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SYSTEMATIC REVIEW

The impact of facial prosthesis on quality of life for people with congenital defects: A systematic review

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ABSTRACT

Purpose: Congenital defects can often cause segregation from society due to aesthetical stigma and subjective opinion by the individual wearing the facial prosthesis, decreasing their overall Quality of Life (QoL). The aim of this systematic review is to collate and subsequently synthesise research reporting the impact of extra-oral facial prostheses on QoL for individuals with a congenital facial defect.

Materials and Methods: A systematic review was undertaken following the Joanna Briggs Institute and PRISMA guidelines. The protocol was registered with the International Prospective Register of Systematic Reviews (CRD42023403545), and searches were performed in six databases from inception to June 4th 2025.

Results: 1215 records were retrieved after review three articles were retained for inclusion. Four QoL measures were used across the study's with the majority reporting QoL as a secondary outcome. A total of 22 people were represented across the study's and were equally divided with 11 males and 11 females with an age range of 16–85. Despite the fact, numerous methodologies and QoL measures were used, statistically significant improvement in QoL was found following the fitting of a facial prostheses.

Conclusions: All three studies suggest that a prosthesis influences patient QoL, however due to the small number of studies and the variety of QoL measures used, definitive conclusions regarding the impact of prosthetics on congenital facial deformities cannot be drawn. Future research should use standardized, prosthesis-specific QoL measures for clearer comparisons. (*Int J Maxillofac Prosthetics 2025;8:42-51*)

Keywords

Congenital, Facial Prosthetic, Systematic Review.

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AUDIOABSTRACTACT

INTRODUCTION

The face plays an important role in creating social relationships, communication, feelings, and expressions and is a significant part of our identity.[1] However, 2-3 of the global population are born with facial defects.[2] Congenital facial defects encompass a variety of disorders including cleft lip with or without palate, cleft palate alone, craniosynostosis, microtia, hemifacial microsomia and other craniofacial syndromes.[3,4] Individuals with facial differences are known to make, undesirable judgments on their appearance, which can result in multiple psychosocial and functional impairments.[5,6] Studies have highlighted the poor body image and low self-esteem of people with congenital facial difference.[7,8] Facial differences due to congenital disorders have been suggested to be a reason for seclusion, emotional suffering, shortened lifespan and psychological and social challenges and reduced quality of life (QoL).[9]

There has been numerous outcome measures used in facial prostheses research over the past decade.[10] More recently QoL as an outcome has been receiving more attention as a factor which is an important role in evaluating the quality of medical intervention.[11] The World Health Organisation have suggested that more research into psychological issues and development of QoL measures in patients with craniofacial conditions is necessary.[12-14]

Facial prostheses are suitable forms of rehabilitation

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for some people with congenital craniofacial deficits, for example, those with microtia and/or atresia missing all or part of an ear. Prostheses aim to improve functionality and appearance, for example, Walsh et al[15] found that an auricular prosthesis significantly improved the ratio of speech to noise at which sentences are understood thus, by channelling soundwaves towards the external auditory meatus. Likewise, facial prostheses may improve facial symmetry, provide support for spectacles, reduce rehabilitation time and provide an option for those that cannot, or do not want surgical reconstruction.[16] The aim of this systematic review is to collate and subsequently synthesise research reporting the impact of extra-oral facial prostheses on QoL for individuals with a congenital facial defect.

MATERIALS AND METHODS

This systematic review was undertaken following the Joanna Briggs Institute (JBI) guidelines and reported in line with the Preferred Reporting Items for systematic Reviews and Meta Analysis (PRISMA).[17,18] The protocol was registered with the International Prospective Register of Systematic Reviews (CRD42023403545). The search strategy was developed using the PICO (Population, Intervention, Comparison, Outcome) model.[19] The strategy was trialled and adapted to each database, with the assistance of a clinical librarian. The study inclusion and exclusion criteria are presented in Table 1.

Table 1. Inclusion and Exclusion Criteria.

Category	Included	Excluded
Population	Participants with facial defects who required or had received prosthetic rehabilitation. Facial defects of any underlying aetiology, extent, or recency.	Participants with facial defects not requiring prosthetic rehabilitation. Studies exclusively involving children under the age of 16. Studies solely including facial defects involving ocular, intra-oral, or combined intra-oral/extra-oral prosthetic rehabilitation. Studies exclusively involving patients with acquired defects caused by malignancy or trauma.
Intervention	Studies of facial prostheses with any retention modality, manufacturing technique or material.	-
Comparator	For comparative studies, any treatment for facial defects, no treatment, or unaffected comparator group.	-
Outcome	QoL measured with a published validated tool.	The occurrence or aetiology of facial defects.
Study Type	Systematic reviews with/without meta-analysis. Any clinical studies with quantitative data.	Observational studies. Mixed methods studies. Health economics studies. Experimental studies. Pilot studies. Any study not including quantitative data.
Characteristics	Studies deriving from any country.	Studies not obtainable written in full English text.

The population of interest were people who had worn an extra-oral facial prosthesis due to a congenital disorder. Studies of indwelling eye prostheses, those that adjoin to an intra-oral prosthesis and, those that include a population under the age of 16 were excluded due to the dissimilarity of treatment protocols and the unknown likeliness of Gillick competence respectively.[20] Studies that solely include facial defects involving ocular, intra-oral, or combined intra-oral/extra-oral prosthetic rehabilitation were not included within the study due to the extreme differences in treatment protocols and the added multifaced factors likely to affect

QoL in such patients.

Medical Subject Heading (MeSH) index terms were identified, and the search strategy was informed by previous literature, and subject matter experts in the form of senior authors.[10]

Electronic searches were performed in MEDLINE, Embase, Emcare, CINAHL, APA PsycInfo and the Cochrane CENTRAL Register of controlled trials by a clinical librarian. The search strategy for OVID MEDLINE is reported in Table 2. Databases were searched from their inception to 4th June 2025.

Table 2. Ovid MEDLINE® All search strategy.

Ovid MEDLINE® ALL
1. Maxillofacial Prosthesis/
2. Orbital Implants/ or Eye, Artificial/
3. ((maxillofacial or maxillo-facial or cranio-facial or craniofacial or face or facial or orbit or orbital or ocular or eye or eyes or auricular or ear or ears or nasal or nose* or cheek*) adj2 (prosthe* or epithe* or artificial)).mp.
4. "Prostheses and Implants"/
5. face/ or eye/ or ear/ or nose/ or cheek/
6. 4 and 5
7. 1 or 2 or 3 or 6
8. "quality of life"/
9. "Activities of Daily Living"/
10. "surveys and questionnaires"/
11. patient satisfaction/
12. Self Concept/
13. ("quality of life" or QoL).mp. [mp=title, book title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
14. "validation studies"/ or "validation studies as topic"/
15. (scor* adj5 (system* or scale*)).mp. [mp=title, book title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
16. or/8-15
17. 7 and 16

The search results were consolidated and imported into the reference management system Rayyan with all duplicates identified and removed. Screening of the titles and abstracts were carried out by two independent reviewers [KS & GC]. All conflicts were resolved by a third reviewer [SH] and the retrieval of potentially relevant full text manuscripts was conducted.

The full text manuscripts were independently screened against the inclusion and exclusion criteria. Any disagreements were resolved by consensus or by consultation with the 3rd author [SH]. A summary of the review process, detailing the number of records retained at each stage is provided (Fig.1). Data were extracted by reviewers [KS & GC], and cross checked by reviewer [SH]. Extracted data included the fields; author(s), sample size, participant/ population group, age range, defect aetiology, the type of prosthesis, means of assessing QoL, and findings of the studies.

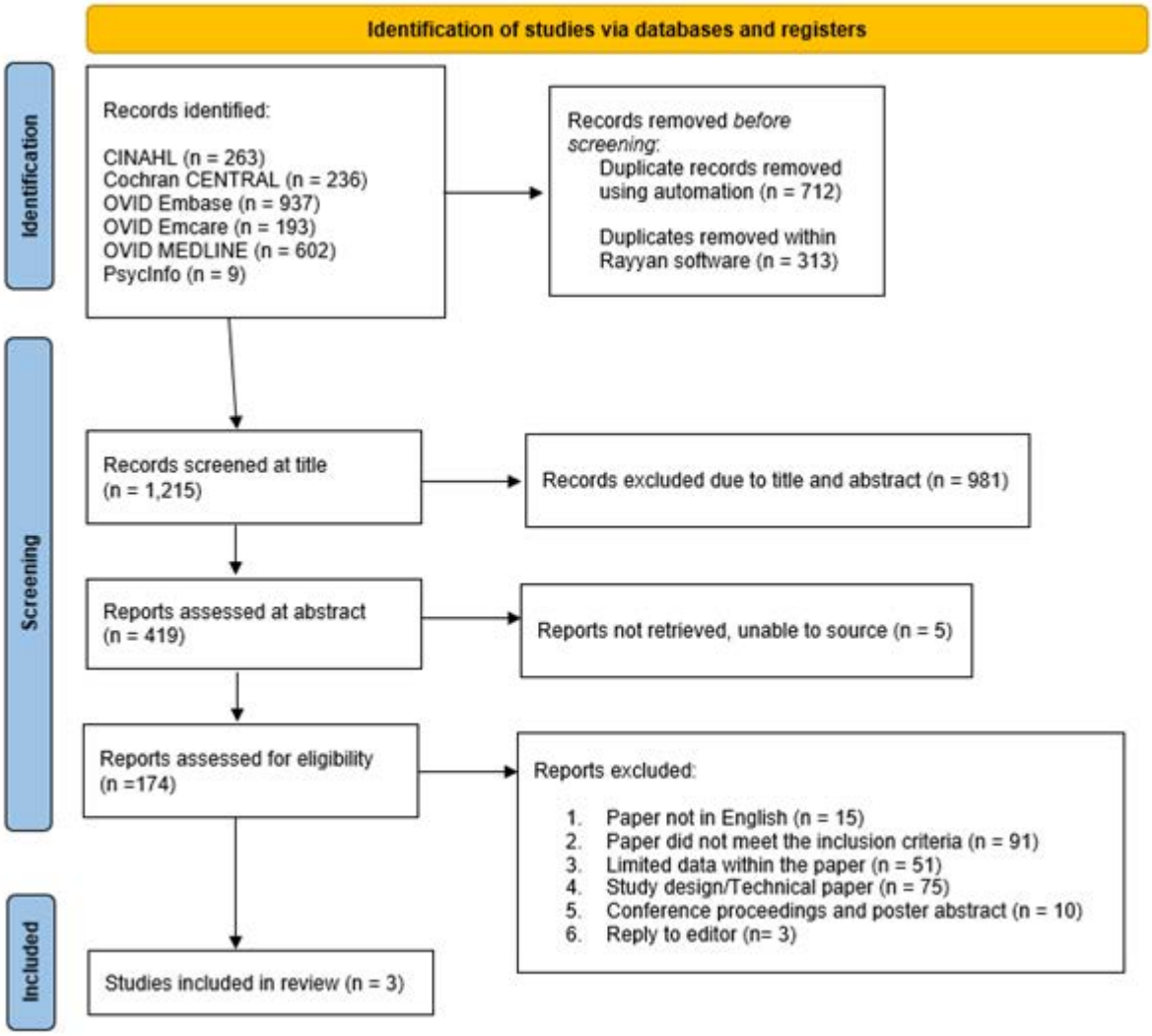


Fig 1. PRISMA Flowchart.

Critical appraisal was evaluated using the JBI family of tools depending on the research design.[21,22] A summary of the critical appraisal assessment is presented in Appendix 1.

Due to the range of methodologies and data collection tools, a narrative synthesis following the European Social Research Council Guidance on the Conduct of Narrative Synthesis in Systematic Reviews was undertaken.[23]

RESULTS

Three studies were retained for data extraction.[11,24,25] Across the three studies, the quality appraisal indicated that all were of reasonable level obtaining a JBI score 82.7% (Table 3).

Four QoL measures were used across the study's (Table 4) with the majority reporting QoL as a secondary outcome.[11]

Table 3. The characteristics of included studies.

Author	Study design	Participants	Age range (Mean average)	Congenital defect	Location of defect	Country of origin	JBI score
Kievit et al[11]	Case series	n=9 (3 Male, 6 Female)	16–67 (40.7yrs)	Auricular	n=4 AD n=2 AS n= 2 ADS	Netherlands	70%
Tam et al[24]	Cohort study	n=6 (4 Male, 2 Female)	19–35 (26.27yrs)	Auricular	n= 3 AD n=3 AS n= 0 ADS	Hong Kong	100%
Vijverberg et al[25]	Cross sectional survey	n=6 (4 Male, 2 Female)	13–85 (44yrs 6 months)	Auricular	n= 3 AD n= 2 AS n=1 ADS	Netherlands	75%

Abbreviations: Right ear (AD), Left ear (AS) and Bilateral (ADS).

Kievit et al[11] investigated the QoL of individuals with an auricular prosthesis and evaluated the skin condition surrounding the immediate area of the titanium implants associated to these prostheses. Tam et al[24] appraised psychosocial factors, and QoL as secondary outcomes, with the primary focus being on the treatment outcomes of prosthetic rehabilitation when the prosthesis design and implant placement is facilitated using Computer-aided design (CAD). Vijverberg et al[25] describes a multidisciplinary approach in the use of osseointegration-related auricular prostheses using VXI implants and retrospectively assessed the surgical procedures, clinical outcome and patient QoL related to implant retained prostheses fabricated and placed utilising CAD.

Study Design and Participants

One study was a case series[11] a second was a cohort study[24] and the third was a cross sectional study.[25] Two studies were undertaken in the Netherlands[11,25] and the other was from Hong Kong.[24] All investigated the QoL of people with a unilateral or bilateral auricular facial defect as a secondary outcome.

A total of 22 participants were included across the studies and were equally divided with 11 males and 11 females with an age range of 16–85 Table 3. The study by Kievit et al[11] included one person younger than 16, however it was possible in this synthesis to remove their data from the results to match inclusion criteria of for the review.

The QoL outcomes Medical Outcomes Short form 36 (SF-36) and Toronto Outcome Measure for Craniofacial Prosthetics (TOMCP) used by Tam et al[24] were administered pre-operatively then at one-week, three, six, and 12-months post operatively. Vijverberg et al[25] either posted the Glasgow benefit inventory (GB) QoL measure or asked participants to complete it during follow-up visits opportunistically ranging from 7-61 months. Kievit et al[11] used two QoL measures Medical Outcomes Short form 12 (SF-12 and GB) sent via post and administered once postoperatively between 3.9 and 17.6 years Table 4.

Quality of Life Measures and Findings

Studies by Kievit et al and Vijverberg et al[11,25] used the GBI questionnaire, which gauges the effect of prosthetic rehabilitation on QoL by questioning self-worth and overall confidence in both a public and private contexts following the fitting of a prosthesis. Despite differences in study design, population and follow-up both report a statistically significant improvement ($p>0.05$) in QoL following implantation and the receiving of an auricular prosthesis retained via bar and clip respectively. Tam et al.[24] found that on the SF-36 physical-health component scores over 12 months patients significantly improved ($p>0.003$). Although, one-week post-op a significant deterioration in QoL was reported compared to the pre-op status. Over the duration of the study there was no significant changes to the SF-36 mental-health component scores.

Table 4. The characteristics of included studies.

Author	Outcome Measures used	Retention modality utilised	Implant losses	Smokers	Previous experience wearing a prosthesis	Mean Result of outcome measures	Data collection time points as reported (mean/range or time point)	Summary of QoL findings
Kievit et al[11]	GBI SF-12	Implant – (bar & clip)	n=0	n=0	Yes (Average 8.9 years)	**GBI** **General health:** 33.8 **Physical health:** 1.7 **Social support:** 1.7 **GBI total:**22.5 **SF-12** **The scores for these domains ranged from 70-97.5. The full overview is below.** **General health:** 70.0 **Physical functioning:** 95.0 **Role limitations physical:** 93.0 **Role limitations emotional:** 94.0 **Pain:** 97.5 **Emotional wellbeing:** 86.0 **Energy:** 74.0 **Social functioning:** 90.6	Mean/ Range 10.2 years /(3.9–17.6)	GBI reported statistically significant $p < 0.05$. SF-12 reported statistically significant improvement in QoL from all patients $p < 0.05$.
Tam et al[24]	SF-36 TOMCP The Chinese version of TOMCP	Implant – (magnet n=3 cases) (Custom-made ball and snap attachment n=2 cases)	n=0	Did not state	No	**SF-36 (Mean)** **Physical component score** Pre-operative: 56.8 1 week: 45.9 3 months: 53.3 6 months: 52.7 1 year: 53.4 **Mental component score** Pre-operative: 45.4 1 week: 50.0 3 months: 46.3 6 months: 47.0 1 year: 50.3 **Mean values over the period of study** Mean health status = 25.8 Mean general domain = 38.4 Mean social domain = 0 Mean physical domain = 3.3 **TOMCP** **Fit and Retention:** 1 week: 62.3 3 months: 67.5 6 months: 57.1 1 year: 82.1 **Aesthetics:** 1 week:61.7 3 months: 78.3 6 months: 63.3 1 year: 86.6 **Maintenance:** 1 week: 63.4 3 months:77.8 6 months:81.9 1 year: 84.7 **Body image:** 1 week: 63.1 3 months: 64.3 6 months: 72.2 1 year: 77.4 **Leisure:** 1 week: 73.3 3 months: 74.2 6 months: 78.1 1 year: 77.2 **Work/school:** 1 week: 71.3 3 months: 72.2 6 months: 75.0 1 year: 75.9 **Family/friends/strangers:** 1 week: 57.4 3 months: 59.3 6 months: 63.9 1 year: 76.9 **Mood:** 1 week:60.3 3 months: 64.7 6 months: 73.4 1 year: 81.7 **Sexuality:** 1 week: 75.0 3 months: 73.6 6 months: 79.2 1 year:79.2 **TOMCP Mean over study period:** 1 week = 65.3 3 months = 69.8 6 months = 70.3 1 year =80.7/10.7	Pre-op 1-week post-op 3-months post-op 6-months post-op 12-months post-op	SF-36 showed significant increase in QoL related to generic health-related QoL over the study period ($p = 0.003$). At one week postoperative there was significant reduction to SF-36 scores (reduced QoL) compared to preoperative status $p < 0.01$. Collectively TOMCP scores increased over time however no significant changes in TOMCP scores over the study period ($p = 0.121$). TOMCP scores were significantly different from 1-week postoperatively ($p < 0.05$). There were significant changes over the period of the study for aesthetics, body image, family/friends/strangers and body image $p < 0.05$

Table 4 ***Cont...*** The characteristics of included studies.

Author	Outcome Measures used	Retention modality utilised	Implant losses	Smokers	Previous experience wearing a prosthesis	Mean Result of outcome measures	Data collection time points as reported (mean/range or time point)	Summary of QoL findings
Vijverberg et al[25]	GBI	Implant – (bar & clip)	n=0	n=0	No	**GBI (Mean)** **Total** =25.8 **General domain** =38.4 **Social domain** =0 **Physical domain** = 3.3	Mean follow up length in years/Range 2.68years/7months–2years 7months). The total follow-up time was 29.6 years. Each patient visited the outpatient clinic for follow up 30 times for assessment of implant and soft tissue. Resulting to 91 observations in total. Patients only issued with 1 prosthesis at an average time of 2 years and 7months.	GBI was sent via email or filled in during follow-up. Patients filled out at various follow-up lengths. The 10 patients (91% response rate) reported a positive score confirming a positive change in overall health status with an average score of 25.8, an average score of the general domain as =38.4, social domain–0 and in the physical domain–3.3

Abbreviations: Glasgow benefit inventory (GBI), Toronto Outcome Measure for Craniofacial Prosthetics (TOMCP), Medical Outcomes Short form 12 (SF-12) Medical Outcomes Short form 36 (SF-36). For all measures the higher the item score derived from the outcome measures indicates a better self-perceived health.

Kievit et al[11] reported that good QoL was e perienced on all domains of the SF-12 as the results were above 50 in the physical domain and over 42 in the psychological/mental health based on the SF-12 norm scores throughout the follow-up period of 10.2 years p>0.05. Thus, suggesting that a facial prosthesis positively affect QoL following the initial postoperative periods.[26]

Tam et al[24] used the condition specific TOMCP measure with all global and domain scores increasing over time; significant differences were observed between the 1-week and 1-year review (p=0.05), but not from pre-op to 1-year (p=0.212) (Table 4).

DISCUSSION

The aim of this systematic review was to understand the impact of extra-oral facial prostheses on QoL for individuals with a congenital facial defect. Although, papers reporting the satisfaction with prostheses are abound within literature, only three papers met the inclusion criteria of this systematic review.[11,24,25] However, results support the hypothesis that facial prostheses can improve the QoL for people with congenital facial defects.

Due to the small number of studies and the variety of QoL measures used, definitive conclusions regarding the impact of prosthetics on congenital facial deformities can not be drawn. Nevertheless, all three papers suggest that a prosthesis influences patient QoL. The concept of QoL is comple with some researchers in the field of prosthetics suggesting that they were evaluating QoL but failed to report this outcome in their study, although patient satisfaction was supported.[26,27]

This systematic review found that a facial prosthesis improves QoL when compared to not wearing a prosthesis[11] potentially allowing one to feel "normal" and integrate into society.[28] Although, when comparing this study's results to the findings by Atay et al[27] who's cross sectional study investigated health-related QoL in patients with facial prostheses following acquired conditions it was found that these individuals reported a significantly lower overall QoL (p<0.05). This may suggest that patients who suffer the burden of acquired facial disfigurement by cause of disease or trauma, experience much more profound psychosocial implications including reduced QoL, beyond the time of prosthetic rehabilitation. This reduction in QoL may imply that other external factors such as a once living with a "normal" face to then life with a possible decrease in function and/or adjuvant treatments are often the reason for the conflicting results. However, in a paper, by Hashemi et al,[29] which was not included in the current review because the sample could not be split into congenital and acquired, they found no difference in QoL between these two cohorts. It is therefore clear that more research is necessary to make definitive a judgment and allow comparison with those people with congenital conditions.

This review focused on people with a congenital condition, the age range of the participants in each study

was broad, suggesting that despite having had the condition from birth, individuals favored wearing a prosthesis in adulthood. The papers excluded children, and although the findings suggest the impact of facial prostheses might be consistent across ages. The authors recommend future research consider age-specific QoL measures, particularly for young children.

The recognition that QoL as an essential component to evaluate the impact of intervention on people treated with a prosthesis is growing.[12-14] However, this current review found that there is no consensus as to which QoL tool is appropriate. Both generic and condition specific measures were used along with different methodologies and follow-up times, making it difficult to generalise the data and limits what conclusions can be drawn regarding the impact of prosthetic rehabilitation on QoL.

Future work including the evaluation of QoL will be required to assess health outcomes through either generic or disorder-specific measurement tools. For example, in the current review the SF-36 is used serving as a widely used generic measure which evaluates overall health status across multiple domains to enable population and condition comparisons. Disorder-specific measures function as customized tools which evaluate how a particular condition or treatment affects patients' lives. The TOM-CP serves as a specific tool to evaluate QoL for patients needing craniofacial prostheses because it measures aspects that generic tools might miss, and that are likely not to be of relevance to the general population. The selection between generic and specific measures or their combined application depends on research objectives and the extent of understanding needed about how disorders and their treatments affect patient well-being. The authors and the World Health Organization consider QoL as a significant factor that should be assessed and used to inform treatments, and that it is important to inform shared-decision making with patients. By using validated measures clinicians can understand general, physical, emotional and psychosocial outcomes for the people they care for, and over time would be able to identify patterns of influnce realted to prosthetic interventions, and how these compare across patient cohorts. This information can underpin clinical advice and also suggest if referrals to other professions such as psychological services, would be beneficial throughout treatment and followup.[30]

Despite the extensive search of the literature, the authors found a limited number of published peer review articles, all with small sample sizes and using varied methodologies and QoL measures used across studies to explore congenital deformities and QoL. Nonetheless, the results do indicate that facial prostheses can have a positive impact QoL.

The studies included in the review indicate that the presence of a congenital facial defect itself likely plays a role in QoL. The studies suggest that facial prostheses may improve social interactions, supporting the hypothesis that facial appearance impacts on QoL.

Health-related QoL measures should be used in routine practice with people who have congenital facial deformities. This would allow clinicians to understand some of the psychological needs of those they care for. Both generic and disease specific measures should be used, to allow comparison with a general population as well as within the patients clinical group. For congenital conditions considerations is required for the persons age, e.g., young children may need their QoL to be evaluated by their parents.

CONCLUSION

This systematic review investigated the impact of facial prostheses on the QoL of individuals with congenital facial defects. While all three studies reported a positive impact on QoL, generalizability of these findings is limited. The studies employed various methodologies and QoL measures, with only one measure specifically designed for facial prostheses.

Despite these limitations, a statistically significant improvement in QoL was found regardless of follow-up duration or prior experience with facial prosthetics. Future research should utilize standardized and facial prosthesis specific QoL measures, along with a defined protocol for their use. This would allow for more robust comparisons and a clearer understanding of how facial prostheses impact QoL for this population.

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Appendix 1. JBI checklist.

Quality Assessment of selected studies in accordance with JBI checklists			
Kievit et al[11]	Case Series	Were there clear criteria for inclusion in the case series?	No
		Was the condition measured in a standard, reliable way for all participants included in the case series?	Yes
		Were valid methods used for identification of the condition for all participants included in the case series?	Yes
		Did the case series have consecutive inclusion of participants?	No
		Did the case series have complete inclusion of participants?	No
		Was there clear reporting of the demographics of the participants in the study?	Yes
		Was there clear reporting of clinical information of the participants?	Yes
		Were the outcomes or follow up results of cases clearly reported?	Yes
		Was there clear reporting of the presenting site(s)/ clinics(s) demographic information?	Yes
		Was statistical analysis appropriate?	Yes
Tam et al[24]	Cohort Study	Were the Two groups similar and recruited from the same population?	Yes
		Were the exposures measured similarly to assign people to both exposed and unexposed groups?	Yes
		Was the exposure measured in a valid and reliable way?	Yes
		Were there confounding factors identified?	Yes
		Were strategies to deal with confounding factors stated?	Yes
		Were the groups/participants free of the outcome at the start of the study (or at the moment of exposure)?	Yes
		Were the outcomes measured in a valid and reliable way?	Yes
		Was the follow up time reported and sufficient to be long enough for outcomes to occur?	Yes
		Was follow up complete, and if not, were the reasons to loss to follow up described and explored?	Yes
		Were strategies to address incomplete follow up utilized?	Yes
		Was appropriate statical analysis used?	Yes
Vijverberg et al[25]	Cross Sectional Study	Were the criteria for inclusion in the sample clearly defined?	Unclear
		Were the study subjects and the settings described in detail?	Yes
		Was the exposure measured in a valid and reliable way?	Yes
		Were objective, standards criteria used for measurement of the condition?	Yes
		Were there confounding factors identified?	Yes
		Were strategies to deal with confounding factors stated?	No
		Were the outcomes measured in a valid and reliable way?	Yes
		Was appropriate statistical analysis used?	Yes