial impact of dental aesthetics in young adults. Eur J Orthod. 2006;28(2):103–11.*
14. *Settineri S, Rizzo A, Liotta M, Mento C. Italian validation of the psychosocial impact of dental aesthetics questionnaire (PIDAQ). Health. 2014 Sep 4;2014.*
15. *Goodman, C.S. (2004) HTA 101: introduction to health technology assessment. www.nlm.nih.gov/nichsr/hta101/ta101_c1.html. (2 May 2014, date last accessed)*
16. *Figueroa FR, Bancalari C, Cartes-Velásquez R, Sanhueza M, Palma C. Prevalence of malocclusion and its psychosocial impact in a sample of chilean adolescents aged 14 to 18 years old. Journal of International Dental and Medical Research. 2017;10(1):14.*
17. *Velangi CS. Dental Aesthetics and its psychosocial impact among adolescents: A cross-sectional survey. International Journal of Applied Dental Sciences 2020; 6(2): 184-188*
18. *de Paula, Júnior DF, Santos NC, da Silva ET, Nunes MF, Leles CR. Psychosocial impact of dental esthetics on quality of life in adolescents: association with malocclusion, self-Image, and oral health–related issues. The Angle Orthodontist. 2009 Nov;79(6):1188-93.*
19. *Ellakany P, Fouda SM, Alghamdi M, Bakhurji E. Factors affecting dental self-confidence and satisfaction with dental appearance among adolescents in Saudi Arabia: a cross sectional study. BMC Oral Health. 2021 Dec;21(1):1-8.*
20. *Dahong X, Xiangrong C, Ying L, Yusong L, Ying G, Yan S. Effect of incisor position on the self-perceived psychosocial impacts of malocclusion among Chinese young adults. The Angle Orthodontist. 2013 Jul;83(4):617-22.*
21. *Jr DF, Silva ET, Campos AC, Nunez MO, Leles CR. Effect of anterior teeth display during smiling on the self-perceived impacts of malocclusion in adolescents. The Angle Orthodontist. 2011 May;81(3):540-5.*
22. *Modesti PA, Reboldi G, Cappuccio FP. Newcastle-Ottawa Quality Assessment Scale (adapted for cross sectional studies). PLoS One. 2016.*