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Psychological and quality of life outcomes following orthognathic surgery: A comprehensive systematic review

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ABSTRACT

Orthognathic surgery (OGS) corrects functional malocclusions and enhances facial profiles. It is suitable for patients with dentofacial deformities, facial asymmetries, and craniofacial anomalies. OGS has significant psychological implications, making the assessment of patient satisfaction and quality of life (QoL) vital for optimal outcomes.

This study evaluates the psychological context of patient satisfaction and QoL improvements post-OGS. A systematic review of 29 studies, following PRISMA guidelines, included databases like Cochrane, MEDLINE, and others. Results showed 25/29 studies reporting improved outcomes: OHIP (12/29), OQLQ (10/29), and SF-36 (7/29). Overall, OGS positively impacted QoL, emphasizing its effectiveness in psychological well-being and aesthetic transformation. Understanding limitations and exploring psychological impacts further can optimize patient outcomes.

1. Introduction

Orthognathic surgery (OGS) addresses skeletal, facial, and dental abnormalities, improving musculoskeletal function and psychosocial well-being. It is often paired with orthodontic appliances to correct malocclusions and enhance aesthetics. Procedures like Le Fort I osteotomy (LFI) and bilateral sagittal split osteotomy (BSSO) reposition the maxilla and mandible, respectively [1].

OGS has profound psychological effects. Patients with dentofacial deformities often experience low self-confidence, social challenges, and distress about their facial appearance [2]. Post-surgery, patients may struggle with adjusting to their new appearance, underscoring the importance of evaluating pre- and post-treatment satisfaction [3]. This study aims to assess psychological factors and QoL improvements in patients undergoing OGS procedures.

OGS involves procedures like LFI, BSSO, and genioplasty, yielding positive clinical outcomes. Patient selection depends on craniofacial deformities, malocclusion severity, and general health. Comprehensive assessments ensure surgery benefits outweigh risks, with clear communication about potential outcomes. OGS outcomes can be influenced by psychological factors [2], oral health [4], and facial aesthetics [5]. This review examines preoperative assessments, patient selection criteria, and the impact of surgery on expectations, body image, and self-esteem. Synthesizing existing literature provides insights to improve patient-centered care and maximize outcomes [3].

1.1. The context of orthognathic surgery

OGS encompasses procedures such as lefort I osteotomy (LFI), Bilateral saggital split osteotomy (BSSO), and genioplasty, resulting in favorable clinical results. Patient selection criteria consider craniofacial deformities, the severity of malocclusion severity, and overall health status. Thorough evaluation ensure the benefits of surgery surpass benefits outweigh risks, with clear communication about potential

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outcomes [6].

1.2. Pre-operative assessment and patient satisfaction

Preoperative psychological evaluations identify conditions like body dysmorphic disorder (BDD), anxiety, or depression that may influence outcomes [7]. BDD, affecting up to 1 in 5 cosmetic surgery patients, is often underdiagnosed despite available screening tools. Addressing these factors improves postoperative functionality and QoL [8].

1.3. Post-operative patient psychology

OGS significantly alters patient psychology postoperatively. Initial concerns about surgery and recovery give way to improved self-esteem, reduced anxiety, and better body image as physical and aesthetic improvements become evident. Effective management of recovery phases is crucial for positive outcomes.

1.4. Quality of life (QOL) indicators

Several self-directed survey tools have been developed to assess patient satisfaction based on quality of life indicators. These encompass social, aesthetic, and psychological domains of health. In the current study, the following scales of measure were used to collect data for the analysis.

1.4.1. Orthognathic quality of life questionnaire (OQLQ)

The Orthognathic Quality of Life Questionnaire (OQLQ), developed by Cunningham et al. (2000), is a condition-specific measure for assessing the effects of orthognathic treatment. It includes 22 items reflecting how dentofacial deviations impact quality of life. The OQLQ is divided into four subscales: oral function (items 2–6, range 0–20), awareness impact (items 8, 9, 12, and 13, range 0–16), social impact (items 15–22, range 0–32), and aesthetic impact (items 1, 7, 10, 11, and 14, range 0–20). Responses are scored on a 5-point Likert scale, from 0 ("does not bother me at all") to 4 ("bothers me a lot"). A lower score indicates better quality of life, with a possible total score ranging from 0 to 88 [9].

1.4.2. 36-Item short form health survey (SF-36)

The SF-36 assesses quality of life with 36 items covering eight areas: physical functioning, role limitations due to physical health, role limitations due to emotional issues, energy/fatigue, emotional well-being, social functioning, pain, and overall health [10]. The scores range from 0 to 100, with higher scores indicating better physical and mental functioning.

1.4.3. Oral health impact profile (OHIP)

The Oral Health Impact Profile (OHIP) is a standardized tool for assessing how oral health impacts an individual's life. It examines social, psychological, and physical aspects of oral well-being across domains such as functional restrictions, discomfort, disability, social disability, and handicap [11]. OHIP helps researchers and clinicians evaluate how oral health affects daily life, contributing to treatment planning, patient progress, and research to improve oral health outcomes. A lower OHIP score indicates higher patient satisfaction.

1.5. Objectives

The objectives of this analysis are (i) to evaluate the factors that affect the psychological well-being and overall quality of life before and after OGS; (ii) to assess the impact of various approaches to OGS; (iii) to identify the factors that contribute to patient satisfaction with OGS; (iv) to identify potential barriers and limitations in the current OGS practice and provide recommendations to improve patient outcomes in orthognathic treatment.

2. Methodology

2.1. Eligibility criteria

We followed the PICOS framework (population, intervention, comparison, outcome, and study design) for the inclusion criteria, targeting studies published in English between 2015 and 2023. A summary of the Boolean strings created for each of the selected databases is mentioned in the table below (Table 1).

The population included adolescents (12–18 years) and adults (18–65 years) with Class I-III craniofacial malocclusion requiring orthognathic treatment. Studies with free full-texts or abstracts and moderator analyses based on effect sizes were included. Exclusion criteria included studies older than 2015, non-RCTs, studies with high risk of bias, and those focusing on children (0–12 years) or the elderly (65+ years), as well as those with incorrect outcome measures or previous facial surgery (Table 2).

Table 1
Inclusion and exclusion criteria for Boolean strings.

Component 1 (Compulsory)	*'orthognathic surgery', 'patient satisfaction', 'Bilaterally sagittal split osteotomy', 'Le Fort I osteotomy'*
Component 2 (Compulsory)	*'OGS', 'psychological impact', 'genioplasty'*
Component 3 (Compulsory)	*'quality of life', 'OHIP-14, 'physical needs', 'OQLQ-22'. 'SF-36'*
Component 4 (Optional)	*'Adoption rate', 'systematic review', 'feedback'. 'Qol'*

Table 2
Inclusion and Exclusion criteria for the review.

Inclusion	Exclusion
1) Only the studies from peer-reviewed journals were added. 2) Data was extracted from a point estimation range of 2015–2023 for all included studies. 3) The target population was taken into consideration. Based on the potential prospects of the study, age groups from 12 to 65 years were considered eligible. For this reason, all populations including adolescents (12–18 years), and adults (18–58 years) were added in the current review. 4) Since the systematic review required journal indexing and moderation analysis, only studies that were available free and/or with full-text accessible were selected. 5) A controlled study design was a strict measure to find relevant data and avoid any risk of bias in the publication design.	1) Studies older than 2015 were ultimately excluded. 2) Studies that targeted other social and psychosocial factors of patient satisfaction. 3) Studies that measured wrong variables for the required study outcomes. 4) Study designs that consisted of narrative reviews 5) Population group (0–12 years) and (>65 years).

Table 3
Parameters and search sources.

Bibliographic databases	PubMed, Google Scholar, and others
Articles type	*Journal articles, Scientific websites, Academic*
Search on	*Titles, Keywords, Abstract*
Sorting on return	*Relevance*
Language	*English*
Period of publication	*2015–2023*

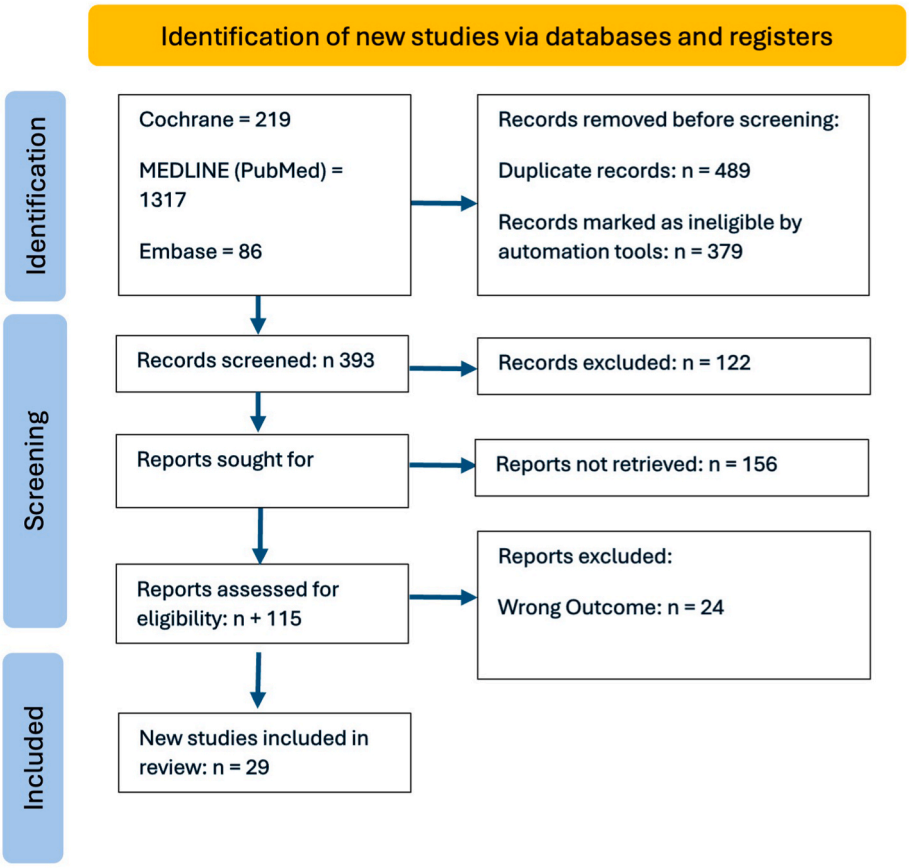

Fig. 1. PRISMA Flow Diagram for the selected studies.

2.2. Information sources

We searched a number of digital databases for relevant literature. These include PubMed, Google Scholar, APA PsychNet, ScienceDirect, Medline, Embase, etc. Independent journals and other independent sources were also included by backward reference searching. A summary of information sources searched for the current study is given in the table below (Table 3).

2.3. Search strategy

We found a total of 50 studies that were eligible for the inclusion criteria and cover the terms: ("orthognathic surgery" OR "orthognathic procedures" OR "orthognathic treatment") AND ("pre-operative psychological assessment" OR "psychological evaluation" OR "psychological assessment") Filters: Abstract, Free full text, English, from 2015 to 2023)" Additionally, we inspected the reference lists of the studies selected for the systematic review. We set inclusion and exclusion criteria for Boolean strings on different databases.

2.4. Selection process

Three researchers independently searched peer-reviewed journals, selecting studies based on the inclusion criteria. Selected studies were uploaded to RAYYAN.AI for screening. Disputes were resolved by the research team. After screening, 29 studies were included for analysis, with others excluded due to population issues, incompatible study design.

2.5. Data items

The total sample size for the selected literature (n = 29) was scrutinized after secondary screening protocol was completed. We used the Preferred Reporting Items for Systematic Review and Meta-Analysis (PRISMA) standards to create a PRISMA flow diagram for the selected studies from journals and other independent resources (if the reports were available). The PRISMA flow diagram is given in Fig. 1.

After the study selection process was complete, we tabulated the study interventions one by one against the study population and the outcomes studied. Only the relevant themes of the outcomes were mentioned in the synthesis table.

Bias in the analysis was minimized by (1) selecting high-quality research and thorough literature review, (2) eliminating the double standard concerning peer review and informed consent applied to clinical research and practice, (3) requiring peer reviewers to acknowledge conflicts of interest. Systematic reviews and narrative reviews were frequently excluded from the literature to maintain the standards of the study. These guidelines detect and remove bias in the study protocol in accordance with stages of removing publication bias. Most of the studies chosen for the systematic analysis were found to have a "low" overall risk of bias. In the current analysis, "high" risk of bias was reported for 2 out of 29 studies, 5 studies had a moderate risk of bias, and "low" risk of bias was reported for all the remaining studies.

2.6. Quality assessment

For systematic review: All the studies selected for quality assessment were analyzed for publication bias. All the studies were manually checked for intervention characteristics, population demographics, and outcomes domains. All the studies eligible for the analysis were

Table 4
Synthesis table for the Systematic Review.

Sr	Study ID	Location	Study Design	Approach	Participants	Intervention	Key-findings
1	Brucoli, Zeppegno et al. (2019) [14]	N/A	Prospective	OGS (Maxilla + Mandible)	The study recruited 33 patients referred for traditional 3-stage orthognathic treatment and surgery-first orthognathic treatment.	Patients were administered psychological and quality-of-life tests 3 times: during the last visit before surgery, about 4 weeks after surgery, and 6 months after maxillofacial (Le-Forte 1) surgery.	The results of the 36-item Short Form Health Survey showed significant differences with better scores for the "surgery-first" group for bodily pain, vitality, social functioning, and mental health ($P < 0.05$).
2	Kufta et al. (2016) [15]	Pennsylvania	Cross-sectional	OGS	37 patients, 15/37 (40.5 %) Le-Fort; 12/37 (32.5 %) BSS); 6/37 (16 %) both	Self-directed questionnaire as the survey tool	Overall satisfaction had the highest correlation with appearance (r¼ 0.52, P ¼ 0.0009). Other categories were correlated as follows: functionality (r ¼ 0.19, P¼ 0.26), general health (r ¼ 0.11).
3	Roman et al. (2022) [16]	Olsztyn	Case-Control	OGS	124 respondents, between 16 and 25 years; 65 patients (cases) and 59 healthy individuals (controls)	Questionnaire that consisted of 2 parts: 1 given to patients after OGS, 1 given to healthy individuals	Average value for physical functioning (PF) in the study group was significantly higher than in the control group (M: 97.15 vs. 91.86; p = 0.014; d = 0.43; 95 % CI [0.07–0.79]).
4	Lancaster et al. (2020) [17]	US	Case-Control	OGS	A total of 80 participants; 37 treatment subjects, 43 controls	Orthognathic Quality of Life Questionnaire (OQLQ)	For the post-treatment period, T3, there was a significant difference between patients and controls only in domain 3, oral function, of the OQLQ.
5	*Torgersbråten*et al. *(2020)* [18]	England	Cross-sectional	*One-piece Le Fort I, bilateral sagittal split osteotomy, or a combination of the two (Bimax)*	*93 consecutively treated patients before and after OGS*	*A structured questionnaire was distributed 3 years post-operatively to patients with an initial diagnosis of mandibular-plane angle (ML/NSL) ≥34.0 degrees*	*The most frequently reported motives for seeking treatment were to improve oral function (85.0 per cent) and dental appearance (71.7 per cent).*
6	*Huang*et al. *(2016)* [19]	China	Longitudinal prospective study	OGS	*50 Chinese orthognathic adult patients; The sample divided into 2 groups: the surgery-first group (female 12, male13; 24.2 ± 5.8 years) and the orthodontic-first group (female 13, male 12; 25.2 ± 4.2 years)*	*14-item Oral Health Impact Profile for assessment of patient's quality of life*	Before having orthognathic surgery, the quality of life declined in the orthodontic-first group. The group that had surgery first experienced an instant improvement in quality of life, which resulted in increased satisfaction.
7	Lin et al. (2022)	China	Case-Control	OGS	A total of 109 participants; 32 controls, 77 patients post-surgery	Self-directed questionnaire as the research tool. (SF-36)	Physical function (P1 ¼ 0.03), role limitations due to physical health (P1 ¼ 0.008) and social functioning (P1 ¼ 0.021) exacerbated after OGS.
8	Bengtsson et al. (2018) [20]	Sweden	Randomized Double-Blind Active-Controlled Clinical Trial	OGS	62 test subjects; 31 test and 31 controls	Questionnaires on the patient's health-related quality of life (HRQoL) were distributed preoperatively and 12 months after surgical treatment.	No statistically significant difference was found between the planning techniques.
9	Chadda et al. (2021) [21]	N/A	Case-Control	OGS	28 subjects; 14 in pre-treatment and 14 in post-treatment group	Self directed questionnaire; surveyed before surgery and 1 month post surgery	The psychological and social aspects of OHIP questionnaire were most affected followed by the functional aspect.
10	*Alhussain*et al. *(2022)* [22]	Saudia Arabia	Prospective	LF1; BSSO; and/or genioplasty	250 patients with previous diagnosis of dentofacial malocclusions.	OHIP-14 questionnaires were used as the research tool of choice.	The research's conclusions indicate that patients view orthognathic surgery and the doctor's demeanor favorably. The majority of patients state that they

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Table 4 (*continued*)

Sr	Study ID	Location	Study Design	Approach	Participants	Intervention	Key-findings
							had no problems following surgery and that they would recommend this surgical method to others.
11	Chaurasia et al. (2018) [23]	Nepal	Experimental-Cohort	OGS	A total of 14 patients who completed pre-surgical orthodontic treatment.	SF-36; OHIP-14; OQLQ	There was a significant improvement in role limitation due to physical health. Five out of seven domains had a significant decrease in OHIP score in post-operative follow up period. Over all OQLQ as well as all domain scores had a significant decrease in the post-operative follow up period.
12	Eslamipour et al. (2017) [24]	Isfahan	Prospective	BSSO-I	A total of 43 patients; same sample size for both test groups	self-administered 22-item Orthognathic Quality of Life Questionnaire	A significant reduction in OQLQ and all sub-domains mean scores was observed over the trajectory of treatment
13	Baherimoghaddam et al. (2016) [25]	N/A	Prospective	OGS	58 in total; 30 in sample size (n = 30)	Self directed questionnaire; surveyed before surgery and 6 month post surgery	A significant decrease was found during T0–T2 in class II patients and during T0–T2 and T0–T3 in class III patients
14	Avelar et al. (2019) [26]	Brazil	Cohort	BSSO (59 %), Bimaxillary surgery (27 %) and maxillary surgery (Le Fort I); (14 %)	Twenty participants agreed to participate in the study and answered	OHIP-14: Wilcoxon matched-pairs test was used to assess changes before and after surgery	Oral conditions can have a strong impact on patients' psychological, social, and functional health.
15	Alanko et al. (2017) [8]	Finland	Prospective	(BSSO) was performed in 19 patients, and a combination of Le Fort I osteotomy (LFI) and BSSO was used in 46 patients.	60 in total; Pre-treatment (n = 40); Post-treatment (n = 22)	Self-directed questionnaire sent via email	Patient scores in all OQLQ subscales, body image, facial body image, RSES, AAQII, and most subscales of the SCL90 changed during treatment (T2–T4)
16	Kurabe et al. (2016) [27]	Japan	Prospective	Le-Fort 1; BSSO, or both	Total (n) = 65; control = 14; test group = 65	Self-directed questionnaire sent to email	The total score and subscale scores after surgery, except scores for the functional limitation and psychological discomfort domains, were significantly higher than those of the control subjects
17	Silva et al. (2016) [28]	Sweden	Prospective Cohort	OGS (Maxilla + Mandible)	50 consecutive patients with skeletal malformations	Self-directed questionnaire sent to email	Statistically significant changes in OHIP-14 score were seen between baseline and 6 months postoperatively. Patients who reported facial appearance as a main factor for treatment had the greatest decrease in total OQLQ score between baseline and 6 months postoperatively (p ¼ 0.05)
18	Kashan et al. (2021) [10]	N/A	Cross-sectional cohort study	BSSO-1	Total (n = 46) consisting of 3 groups of patients, who were seeking either facial cosmetic, orthognathic, or dentoalveolar procedures.	All patients in the study were screened for BDD using the Body Dysmorphic Disorder Questionnaire (BDDQ) and assessed for severity of disorder using the BDDQ severity scale.	The group containing the highest proportion of patients at high-risk for BDD were those seeking facial cosmetic procedures (16.7 %)
19	Saghafi et al. (2020) [29]	N/A	Prospective study	The patients in each group had Le Fort I osteotomy or bilateral sagittal split ramus osteotomy, or both, with or without genioplasty	Data were collected on 32 patients (aged 17–47 years) who were all treated at a single multidisciplinary orthognathic clinic.	Participants completed a 22-item Orthognathic Quality of Life Questionnaire (OQLQ), and a seven-item Generalised Anxiety Disorder (GAD-7) questionnaire at intervals	Quality of life was significantly better in the surgery-first group preoperatively (p = 0.010, ES = 0.96). The mean score and the individual domain scores of the OQLQ showed significant

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Table 4 (*continued*)

Sr	Study ID	Location	Study Design	Approach	Participants	Intervention	Key-findings
						of 6 weeks and then at 6 months	improvements at six weeks and six months postoperatively.
20	Kettunen et al. (2023) [30]	Finland	Retrospective study	Le-forte 1 followed by genioplasty	Patients 18 years who received bilateral sagittal split osteotomy (BSSO), Le Fort I, or bimaxillary-osteotomy with postoperative follow-up of 6 months were included in the study	The electronic medical records of all patients undergoing OS from 2017 to 2019 were reviewed from the hospital database.	During the postoperative phase, new psychiatric morbidity or exacerbation of a preexisting psychiatric condition was found in 12 patients (7 %) out of 182 patients.
21	Gabardo et al. (2019) [1]	Positivo	Prospective observational study	Le-forte 1 or incorrectly filled previous BSSO	The intended sample size was 102 individuals aged 18 years and over, of both sexes	Pre and post-surgery evaluations, in relation to the applied questionnaire scores (general and by domains) were compared using the Wilcoxon non-parametric test.	There was improvement in the perception of QOL from T0 to T1 in the general score, in the physical and psychological domains, and in the quality of life and general health perception
22	Posnick and Kinard (2019) [31]	Washington, DC	Prospective	Not specified	The sample was composed of 20 subjects randomly selected from the long-face DFD (dentofacial deformity) database.	A survey, distributed through Amazon.com's Mechanical Turk crowdsourcing platform, to compare 6 perceived personality traits and 6 perceived emotional traits before and after (>6 months) orthognathic surgery.	After jaw reconstruction and completion of orthodontic treatment, long-face subjects as a group were perceived to be significantly more trustworthy, more friendly, more intelligent, more attractive and more dominant and also as happier and less angry, sad, afraid, or disgusted than they were prior to surgery ($p < 0.05$).
23	Agırnaslıgıl et al. (2019) [5]	Turkey	Patient-control study (Prospective cohort)	Le Fort I osteotomy procedure and setback of the mandible by bilateral sagittal split ramus osteotomy (BSSRO)	Two hundred five subjects with a mean age of 21.42 6 1.98 years (95 male, 110 female) were involved	Self-directed questionnaire. Subjects divided into 3 groups; Group 1 (control group) has 60 participants; Group 2 (longitudinal group); Group 3 (cross-sectional group)	In the results of the cross-sectional study group, self-esteem of patients increased significantly with surgery (P \0.001), and the levels of sensitivity to criticism (P \0.05) and social appearance anxiety (P \0.001) decreased significantly, as in the longitudinal study group
24	*Alhadi*et al. *(2019)* [11]	N/A	Prospective	Le-forte and BSSO Type 1	*One hundred and eighteen patients who had undergone orthognathic surgery were included*	*All participants completed a questionnaire regarding their reasons for undergoing treatment, treatment logistics, treatment outcomes, and satisfaction throughout their journey.*	*Most patients were 'very satisfied' (71.2 %) or 'satisfied' (19.5 %) with the overall treatment. The majority wished to improve their smile (78.0 %); post-treatment, 89.0 % of patients reported an improved smile.*
25	*Joachim*et al. *(2021)* [32]	Netherlands	*Retrospective cohort study*	OGS	*Total 55 patients who had undergone orthognathic surgery.*	*Each participant completed a modified questionnaire used to assess the patient's aesthetic, social, and functional abilities after orthognathic surgery.*	*Patient satisfaction with the orthognathic surgical procedure was mostly a result of improvements in facial esthetics, followed by psychological well-being and functional abilities.*
26	*Belušić-Gobić*et al., *(2021)* [33]	N/A	Prospective Cohort	OGS	*The sample included 110 Caucasian subjects (73 % females) aged 19–54 years.*	A total of 55 patients, matched for age and sex, received combined orthodontic and orthognathic surgical treatment for their dentofacial deformities. The other 55 patients were treated as untreated controls and did not receive any orthodontic treatment.	*The major effect size was a decrease in facial aesthetic concerns (FE; 7.6 ± 6.2; $p < 0.001$; $r = 0.78$), followed by a decrease in impairment of and OHIP (8.0 ± 7.1 and 16.6 ± 14.6; $p < 0.001$; $r = 0.75$).*
27	*De Paula Gomes*et al., *(2019)* [34]	Denmark	Cross-sectional study	BSSO; LF1	*N = 106; average age, 27.2 years*	*Participants answered the Oral Health Impact Profile*	Along with functional aspects, psychological and

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Table 4 (*continued*)

Sr	Study ID	Location	Study Design	Approach	Participants	Intervention	Key-findings
						14 (OHIP-14) questionnaire and Orthognathic Quality of Life Questionnaire (OQLQ).	aesthetic factors had a significant impact on patients' quality of life who had dentofacial deformities.
28	*Rezaei*et al.,*(2019)* [35]	Iran	*Descriptive quasi-experimental design*	OGS	This study involved 112 skeletal class III patients in total, 39 (34.8 %) males and 73 (65.2 %) females.	All patients filled out a demographic information questionnaire, the oral health impact profile-14 (OHIP-14), and the orthognathic quality of life questionnaire (OQLQ) under the supervision of the examiner.	*OHRQoL summary score changed from 14.5 prior to orthodontic treatment to 23.4 prior to surgery and during orthodontic treatment to 5.4 after surgery.*
29	*Grewal*et al. *(2019)* [36]	N/A	*Longitudinal Study*	Le-Forte 1	*A convenience sample of 18.1 to 25.3-year-old young adults (n = 400).*	*The self-perception of dental aesthetics pre- and post-treatment related to gender variations and severity of malocclusion (Angle's class I, II, III) was assessed.*	*Statistically positive psychosocial impacts were observed after orthodontic treatment for the six PIDAQ domains (P < 0.001 for all six domains).*

independently selected based on the CASP (Critical Appraisal Skills Programme) tool [12]. According to the CASP protocol, the risk of bias algorithm assessed 3 domains of potential risk of bias. Bias in the analysis was minimized by (1) selecting high-quality research and thorough literature review, (2) eliminating the double standard concerning peer review and informed consent applied to clinical research and practice, (3) requiring peer reviewers to acknowledge conflicts of interest. Systematic reviews and narrative reviews were frequently excluded from the literature to maintain the standards of the study. These guidelines detect and remove bias in the study protocol in accordance with Chalmers et al. (1990) stages of removing publication bias [13]. The quality assessment included three broad categories of questions: (1) Were the study results validated? (2) What were the results? (3) Are the results of the study applicable locally? 11 questions for quality assessment were answered with careful consideration of study designs and the relevant outcomes. The responses to the questions were "Yes," "No," and "Can't tell." If the first question is answered in the affirmative, it makes logical sense to move on to the other inquiries. The questions overlap each other in certain ways. The description of the answeres and researchers' remarks has also been mentioned in the assessment table (See results section).

3. Results

3.1. Study characteristics

The final sample for the systematic analysis included 29 peer-reviewed studies. Thirteen of these studies used a prospective study design, five used a prospective cohort design, three of these used randomizations, and four used a (quasi)-experimental design; and five used propensity score methods to construct a matched comparison group. Sample sizes ranged from as small as N = 14 to as large as N = 65. Follow-up data collection time points ranged from 3 weeks to 60 months (5 years). The results of the systematic review revealed a total of 25/29 (86.2 %) studies advocating the effectiveness of orthognathic surgery on patient satisfaction scores. The current study used a comprehensive analysis for all QoL indicators previously mentioned. A majority of studies showed a positive patient outcome when OQLQ, SF-36, and OHIP scores were considered separately. On the other hand, 5/29 (17.2 %) studies concluded "no effect" or "negative" association for 2 individual study outcomes. 2 individual groups were defined in the systematic review: (1) patients who underwent OGS vs. who did not; (2) patients who participated in the survey before and after OGS. The synthesis table for the systematic review is given below (Table 4).

3.2. CASP assessment

As mentioned earlier, CASP tool was used to assess the risk for all the primary studies selected for the systematic review. We used Critical Appraisal Skills Programme (CASP) tool to create a quality assessment table for all the studies included in the final sample. The assessment table for 8 primary studies is mentioned (Table 5).

4. Discussion

The results of this systematic review demonstrate that orthognathic surgery (OGS) significantly improves the quality of life (QoL) for patients with dentofacial deformities, as assessed using the OHIP-14 and OQLQ questionnaires. Aggregated data on improved QoL is essential for patients and maxillofacial surgeons in setting realistic expectations. The overall improvement in QoL scores, even when accounting for factors like anxiety, depression, and low self-esteem, underscores the positive impact of OGS. Notably, moderate heterogeneity remains in OQLQ data despite removing Lancaster et al. (2020) [17], which exclusively used OQLQ without correlation to other tools. This highlights the unique value of OQLQ in assessing QoL.

Aligned with Cremona et al. (2022), this review confirms significant QoL improvements post-OGS. However, a p-value exceeding 0.05 suggests limited statistical power, likely due to small sample sizes and geographic variations. This underscores the need for large-scale, multicenter trials to enhance reliability. While pre-surgical orthodontic treatment may temporarily lower QoL, prospective cohorts by He et al. (2018) [37] and Avelar et al. (2019) [26] show marked psychological and social improvements within six weeks to three months post-surgery. These findings align with De Araújo et al. (2019) [38], which confirms OGS benefits across functional, social, psychological, and aesthetic domains.

Several preoperative factors, including anxiety, depression, and facial aesthetics, predict patient outcomes following OGS. Improved oral health, physical function, and reduced role limitations significantly contribute to positive experiences, as shown in OQLQ, OHIP, and SF-36 measures. For example, Joachim et al. (2021) [32] found patient

Table 5
Quality assessment table, Critical Appraisal Skills Programme (CASP).

Sr.		Bahermoghaddam et al., 2016	Silve et al., 2016	Kurabe et al., 2016	Bengtsson et al., 2018	Churassia et al., 2018	Avelar et al., 2019	Chadda et al., 2021	Eslamipour et al., 2018	Lancaster et al., 2020	Kufta et al., 2016	Lin et al., 2022
1	**Did the study address a clearly focused issue?**	**Y**	**Y**	**Y**	**Y**	**Y**	**Y**	**Y**	**Y**	**Y**	**Y**	**Y**
2	**Did the authors use an appropriate method to answer their question?**	**Y**	**N**	**Y**	**Y**	**Y**	**Y**	**Y**	**Y**	**Y**	**Y**	**Y**
3	**Were the cases recruited in an acceptable way?**	**Y**	**Y**	**?**	**Y**	**?**	**?**	**Y**	**Y**	**Y**	**Y**	**?**
4	**Were the controls selected in an acceptable way?**	**Y**	**Y**	**Y**	**Y**	**N**	**Y**	**Y**	**?**	**Y**	**Y**	**Y**
5	**Was the exposure accurately measured to minimize bias?**	**Y**	**Y**	**N**	**N**	**Y**	**Y**	**N**	**N**	**Y**	**Y**	**N**
6 (a)	**Aside from the experimental intervention, were the groups treated equally?**	**Y**	**N**	**Y**	**Y**	**Y**	**?**	**?**	**?**	**?**	**Y**	**Y**
6 (b)	**Have the authors taken account of the potential confounding factors?**	**?**	**Y**	**N**	**Y**	**Y**	**Y**	**N**	**N**	**Y**	**Y**	**N**
7	**How large was the treatment effect?**	The study predicted possible association of variables.	The study predicted close OR values for outcome.	CI (−0.57,-0.36) The study showed significance between studied variables.	OR = 0.01The study showed no significance between the two variables of interest	statistically significant and positive association between the studied variable (p < 0.005)	The study predicted close OR values for outcome.	A small association was noticed for this study analysis (p = 0.001)	*The study predicted possible association of variables.*	*Study predicted possible association of variables.*	*The study predicted possible association of variables.*	OR = 0.01; The study showed no significance between the two variables of interest
8	**How precise was the estimate of the treatment effect?**	Statistically significant association with p < 0.001	Analysis had a linear relation (p = 0.05)	p < 0.0001; The results validate the study hypothesis.	P = 0.05; The overall effect size showed no significance	The study estimated the Mean Difference and CI as −3.80 (−5.11, −2.50)	Statistically significant association with p < 0.001	CI = 95 % (−0.89, 0.35) showed a linear relation with p < 0.01	*Statistically significant association with p<0.001*	OR = 0.01, anddeviation was small.	OR<1.1; supports the overall analysis.	*The study estimated the Mean Difference and CI which were insignificant*
9	**Do you believe the results?**	**Y**	**Y**	**Y**	**Y**	**Y**	**Y**	**Y**	**Y**	**Y**	**Y**	**Y**
10	**Can the results be applied to the local population?**	**N**	**Y**	**Y**	**N**	**N**	**N**	**?**	**Y**	**N**	**?**	**Y**
11	**Do the results of this study fit with other available evidence?**	**Y**	**?**	**N**	**Y**	**Y**	**Y**	**Y**	**Y**	**Y**	**Y**	**Y**
	SCORE OUT OF11	**9**	**7**	**9**	**8**	**8**	**7**	**7**	**9**	**10**	**9**	**8**

satisfaction largely driven by improvements in facial aesthetics, particularly in psychological well-being and functional ability. Gabardo et al. (2019) [1] similarly noted that physical and physiological enhancements were critical for positive outcomes. Their study, assessing QoL at T0 (pre-surgery) and T1 (6 weeks post-surgery), emphasized immediate functional and psychological benefits, aligning with self-reported satisfaction in emotional and social well-being.

Challenges such as postoperative pain, swelling, and psychosocial stress can affect satisfaction. Mismanaged expectations often lead to dissatisfaction, making comprehensive preoperative preparation vital. Brucoli et al. (2019) [14] emphasize thorough patient education on surgical steps, expected outcomes, and postoperative care to enhance satisfaction. Psychological assessments can identify patients at higher risk of stress, allowing for tailored support. Effective communication, robust social support, and realistic expectation-setting are critical for a smoother treatment process, enhancing patient satisfaction and well-being.

For some indications, a "surgery-first" approach without prior orthodontics is an alternative to address significant skeletal disparities instantly [20]. This method improves appearance and functionality, offering quicker resolution of facial asymmetries and greater patient satisfaction (Sebastiani et al., 2016) [7].

4.1. Patient satisfaction after OGS

This study measured patient satisfaction across several domains: (1) oral function, (2) functional limitation, (3) physical function, (4) emotional well-being, (5) energy/fatigue, (6) self-esteem and confidence, (7) pain, (8) social well-being, (9) general health, (10) psychological discomfort, and (11) awareness. Evaluating physical, emotional, and psychological well-being is crucial to determine the clinical significance of OGS adoption rates. Dentofacial deformities often impact psychological well-being more than physical functioning, affecting social interactions. Using the SF-36 questionnaire, this study showed that OGS improves patients' physical and mental status. Similarly, OQLQ, a condition-specific tool, effectively evaluates QoL improvements after OGS. Dentofacial deformities affect both function and aesthetics, and this review shows significant QoL improvements in OGS patients undergoing Le Fort I osteotomy and bilateral sagittal split osteotomy (BSSO). Notably, the most significant differences were observed in oral function and physical limitation domains.

Oral function and physical limitations were key confounders of satisfaction pre- and post-OGS. As Kufta et al. (2016) [15] demonstrated, overall satisfaction highly correlated with appearance ($r = 0.52$, $P = 0.0009$). Roman et al. (2022) [16] further validated this, finding significantly higher physical functioning scores in the study group compared to controls (M: 97.15 vs. 91.86, $p = 0.014$). These findings were echoed by Huang et al. (2016) [19], who reported increased satisfaction post-surgery.

The systematic review shows a positive association between OGS and patient satisfaction. Enhanced oral and physical functionality, improved facial aesthetics, and reduced psychological discomfort contribute to these outcomes. Consistent findings from various studies emphasize the multi-faceted benefits of OGS, making it a cornerstone in managing dentofacial deformities.

4.2. Psychological assessment for OGS

Assessing the patient's mental health, coping strategies, and expectations prior to orthognathic surgery (OGS) is crucial for understanding psychological satisfaction. Preoperative evaluation helps tailor counseling and manage psychological outcomes. According to Van Steenbergen et al. (1996), psychological satisfaction is shaped by individual experiences and perceptions of appearance, influenced by familial attitudes, interpersonal experiences, and resilience.

Post-OGS, psychological evaluation focuses on adaptation to new facial features, self-esteem changes, and overall satisfaction. Alanko et al. (2017) [8] assessed self-esteem and quality of life (QOL) scores at multiple intervals: T0 (pre-surgery), T1 (post-orthodontic treatment), T2-4 (surgery follow-ups), and T5 (1 year post-surgery). While a temporary decline in self-esteem and QOL was noted during recovery (T1-T4), scores significantly improved at the 1-year mark. Similarly, Eslamipour et al. (2017) [24] identified five key psychological assessment domains: postoperative pain, adjustment to appearance, functional improvement, and patient satisfaction. Pre- and post-operative surveys revealed that functional improvement (p-value <0.05) was the most significant factor in psychological benefits. However, only 13 % of patients reported they would opt for OGS again, highlighting the need for high motivation among patients undergoing this process.

Psychological satisfaction often experiences transient declines due to factors like postoperative pain, swelling, and self-image adjustments. Initial recovery challenges may lead to temporary distress; however, long-term benefits, such as improved body image, facial aesthetics, and interpersonal relationships [24], are frequently observed. This underscores the importance of supportive postoperative psychological care to manage these challenges and foster positive adjustment.

4.3. Limitations

Despite addressing critical outcomes, the study faced several limitations. First, small sample sizes (e.g., $n = 14, 20, 35$) limit generalizability to larger populations. Second, data from geographically diverse subjects may introduce variability. Third, while overall QOL scores were analyzed, individual domain-specific scores were not. Finally, demographic factors like age and gender were not considered, though they can significantly influence results.

5. Conclusion

Indicators like OHIP-14, SF-36, and OQLQ-22 effectively measure QOL and patient satisfaction. This review highlights the psychological dimensions of OGS, emphasizing the role of body image, self-esteem, and stress in patient outcomes. Addressing these factors through patient selection, psychological evaluations, clear communication, and managing expectations is critical. Social and emotional support before, during, and after surgery is vital, alongside addressing conditions like body dysmorphic disorder and considering cultural variations. These insights can optimize clinical strategies and improve psychological outcomes globally.

Ethics statement/confirmation of patient permission

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Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.adoms.2025.100522.

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