Associations Between Clinician-Graded Facial Function and Patient-Reported Quality of Life in Adults With Peripheral Facial Palsy A Systematic Review and Meta-analysis

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Associations Between Clinician-Graded Facial Function and Patient-Reported Quality of Life in Adults With Peripheral Facial Palsy
A Systematic Review and Meta-analysis

Tessa E. Bruins, MD; Martinus M. van Veen, MD, PhD; Paul M. N. Werker, MD, PhD; Pieter U. Dijkstra, PT, PhD; Dieuwke C. Broekstra, PhD

IMPORTANCE Understanding how the quality of life of adults (≥18 years) with peripheral facial palsy can be estimated using clinician measures of facial function and patient-reported variables might aid in counseling patients and in conducting research.

OBJECTIVES To analyze associations between clinician-graded facial function and patient-reported quality of life in adults with peripheral facial palsy, compare associations between facial function and the physical and social functions of quality of life, and examine factors that might influence the associations.

DATA SOURCES A literature search was conducted in PubMed, Embase, CINAHL, Web of Science and PsycInfo on June 4, 2020, with no restrictions on the start date.

STUDY SELECTION Twenty-three studies reporting an association between clinician-graded facial function and patient-reported quality of life in adults with peripheral facial palsy were included. Facial function instruments included the House-Brackmann, Sunnybrook Facial Grading System, and electronic clinician-graded facial function assessment. Quality-of-life instruments included the Facial Disability Index and Facial Clinimetric Evaluation Scale.

DATA EXTRACTION AND SYNTHESIS Data extraction and qualitative synthesis were performed according to the Meta-analysis of Observational Studies in Epidemiology guidelines. Record screening, data extraction, and quality assessments were done by 2 researchers independently. Data were pooled using random-effects models.

MAIN OUTCOMES AND MEASURES The main outcome was the association between facial function and quality of life, quantified by Pearson *r*, Spearman ρ, or regression analysis.

RESULTS In total, 23 studies (3746 participants) were included. In the 21 studies that reported on the sex of the cohorts, there were 2073 women (57.3%). Mean or median age ranged from 21 to 64 years and mean or median duration of palsy ranged from newly diagnosed to 12 years. Bell palsy (n = 1397), benign tumor (n = 980), and infection (n = 257) were the most common etiologic factors. Pooled correlation coefficients were 0.424 (95% CI, 0.375-0.471) to 0.533 (95% CI, 0.447-0.610) between facial function and Facial Clinimetric Evaluation Scale total, 0.324 (95% CI, 0.128-0.495) to 0.397 (95% CI, 0.242-0.532) between facial function and Facial Clinimetric Evaluation Scale social function, 0.423 (95% CI, 0.322-0.514) to 0.605 (95% CI, −0.124-0.910) between facial function and Facial Disability Index physical function, and 0.166 (95% CI, 0.044-0.283) to 0.208 (95% CI, 0.031-0.373) between facial function and Facial Disability Index social function.

CONCLUSIONS AND RELEVANCE Associations noted in this systematic review and meta-analysis were overall low to moderate, suggesting that only a small part of quality of life is explained by facial function. Associations were higher between facial function and physical function than social function of quality of life.

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Supplemental content

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Facial palsy results in weakness of the mimic muscles, which may result in problems with eye closure, eating, drinking, and smiling.[1-3] Facial palsy negatively affects quality of life (QOL).[4-6] Traditionally, measures of facial function impairment are standardized using clinician-graded scales for facial symmetry and function, such as the House-Brackmann scale,[7] Sunnybrook Facial Grading System,[8] and an electronic clinician-graded facial function assessment (eFACE).[9] Quality of life is usually assessed with patient-reported outcome measures (PROMs). More general PROMs, such as the 36-item Short Form, allow for comparison with other diseases.[10,11] Disease-specific PROMs are better suited for assessing the association between a specific condition and QOL. Disease-specific QOL in persons with facial palsy can be assessed using PROMs, such as the Facial Disability Index (FDI) and the Facial Clinimetric Evaluation scale (FaCE).[12,13] These questionnaires distinguish physical and social burden. Simultaneous application of a clinician-graded scale and a PROM enables studying associations between the severity of facial function impairment and disease-specific QOL.

Several studies have analyzed this association, but sample sizes are often small and results inconsistent.[4-6,10,12] The strength of the associations found varies widely. This variety may be associated with differences in sample characteristics, such as cause and duration of palsy, age and sex of the sample, and the measurement instruments used.[4-6] Previous systematic reviews evaluating QOL in adults with peripheral facial palsy focus on QOL before and after treatment[14] and on psychosocial symptoms (eg, anxiety and depression).[15,16] However, current literature lacks an overview and summary of associations between the severity of facial function impairment and QOL, which might provide insight into which part of QOL can be estimated by facial function and which part can be estimated by other variables. Such an overview might be helpful in clinical decision-making. Therefore, we conducted a systematic review and meta-analysis of associations between clinician-graded facial function and patient-reported disease-specific QOL in adults with peripheral facial palsy. We analyzed differences in the strength of the associations between facial function and various domains (ie, physical and social functioning) of QOL. We compared the associations of different facial function instruments with the same QOL instrument. In addition, we performed a meta-regression analysis to examine which patient characteristics appear to influence the associations.

Key Points

Question What is the association between clinician-graded facial function and patient-reported quality of life in adults (≥18 years) with peripheral facial palsy?

Findings This systematic review and meta-analysis of 23 studies including 3746 participants found that associations between clinician-graded facial function and patient-reported quality of life were overall low to moderate. Facial palsy severity was associated more with the physical than social function of quality of life.

Meaning This study noted that quality of life can only moderately be estimated by facial function, suggesting that, in both clinical practice and research, factors other than clinician-graded facial function need to be taken into account.

Methods

Database Search

This review is reported according to the Meta-analysis of Observational Studies in Epidemiology (MOOSE) reporting guideline[17] and the review protocol is registered.[18] The search strategy was developed with an information specialist of the University of Groningen. The search was conducted on June 4, 2020, in PubMed/MEDLINE, Embase, CINAHL, Web of Science, and PsycInfo (eTable 1 in the Supplement). Search terms included related terms for facial palsy (eg, *facial paral**, *facial disabil**) and quality of life (eg, *patient outcome*, *QOL*). Duplicate publications were removed using an Endnote deduplication method.[19] Inclusion criteria for abstracts were adults (≥18 years) with facial palsy, reported clinician-graded facial function scores, reported QOL scores, and a reported association or possibility to calculate an association between facial function and QOL. Exclusion criteria were studies with fewer than 10 cases, conference proceedings, and reviews. No language or date restrictions were imposed. A training session regarding the selection of articles using the inclusion and exclusion criteria was held between the 2 reviewers (T.E.B. and M.M.v.V.), using a random sample of 14 publications of the search. Titles and abstracts and thereafter full-text publications were screened for eligibility independently by the 2 reviewers. Disagreement was discussed between the 2 reviewers; if unresolved, a third researcher (P.U.D.) gave a binding verdict. Agreement between the 2 reviewers was calculated for screening titles, abstracts, and full-text publications.

For full-text selection, additional criteria were peripheral facial palsy, specified instruments for grading facial function (House-Brackmann, Sunnybrook Facial Grading System, or eFACE), specified QOL instruments (FDI or FaCE), and a maximum interval of 4 weeks between measurement of facial function and QOL. Full-text articles in the English, Dutch, German, French, Spanish, and Italian languages were included because the research team was sufficiently proficient in these languages.

The choice for specific measurement instruments was based on a preliminary search on eligible studies and recommendations of previous systematic reviews. A systematic review concluded that the Sunnybrook Facial Grading System was the only appropriate tool according to the criteria given in that review.[20] The eFACE was developed and validated, and we included this instrument.[9] The House-Brackmann scale was the most frequently used tool in the past 5 years in eligible studies and was therefore also included.[21] Another systematic review concluded that the FDI and FaCE scale were appropriate QOL instruments.[22] The preliminary search supported this choice and no additional QOL instruments were included.

Quality Assessment and Data Extraction

Quality of the included studies was assessed using the quality assessment tool for observational cohort and cross-

sectional studies from the National Institute of Health.[23] Three items regarding comparability between participants and nonparticipants, blinding participants for facial function scores, and reporting missing data were added to fit the aim of this review. A total of 11 items were assessed (eTable 2 in the Supplement). A composite score was not used, because it is less suitable for rating overall quality.[24] Extracted data included sample characteristics (number of participants, sex, age, duration of palsy, and cause of palsy), study design, instruments used to assess facial function and QOL, and the calculated association between facial function and QOL. Regardless of the study design, only cross-sectional data were extracted because we were interested in the association between facial palsy severity and perceived QOL. If a study had several measurement moments, available data of the measurement moment with the largest sample size were extracted. Corresponding authors were contacted for additional information in case of missing data and if a regression coefficient was reported instead of a correlation coefficient. Regarding the cause of the palsy, the following categories were distinguished: Bell palsy or idiopathic, tumor (benign, malignant, or unspecified), infection, iatrogenic, trauma, congenital, and other/unknown (**Table 1**). Quality assessment and data extraction were conducted by the same 2 reviewers independently with the third researcher giving a binding verdict if necessary.

Statistical Analysis

Agreement between the 2 reviewers was expressed as absolute agreement and Cohen κ value. Meta-analysis was performed using Comprehensive Meta-analysis, version 3 software (Biostat Inc),[41] using a random-effects model. Effect sizes are presented as correlation coefficients, 95% CIs, and *P* values, with significance set at $P < .05$. The House-Brackmann correlations were converted to positive correlations for easier comparing. Statistical heterogeneity between studies was assessed by calculating I^2 values, whereby 0% to 40% was classified as low, 30% to 60% as moderate, 50% to 90% as substantial, and 75% to 100% as considerable heterogeneity.[42,43] To explore any apparent influence of age, sex, duration of palsy, and cause of palsy on the association between facial function and QOL, univariate meta-regression analyses were performed using the same software.

Results

The database search resulted in 2109 records. After full-text screening, 23 studies were included for narrative review and meta-analysis (**Figure 1**). The studies by Tavares-Brito et al[5] and van Veen et al[1] both met the inclusion criteria but were based on the same sample; the van Veen et al[1] study was excluded because it provided analysis for the separate groups (flaccid or nonflaccid palsy) and not for the total sample. The Cohen κ values were 0.65 (88% agreement) for screening abstracts and 0.87 (98% agreement) for full text.

Study Characteristics

In total, 3746 participants were included in 23 studies (Table 1).[1,4-6,10,12,13,25-40] Sample sizes ranged from 15 to 920 patients.[5,26] In the meta-analysis, the number of participants used to calculate associations between facial function and QOL ranged from 3039 (81%) to 3665 (98%). In the 21 studies that reported on the sex of the cohorts, there were 2073 women (57.3%) and 1546 men (42.7%). Mean or median age ranged from 21 to 64 years.[29,32] Mean or median duration of palsy ranged from newly diagnosed to 12 years.[4,29] Bell palsy (1397 [37%]); benign tumors (980 [26%]), most of which were acoustic neuroma (≥774 [≥80%]); and infection (257 [7%]) were the most common causes of palsy; 2 studies did not report cause.[12,25] The Sunnybrook Facial Grading System was the most commonly used facial function instrument in 16 studies,[4,6,12,13,25,26,28-31,33-36,38,40] and the FDI was the most commonly used QOL instrument in 18 studies.[4,10,12,13,25-28,30-36,38-40]

Risk of Bias

In 22 studies (96%), the populations were clearly defined (item 1), in 21 studies (91%), participants were selected from similar populations (item 4a), and in all studies, inclusion and exclusion criteria were specified and uniformly applied (item 4b) (eTable 3 in the Supplement). Three (12%) studies analyzed comparability between participant and nonparticipant characteristics (items 3a, 3b). Three (13%) studies provided a sample size justification (item 5), clinicians were blinded in 2 (9%) studies, and participants were blinded in 4 (17%) studies (items 9a, 9b). In 20 studies (87%), potential confounding variables were measured, but only 5 studies (22%) adjusted for confounders.[4,5,10,37,40]

Associations Between Facial Function and QOL

Figure 2A shows correlation of FaCE total with heterogeneity (I^2) of pooled associations.[4-6,10,13,28,29,31,34-38,40,44] In the meta-analyses, pooled correlation coefficients between the QOL instrument FaCE total score and the other facial function instruments showed 0.424 (95% CI, 0.375-0.471; I^2 = 0%) for eFACE, 0.533 (95% CI, 0.447-0.610; I^2 = 69%) for House-Brackmann, and 0.533 (95% CI, 0.447-0.610; I^2 = 52%) for the Sunnybrook Facial Grading System (Figure 2A). Pooled correlation coefficients between FaCE social function and the other instruments were 0.324 (95% CI, 0.324 (95% CI, 0.128-0.462; I^2 = 23%) for eFACE, 0.397 (95% CI, 0.242-0.532; I^2 = 79%) for House-Brackmann, and 0.356 (95% CI, 0.238-0.463; I^2 = 44%) for Sunnybrook Facial Grading System (Figure 2B).[10,13,28,29,31,34-36,38,40,44]

Pooled correlation coefficients between FDI physical function and the other instruments were 0.605 (95% CI, −0.124 to 0.910; I^2 = 95%), for eFACE, 0.473 (95% CI, 0.311-0.607; I^2 = 88%) for House-Brackmann, and 0.423 (95% CI, 0.322-0.514; I^2 = 55%) for Sunnybrook Facial Grading System and (**Figure 3**A).[4,10,12,25-28,30,32-36,38-40] Pooled correlation coefficients between FDI social function and the other instruments were 0.208 (95% CI, 0.301-0.373; I^2 = 0%) for eFACE, 0.166 (95% CI, 0.044-0.283; I^2 = 68%) for House-Brackmann, and 0.182 (95% CI, 0.095-0.266; I^2 = 21%) for Sunnybrook Facial Grading System (Figure 3B).[4,10,12,25,28,30,32-35,38-40] The strongest pooled correlation, based on 2 studies, was found between the eFACE and the FDI physical function. The weakest pooled correlation, also based on 2 studies, was found between the House-Brackmann and FDI social function. We examined whether the choice of

Table 1. Study Characteristics

Source	No. total (% women), No. analyzed	Age, mean (SD), y	Duration of palsy, mean (SD), y	Cause, No. (%)	Facial function instrument	QOL instrument	Correlation measure[a]	
							Spearman ρ	Pearson r
VanSwearingen and Brach,[12] 1996	46 (65.0); FDI(p), 46; FDI(s), 44	46.8 (15.6)	Unknown	Unknown	SB	FDI(p)	NA	0.507
						FDI(s)	NA	0.066
VanSwearingen et al,[25] 1998	48 (NR); FDI(p), 48; FDI(s), 47	49.0 (16.3)	Unknown	Bell palsy, benign and malignant tumor, other/unclear	SB	FDI(p)	0.44	NA
						FDI(s)	0.39	NA
Kahn et al,[13] 2001	86 (64.0); 41	Median, 50.5	Median, 3.9	Bell palsy/idiopathic, 37 (43.0); benign tumor, 26 (30.2); malignant tumor, 4 (4.7); tumor unspecified, 4 (4.7); infection, 8 (9.3); trauma, 4 (4.7); congenital, 1 (1.2); other/unknown, 2 (2.3)	HB	FaCE	−0.55	NA
						FDI(p/s)	NA	NA
					SB	FaCE	0.57	NA
						FDI(p/s)	NA	NA
Frijters et al,[26] 2008	15 (26.7); 15	22.6 (8.9); median (IQR), 22.2 (22.2-26.2)	8.8 (5.9); median (IQR): 6.6 (4.2-14.9)	Trauma, 15 (100)	SB	FDI(p)	0.76	
						FDI(s)	NA	NA
Gonzalez-Cardero et al,[27] 2012	79 (NR); 79	Mean, 40.0	3 mo after parotid surgery	Benign tumor, 79 (100)	HB	FDI(p)	0.405	NA
						FDI(s)	NA	NA
Marsk et al,[28]2013	93 (53.0); 93	Mean, 56.9; median, 59.0	Mean, 4.3; median, 1.9	Bell palsy/idiopathic, 73 (78.5); benign tumor, 4 (4.3); infection, 16 (17.2); congenital, 1 (1.1)	HB	FaCE	−0.69	NA
						FDI(p)	−0.61	NA
						FDI(s)	−0.38	NA
					SB	FaCE	0.74	NA
						FDI(p)	0.63	NA
						FDI(s)	0.40	NA
Ng et al,[29] 2013	21 (47.6); 21	Median, 21.0	Newly diagnosed	Bell palsy/idiopathic, 21 (100)	SB	FaCE	0.63	NA
Pavese et al,[30] 2014	100 (72.0); 100	45.0 (15.0)	3.5 (5.8)	Iatrogenic, 46 (46.0); traumatic 5 (5.0); congenital, 2 (2.0); other, 47 (47.0)	SB	FDI(p)	0.44	NA
						FDI(s)	0.19	
Kleiss et al,[31]2015	93 (66.0); HB: 62; SB: 54	55.1 (13.8); median, 55	3.8 (4.3); median, 2.4	Bell palsy/idiopathic, 48 (51.6); benign tumor, 6 (6.5); infection, 16 (17.2); iatrogenic, 7 (7.5); other/unknown, 16 (17.2)	HB	FaCE	−0.292	NA
					SB	FDI(p/s)	NA	NA
						FaCE	0.570	NA
						FDI(p/s)	NA	NA
Kleiss et al,[6] 2015	794 (59.9); HB, 794; SB, 188	47.0 (16.0)	Median (IQR), 1.0 (0.3-4.0)	Bell palsy/idiopathic, 353 (44.5); benign tumor, 99 (12.5); other/unknown, 342 (43.1)	HB	FaCE	−0.373	NA
					SB	FaCE	NA	0.488
Tveiten et al,[32] 2017	539 (44.0); 539	63.9 (12.4)	7.7 (2.4)	Benign tumor, 539 (100)	HB	FDI(p)	−0.468[b]	NA
						FDI(s)	−0.039	NA

(continued)

Table 1. Study Characteristics (continued)

Source	No. total (% women), No. analyzed	Age, mean (SD), y	Duration of palsy, mean (SD), y	Cause, No. (%)	Facial function instrument	QOL instrument	Correlation measure[a]	
							Spearman ρ	Pearson *r*
Chong et al,[33] 2017	83 (60.2); 83	45.4 (16.2)	6.8 (9.7)	Bell palsy/idiopathic, 46 (55.4); tumor unspecified, 27 (32.5); trauma, 4 (4.8); congenital, 4 (4.8); other/unknown, 2 (2.4)	HB	NA	NA	NA
					SB	FDI(p)	0.38	NA
						FDI(s)	0.09	NA
					eFACE	FDI(p)	0.28	NA
						FDI(s)	0.22	NA
Volk et al,[10] 2017	256 (60.0); 256	52.0 (18.0); median, 54.0	4.0 (8.7); median, 0.8	Bell palsy/idiopathic, 116 (45.3); tumor unspecified, 36 (14.1); infection, 33 (12.9); iatrogenic, 47 (18.4); traumatic, 46 (18.0); congenital, 6 (2.3); other, 2 (0.8)	HB	FaCE	−0.461	NA
						FDI(p)	−0.221	NA
						FDI(s)	−0.054	NA
Györi et al,[34] 2018	30 (60.0); 30	48.8 (15.6)	.7 (13.5)	Bell palsy/idiopathic, 6 (20.0); infection, 5 (16.7); iatrogen, 12 (40.0); trauma, 6 (20.0); other/unknown, 1 (3.3)	SB	FaCE	0.495	NA
						FDI(p)	0.536	NA
						FDI(s)	0.001	NA
Barry et al,[35] 2019	67 (61.2); 67	56.4 (14.2); median, 55	2.4 (5.5); median, 0.4	Bell palsy/idiopathic, 36 (53.7); tumor unspecified, 3 (4.5); infection; iatrogenic, 20 (29.9); trauma, 4 (6.0)	HB	FaCE	−0.51	NA
						FDI(p)	−0.35	NA
						FDI(s)	−0.25	NA
					SB	FaCE	0.49	NA
						FDI(p)	0.30	NA
						FDI(s)	0.21	NA
Díaz-Aristizabal et al,[36] 2019	30 (76.7); 30	51.1 (16.0)	8.5 (16.4)	Bell palsy/idiopathic; 17 (56.7); benign tumor, 5 (16.7); infection, 5 (16.7); iatrogenic, 2 (6.7); trauma, 1 (3.3)	SB	FaCE	0.662	NA
						FDI(p)	NA	0.542
						FDI(s)	NA	NA
Tavares-Brito et al,[44] 2019	90 (60.0); 90	Median (IQR), 44.5 (28.8-62.0)	Median (IQR), 0.1 (0.0-1.1)	Bell palsy/idiopathic, 53 (58.9); infection, 10 (11.1); trauma, 16 (17.8); other/unknown, 11 (12.2)	HB	FaCE	−0.538	NA
					eFACE	FaCE	0.537	NA
Tavares-Brito et al,[5] 2019[c,d]	920 (59.5); 920	48.6 (16.7)	Median (IQR), 0.8 (0.2-3.5)	Bell palsy/idiopathic, 375 (40.8); benign tumor, 143 (15.5); malignant tumor, 74 (8.0); infection, 124 (13.5); trauma, 52 (5.7); iatrogenic, 40 (4.3); congenital, 17 (1.8); other/unknown, 95 (10.3)	eFACE	FaCE	0.409[c]	NA
van Veen et al,[37] 2019[e]	92 (77.0); 92	Median (IQR), 53.5 (34.0-64.1)	Median (IQR), 1.2 (0.5-3.6)	Bell palsy/idiopathic, 48 (52.2); benign tumor, 9 (9.8); malignant tumor, 4 (4.3); infection, 25 (27.2); iatrogenic, 4 (4.3); trauma, 1 (1.1); other/unknown, 1 (1.1)	eFACE	FaCE	0.482[c]	NA
Bruins et al,[4] 2020[f]	121 (52.0); FaCE: 71; FDI(p): 69; FDI(s): 70	Median (IQR), 62.0 (48.0-81.0)	Median (IQR), 12.0 (7.0-27.0)	Bell palsy/idiopathic, 11 (9.1); benign tumor, 44 (36.4); malignant tumor, 13 (10.7); infection, 11 (9.1); trauma, 18 (14.9); congenital, 10 (8.3); other/unknown, 14 (11.6)	SB	FaCE	0.332[c]	NA

(continued)

Table 1. Study Characteristics (continued)

Source	No. total (% women), No. analyzed	Age, mean (SD), y	Duration of palsy, mean (SD), y	Cause, No. (%)	Facial function instrument	QOL instrument	Correlation measure[a]	
							Spearman ρ	Pearson *r*
Bylund et al,[38] 2021	First visit, 96 (37.5); 88-96	First visit, 49.0 (17.0)	First visit, 7.0 (8.0) d	Bell palsy/idiopathic, 96 (100)	HB	FaCE	−0.43	NA
						FDI(p)	−0.25	NA
						FDI(s)	−0.07	NA
					SB	FaCE	0.42	NA
						FDI(p)	0.32	NA
						FDI(s)	0.08	NA
Özden et al,[39] 2020	51 (51.0); 51	46.7 (17.1)	0.3 (0.3)	Bell palsy/idiopathic, 51 (100)	HB	FDI(p)	NA	−0.837
						FDI(s)	NA	−0.355
Volk et al,[40] 2020	41 (46.0); 41	48.4 (19.9); median: 55.0	Time between lesion and surgery, 2.4 (4.2); median, 1.2; time between surgery and measurements, 4.1 (3.2); median, 3.5	Benign tumor, 26 (63.4); malignant tumor, 7 (17.1); trauma, 3 (7.3); other, 5 (12.2)	SB	FaCE	0.450[g]	NA
						FDI(p)	0.176[g]	NA
						FDI(s)	0.199[g]	NA
					eFACE	FaCE	0.373[g]	NA
						FDI(p)	0.811[g]	NA
						FDI(s)	0.184[g]	NA

Abbreviations: eFACE, Clinician-Graded Electronic Facial Paralysis Assessment; FaCE, Facial Clinimetric Evaluation scale; FDI, Facial Disability Index physical (p) and social (s) function; NR, not reported; HB, House-Brackmann; IQR, interquartile range; QOL, quality of life; SB, Sunnybrook Facial Grading Instrument.

[a] Two or 3 decimals reported, depending on the reported decimals in the original article.

[b] The article described a positive correlation, but based on the third figure in that article, the correlation should be negative.

[c] Spearman ρ requested from authors.

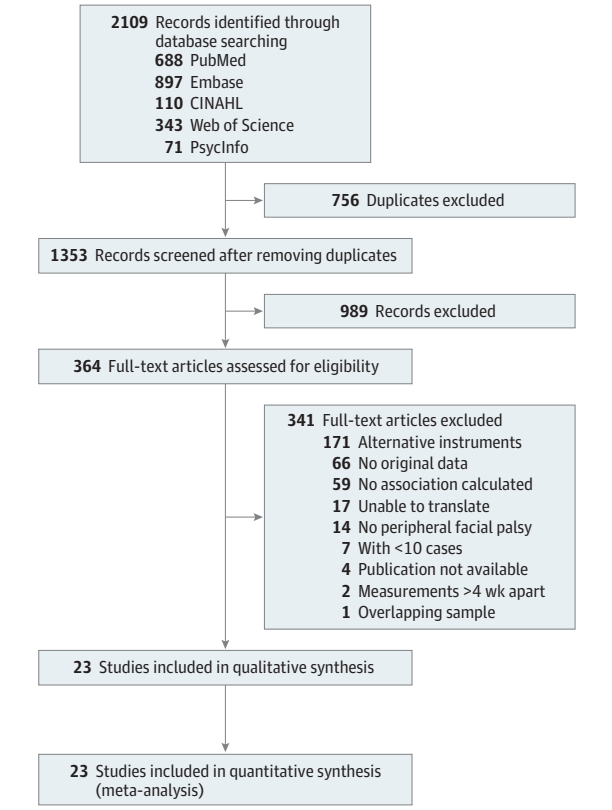
[d] Univariate regression coefficient, 0.434.

[e] Univariate regression coefficient, 0.772 (95% CI, 0.497 to 1.047).

[f] Univariate regression coefficient, FaCE, 0.37 (95% CI, 0.22 to 0.53); FDI(p), 0.20 (95% CI, 0.04 to 0.36); FDI(s), 0.06 (95% CI, −0.09 to 0.22).

[g] Before surgery.

Figure 1. Preferred Reporting Items for Systematic Reviews and Meta-analyses Flow Diagram



facial function instrument was associated with the association between facial function and QOL by comparing 95% CIs. Forest plots show overlapping 95% CIs of the pooled correlations between eFACE, House-Brackmann, and Sunnybrook Facial Grading System and the same QOL outcome (Figure 2).

Associations Between Facial Function and the Physical and Social Domains

Pooled correlation coefficients between facial function and QOL were higher for the physical domain of QOL, represented by FaCE total and FDI physical function (Figure 2A, Figure 3A), than for the social domain, represented by FaCE and FDI social function (Figure 2B, Figure 3B).

The results of the meta-analysis examining the correlations between facial function and all FaCE subdomains are presented in eTable 4 in the Supplement. The strongest correlations with the subdomain facial movement of the FaCE were noted with House-Brackmann (0.593; 95% CI, 0.443-0.711), Sunnybrook Facial Grading System (0.634; 95% CI, 0.496-0.741), and eFACE (0.531; 95% CI, 0.197-0.754).

Factors Influencing Association Between Facial Function and QOL

Only factors apparently influencing the associations between the Sunnybrook Facial Grading System score and QOL could be evaluated in the meta-regression analysis, because the number of studies was too limited for any other associations to be analyzed. The number of studies included in the meta-regression analysis ranged from 6 to 11. This meta-regression does not show the association between a factor and QOL; rather, how a factor relates to the association between facial function (Sunnybrook Facial Grading System) and QOL is estimated. The mean age of the participants was associated with the correlation between Sunnybrook Facial Grading System and FDI social function (0.018; 95% CI, 0.000-0.037) (**Table 2**), indicating that, in studies with a higher mean age of the populations, the associations found apparently are higher (0.018 per means in years of age).

Discussion

This systematic review and meta-analysis examined the association between clinician-graded facial function and patient-reported, disease-specific QOL in adults with peripheral facial palsy. Associations were low to moderate, meaning that only a small part of QOL is explained by facial function and a considerable part of QOL is explained by other factors. Our findings are in concordance with previous literature. In a systematic review examining the association between disease-related impairments and health-related QOL in patients with various disorders, pooled effect sizes less than or equal to 0.46 were found.[45] The authors stated that QOL scores do not adequately reflect impairment because these scores appear to be influenced by factors in addition to the impairment. Studies analyzing variables associated with QOL in patients with facial palsy described that, in general, a shorter duration of palsy, an older age, female sex, higher depression scores, higher anxiety scores, and worse facial function were associated with lower QOL.[4-6,46] A study examining the explained variance (R^2) of QOL suggested that the FaCE total score is largely determined by the eFACE and a smaller portion might be explained by other factors, such as sex and type of visit (initial evaluation or follow-up).[37]

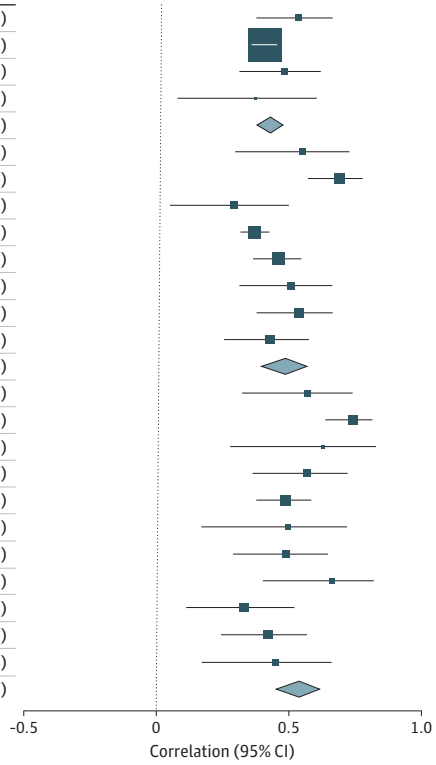
In this review, the correlation between the facial function and social function domain of QOL was weaker than the correlation between facial function and physical function. Different patients with the same facial palsy severity may experience social burden differently, and patients experiencing the same social burden may have variations in facial palsy severity. Previous studies found increased anxiety and depression rates in persons with facial palsy,[15,47-49] but anxiety or depression was not associated with facial palsy severity.[16] A systematic review examining the psychosocial aspects of facial palsy advises psychological screening of every patient given the inconsistencies between studies in the strength of the correlation between facial palsy severity and psychosocial outcomes.[16] Although psychosocial counseling has been previously recommended, to our knowledge, there is no research published on what type of counseling is needed most in the facial palsy population.[16,50,51]

We examined whether the choice of facial function instrument affects the association between facial function and QOL. We consistently found overlapping 95% CIs of summary statistics when correlating the 3 facial function instruments with

Figure 2. Correlations Between the Facial Clinimetric Evaluation Scale (FaCE) and Other Instruments

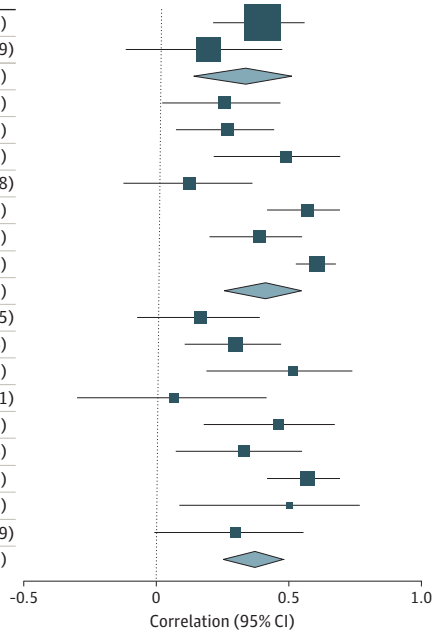
A FaCE total

Source	Comparison	Total	Correlation (95% CI)
Tavares-Brito et al,[44] 2019	eFACE	90	0.537 (0.371 to 0.670)
Tavares-Brito et al,[5] 2019	eFACE	920	0.409 (0.354 to 0.461)
van Veen et al,[37] 2019	eFACE	92	0.482 (0.308 to 0.625)
Volk et al,[40] 2020	eFACE	41	0.373 (0.074 to 0.611)
Pooled	eFACE		0.424 (0.375 to 0.471)
Kahn et al,[13] 2021	HB	41	0.550 (0.292 to 0.734)
Marsk et al,[28] 2013	HB	93	0.690 (0.566 to 0.784)
Kleiss et al,[31] 2015	HB	62	0.292 (0.046 to 0.505)
Kleiss et al,[6] 2015	HB	794	0.373 (0.312 to 0.431)
Volk et al,[10] 2017	HB	256	0.461 (0.359 to 0.552)
Barry et al,[35] 2019	HB	67	0.510 (0.307 to 0.668)
Tavares-Brito et al,[44] 2019	HB	90	0.538 (0.372 to 0.670)
Bylund et al,[38] 2021	HB	95	0.430 (0.250 to 0.581)
Pooled	HB		0.481 (0.391 to 0.562)
Kahn et al,[13] 2001	SB	41	0.570 (0.318 to 0.747)
Marsk et al,[28] 2013	SB	93	0.740 (0.631 to 0.820)
Ng et al,[29] 2013	SB	21	0.630 (0.272 to 0.835)
Kleiss et al,[31] 2015	SB	54	0.570 (0.357 to 0.727)
Kleiss et al,[6] 2015	SB	188	0.488 (0.371 to 0.590)
Györi et al,[34] 2018	SB	30	0.495 (0.164 to 0.726)
Barry et al,[35] 2019	SB	67	0.490 (0.283 to 0.653)
Díaz-Aristizabal et al,[36] 2019	SB	30	0.662 (0.396 to 0.825)
Bruins et al,[4] 2020	SB	71	0.332 (0.107 to 0.525)
Bylund et al,[38] 2021	SB	95	0.420 (0.239 to 0.573)
Volk et al,[40] 2020	SB	41	0.450 (0.165 to 0.666)
Pooled	SB		0.533 (0.447 to 0.610)



B FaCE social function

Source	Comparison	Total	Correlation (95% CI)
Tavares-Brito et al,[44] 2019	eFACE	90	0.391 (0.200 to 0.553)
Volk et al,[40] 2020	eFACE	41	0.189 (-0.126 to 0.469)
Pooled	eFACE		0.324 (0.128 to 0.495)
Barry et al,[35] 2019	HB	67	0.250 (0.010 to 0.462)
Bylund et al,[38] 2021	HB	95	0.260 (0.062 to 0.439)
Kahn et al,[13] 2001	HB	41	0.480 (0.202 to 0.686)
Kleiss et al,[31] 2015	HB	62	0.119 (-0.135 to 0.358)
Marsk et al,[28] 2013	HB	93	0.560 (0.402 to 0.686)
Tavares-Brito et al,[44] 2019	HB	90	0.379 (0.187 to 0.543)
Volk et al,[10] 2017	HB	256	0.595 (0.510 to 0.669)
Pooled	HB		0.397 (0.242 to 0.532)
Barry et al,[35] 2019	SB	67	0.160 (-0.083 to 0.385)
Bylund et al,[38] 2021	SB	95	0.290 (0.094 to 0.464)
Díaz-Aristizabal et al,[36] 2019	SB	30	0.504 (0.176 to 0.731)
Györi et al,[34] 2018	SB	30	0.060 (-0.307 to 0.411)
Kahn et al,[13] 2001	SB	41	0.450 (0.165 to 0.666)
Kleiss et al,[31] 2015	SB	54	0.323 (0.060 to 0.544)
Marsk et al,[28] 2013	SB	93	0.560 (0.402 to 0.686)
Ng et al,[29] 2013	SB	21	0.490 (0.074 to 0.761)
Volk et al,[40] 2020	SB	41	0.290 (-0.019 to 0.549)
Pooled	SB		0.356 (0.238 to 0.463)

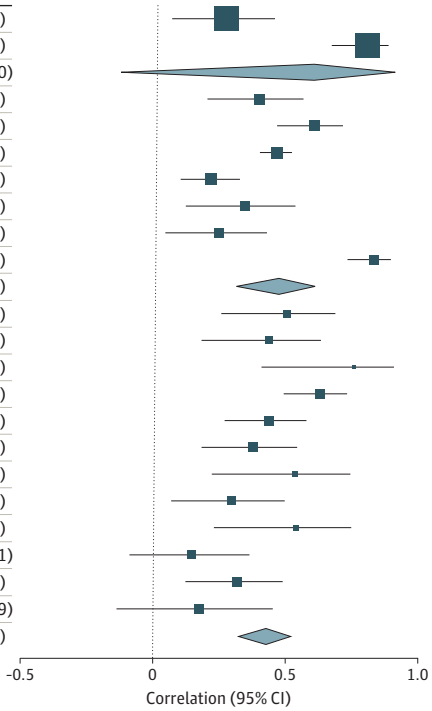


A, Correlation of FaCE total with heterogeneity (I^2) of pooled associations between electronic, clinician-graded facial function assessment (eFACE) (0%), House-Brackmann (HB) (69%), and Sunnybrook Facial Grading System (SB) (52%). B, FaCE social function with heterogeneity of pooled associations between eFACE (23%), HB (79%), and SB (44%). Correlations including the HB were converted to positive values for easier comparison. Squares represent mean values, with the size of the squares indicating weight and horizontal lines representing 95% CIs. Diamonds represent the pooled mean with the points of the diamonds representing 95% CIs.

Figure 3. Correlations Between the Facial Disability Index (FDI) Physical (p) and Social (s) Scales and Other Instruments

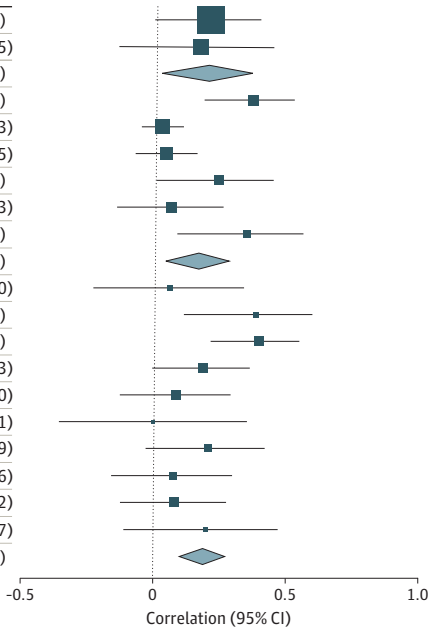
A FDI(p)

Source	Comparison	Total	Correlation (95% CI)
Chong et al,[33] 2017	eFACE	83	0.280 (0.068 to 0.467)
Volk et al,[40] 2020	eFACE	41	0.811 (0.671 to 0.895)
Pooled	eFACE		0.605 (-0.124 to 0.910)
Gonzalez-Cardero et al,[27] 2012	HB	79	0.405 (0.202 to 0.575)
Marsk et al,[28] 2013	HB	93	0.610 (0.464 to 0.724)
Tveiten et al,[32] 2016	HB	539	0.468 (0.399 to 0.531)
Volk et al[10] 2017	HB	256	0.221 (0.101 to 0.335)
Barry et al,[35] 2019	HB	67	0.350 (0.120 to 0.544)
Bylund et al,[38] 2021	HB	88	0.250 (0.043 to 0.437)
Özden et al,[39] 2020	HB	51	0.837 (0.730 to 0.904)
Pooled	HB		0.473 (0.311 to 0.607)
van Swearingen and Brach,[12] 1996	SB	46	0.507 (0.254 to 0.695)
van Swearingen et al,[25] 1998	SB	48	0.440 (0.178 to 0.644)
Frijters et al,[26] 2008	SB	15	0.760 (0.406 to 0.916)
Marsk et al,[28] 2013	SB	93	0.630 (0.489 to 0.739)
Pavese et al,[30] 2014	SB	100	0.440 (0.267 to 0.586)
Chong et al,[33] 2017	SB	83	0.380 (0.179 to 0.551)
Györi et al,[34] 2018	SB	30	0.536 (0.218 to 0.751)
Barry et al,[35] 2019	SB	67	0.300 (0.064 to 0.504)
Díaz-Aristizabal et al,[36] 2019	SB	30	0.542 (0.226 to 0.755)
Bruins et al,[4] 2020	SB	69	0.147 (-0.093 to 0.371)
Bylund et al,[38] 2021	SB	88	0.320 (0.118 to 0.496)
Volk et al,[40] 2020	SB	41	0.176 (-0.139 to 0.459)
Pooled	SB		0.423 (0.322 to 0.514)



B FDI(s)

Source	Comparison	Total	Correlation (95% CI)
Chong et al,[33] 2017	eFACE	83	0.220 (0.005 to 0.416)
Volk et al,[40] 2020	eFACE	41	0.184 (-0.131 to 0.465)
Pooled	eFACE		0.208 (0.031 to 0.373)
Marsk et al,[28] 2013	HB	93	0.380 (0.191 to 0.542)
Tveiten et al,[32] 2016	HB	539	0.039 (-0.046 to 0.123)
Volk et al,[10] 2020	HB	256	0.054 (-0.069 to 0.175)
Barry et al,[35] 2019	HB	67	0.250 (0.010 to 0.462)
Bylund et al,[38] 2021	HB	90	0.070 (-0.139 to 0.273)
Özden et al,[39] 2020	HB	51	0.355 (0.088 to 0.574)
Pooled	HB		0.166 (0.044 to 0.283)
van Swearingen and Brach,[12] 1996	SB	46	0.066 (-0.229 to 0.350)
van Swearingen et al,[25] 1998	SB	47	0.390 (0.116 to 0.609)
Marsk et al,[28] 2013	SB	93	0.400 (0.214 to 0.558)
Pavese et al,[30] 2014	SB	100	0.190 (-0.007 to 0.373)
Chong et al,[33] 2017	SB	83	0.090 (-0.128 to 0.300)
Györi et al,[34] 2018	SB	30	0.001 (-0.359 to 0.361)
Barry et al,[35] 2019	SB	67	0.210 (-0.032 to 0.429)
Bruins et al,[4] 2020	SB	70	0.076 (-0.162 to 0.306)
Bylund et al,[38] 2021	SB	90	0.080 (-0.129 to 0.282)
Volk et al,[40] 2020	SB	41	0.199 (-0.116 to 0.477)
Pooled	SB		0.182 (0.095 to 0.266)



A, Correlation of FDI(p) with heterogeneity (I^2) of pooled associations between electronic, clinician-graded facial function assessment (eFACE) (95%), House-Brackmann (HB) (88%), and Sunnybrook Facial Grading System (SB) (55%). B, Correlation of FDI(s) with heterogeneity of pooled associations between eFACE (0%), HB (68%), and SB (21%). Correlations including the HB were converted to positive values for easier comparison. Squares represent mean values, with the size of the squares indicating weight and horizontal lines representing 95% CIs. Diamonds represent the pooled mean with the points of the diamonds representing 95% CIs.

Table 2. Meta-Regression Univariate

Association	Covariate (No. of studies)	Coefficient (95% CI)	*P* value
SB with FaCE total	Intercept age	−1.150 (−3.332 to 1.032)	.30
	Age, mean (6)	0.034 (−0.008 to 0.076)	.11
	Intercept % female	0.300 (−0.524 to 1.121)	.48
	% Female (7)	0.006 (−0.009 to 0.021)	.41
	Intercept % Bell palsy	0.467 (0.251 to 0.683)	<.001
	% Bell palsy (11)	0.003 (−0.001 to 0.006)	.18
SB with FaCE social function	Intercept age	−1.742 (−3.397 to 1.914)	.58
	Age, mean (6)	0.021 (−0.030 to 0.071)	.42
	Intercept % Bell palsy	0.240 (−0.041 to 0.521)	.10
	% Bell palsy (9)	0.002 (−0.002 to 0.007)	.30
SB with FDI(p)	Intercept age	0.843 (−0.050 to 1.736)	.06
	Age, mean (11)	−0.007 (−0.026 to 0.011)	.42
	Intercept % female	0.479 (−0.113 to 1.070)	.11
	% Female (10)	0.000 (−0.010 to 0.010)	.98
	Intercept duration palsy	0.382 (−0.259, 1.022)	.24
	Duration of palsy (4)	0.047 (−0.120 to 0.213)	.58
	Intercept % Bell palsy	0.407 (0.184 to 0.630)	<.001
	% Bell palsy (10)	<0.001 (−0.003 to 0.005)	.68
SB with FDI(s)	Intercept age	−0.712 (−1.617 to 0.193)	.12
	Age, mean (9)	0.018 (0.000 to 0.037)	.048
	Intercept % female	0.170 (−0.378 to 0.718)	.54
	% Female (8)	<0.001 (−0.009 to 0.010)	.98
	Intercept % Bell palsy	0.144 (−0.012 to 0.300)	.07
	% Bell palsy (8)	<0.001 (−0.002 to 0.003)	.63

Abbreviations: FaCE, Facial Clinimetric Evaluation scale; FDI, Facial Disability Index physical (p) and social (s) function; SB, Sunnybrook Facial Grading Instrument.

the same QOL instrument (Figures 2 and 3), so no significant differences in strength of the correlations were found. The House-Brackmann instrument has received increasing criticism owing to its crude scale, which does not allow for distinguishing changes in different regions of the face and is therefore deemed less suitable for clinical and scientific evaluation of facial palsy.[7,20,52]

The meta-regression analyses showed that only mean age of the study population influenced the association between the Sunnybrook Facial Grading System and FDI social function, indicating that in studies with a higher mean age, the associations were somewhat higher (0.018 per means in years of age). Clinically, this finding suggests that, in older participants, the association between facial function and social function is somewhat higher, and vice versa, with younger patients more variable in experiencing social burden independent of facial palsy severity. Other factors analyzed in the meta-regression were percentage of women, duration of palsy, and diagnosis of idiopathic facial palsy, which were not significantly different or could not be analyzed owing to the small number of studies. The lack of significant findings in our meta-regression could be due to heterogeneity between studies, probably related to large variability in patient characteristics, such as sex ratio, age, and duration of palsy (clinical heterogeneity). Obtaining a homogeneous sample with a sufficient number of patients with facial palsy is difficult owing to the great variability in age at occurrence, disease course, cause of palsy, laterality, previous treatment, and a low incidence.[53,54] Methodologic variations between studies, such as differences in facial function assessment, outcome assessment, and handling of confounders and missing data, may also have contributed to the large heterogeneity.[55]

Risk of Bias Assessment

There is no single method best for assessing risk of bias in observational studies because there is disagreement on how to approach risk of bias assessment.[56,57] Because this review analyzed cross-sectional data, we chose a tool suited for this purpose and modified it slightly so that it better met the aim of the study. Overall, it appeared that studies failed to report the method. For example, 57% of the studies analyzed did not report whether facial function and 43% whether QOL assessments were implemented consistently. Whether assessors were blinded to QOL scores of patients was not reported in 61% of the studies and whether participants were blinded to facial function scores was not reported in 70% of the studies. For better comparison of studies and to estimate the risk of bias adequately, future research should better report exposure and outcome assessment.

Limitations

The study had limitations. In this review, physical function is defined as FaCE total score and FDI physical function. A limitation of this approach is that the FaCE total score also comprises a social subdomain. There is not one subdomain of the FaCE that directly matches the FDI physical function and it was not possible to exclude the social subdomain and merge all physical subdomains of the FaCE. However, when comparing

the pooled correlations of the FaCE total (Figure 2A) with the FaCE subdomains (eTable 4 in the Supplement), there was no indication that including social function data as part of the FaCE total score was associated with the conclusion of this review. Clinical and methodologic heterogeneity, indicated by high I^2 values, was substantial between studies, suggesting bias. Another limitation of this review is that every study analyzed the association between facial function severity and QOL in a linear model. To our knowledge no study has ever explored whether another model fit might better explain the association between facial function and QOL. Another model might better explain the association between clinician-graded facial function and QOL. Furthermore, some of the included studies used Spearman ρ and some used Pearson *r* to analyze their data, but there were too few studies that used Pearson *r* to test whether the choice of test statistic appeared to influence the association found. In addition, the pooled correlations were not adjusted for covariates.

This review provides insight into which part of QOL can be explained by facial function and which part is explained by other variables. Given the considerably large unexplained part, we recommend assessing facial palsy using both clinician-graded as well as patient-reported instruments. Existing relevant literature is limited by small sample sizes and a large amount of heterogeneity between studies. Although large sample sizes are often difficult to obtain in the field of facial palsy, it would be beneficial to aim for such sample sizes in future research.

Conclusions

This systematic review and meta-analysis noted that clinician-graded facial function and patient-reported, disease-specific QOL appear to be only moderately correlated. Particularly, the social function domain of QOL is weakly correlated with the severity of facial function impairment, emphasizing that the psychosocial burden that comes with peripheral facial palsy is not necessarily defined by the severity of the palsy. Therefore, we recommend assessing facial palsy using both clinician-graded and patient-reported instruments. Future research should focus on identifying factors other than severity of facial function impairment that might influence QOL in adults with peripheral facial palsy.

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Concept and design: All authors.
Acquisition, analysis, or interpretation of data: Bruins, van Veen, Dijkstra, Broekstra.
Drafting of the manuscript: Bruins, Dijkstra, Broekstra.
Critical revision of the manuscript for important intellectual content: van Veen, Werker, Dijkstra, Broekstra.
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Administrative, technical, or material support: Bruins, van Veen.
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