

Supplementary Table 1. Search queries and results

	No.	Query	Results
Medline (PubMed)	#1	((((((((((extraoral traction appliances[MeSH Terms]) OR (maxillary protraction)) OR (reverse headgear)) OR (reverse head gear)) OR (protraction headgear)) OR (protraction head gear)) OR (headgear)) OR (head gear)) OR (facemask)) OR (face mask)) OR (mpa)) OR (delaire)) OR (class iii elastics)) OR (intermaxillary traction)	40,412
	#2	((((((((((orthodontic anchorage procedures[MeSH Terms]) OR (orthodontic anchorage)) OR (miniscrew)) OR (mini screw)) OR (miniplate)) OR (bone screw)) OR (bone plate)) OR (skeletal anchorage)) OR (skeletal anchor)) OR (bone anchorage)) OR (bone anchor)) OR (mini plant)) OR (orthodontic anchor)	72,033
	#3	#1 AND #2	841
	#4	((((((((((malocclusion, angle class iii[MeSH Terms]) OR (anterior crossbite)) OR (skeletal class iii)) OR (reverse occlusion)) OR (habsburg jaw)) OR (prognathism mandibular)) OR (habsburg jaw)) OR (angle class iii)) OR (underbite)) OR (maxillary hypoplasia)) OR (mandibular hyperplasia)) OR (mandibular protrusion)) OR (maxillary retrusion)	103,436
	#5	((((((((((randomized controlled trial[Publication Type]) OR (controlled clinical trial[Publication Type])) OR (randomized[Title/Abstract])) OR (placebo[Title/Abstract])) OR (drug therapy[MeSH Subheading])) OR (randomly[Title/Abstract])) OR (trial[Title/Abstract])) OR (groups[Title/Abstract]))	4,723,357
	#6	(animals[MeSH Terms]) NOT (humans[MeSH Terms])	4,682,411
	#7	#5 NOT #6	4,098,062
	#8	#3 AND #4 AND #7	105
Embase	#1	orthodontic anchorage'/exp OR 'orthodontic anchor'/exp OR 'orthodontic anchorage procedures' OR 'miniscrew'/exp OR 'miniplate'/exp OR 'bone screw'/exp OR 'bone plate'/exp OR 'skeletal anchorage' OR 'skeletal anchor' OR 'bone anchorage' OR 'bone anchor' OR 'mini implant'	49,247
	#2	orthodontic headgear'/exp OR 'face mask'/exp OR 'extraoral traction appliances' OR 'maxillary protraction'/exp OR 'reverse headgear' OR 'protraction headgear' OR 'protraction head gear' OR facemask OR mpa OR delaire OR 'class iii elastics' OR 'intermaxillary traction'	54,473
	#3	#1 AND #2	342
	#4	skeletal class iii malocclusion'/exp OR 'maxillary hypoplasia'/exp OR 'angle class iii' OR 'anterior crossbite' OR 'reverse occlusion' OR 'mandibular prognathism' OR 'mandibular hyperplasia' OR 'mandibular protrusion' OR 'maxillary retrusion' OR habsburg OR habsburg OR underbite	2,581
	#5	randomized controlled study' OR 'controlled study'/exp	7,476,641
	#6	#3 AND #4 AND #5	3
Cochrane	#1	(maxillary protraction) OR (reverse headgear) OR (reverse head gear) OR (protraction head gear) OR (protraction headgear) (Word variations have been searched)	96
	#2	(orthodontic headgear) OR (headgear) OR (head gear) OR (facemask) OR (face mask) (Word variations have been searched)	3,342
	#3	(orthodontic face bow) OR (face bow) OR (mpa) OR (delaire) OR (class iii elastics) (Word variations have been searched)	2,716
	#4	(intermaxillary protraction) (Word variations have been searched)	7
	#5	(orthodontic anchorage) OR (orthodontic anchor) OR (miniscrew) AND (miniplate) OR (bone screw) (Word variations have been searched)	2,302
	#6	(bone plate) OR (skeletal anchorage) OR (skeletal anchor) AND (bone anchorage) OR (bone anchor) (Word variations have been searched)	2,173
	#7	(mini plant) (Word variations have been searched)	107
	#8	MeSH descriptor: [Extraoral Traction Appliances] explode all trees	134

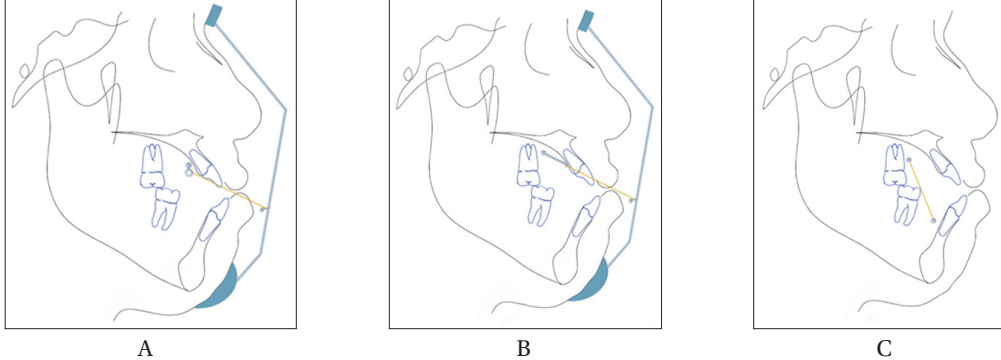
Supplementary Table 1. Continued

No.	Query	Results
#9	#1 OR #2 OR #3 OR #4 OR #8	5,196
#10	MeSH descriptor: [Orthodontic Anchorage Procedures] explode all trees	125
#11	#5 OR #6 OR #7 OR #10	3,100
#12	MeSH descriptor: [Malocclusion, Angle Class III] explode all trees	115
#13	(anterior crossbite) OR (skeletal class iii) OR (reverse occlusion) OR (habsburg jaw) OR (mandibular prognathism) (Word variations have been searched)	1,646
#14	(habsburg jaw) OR (angle class iii) OR (underbite) OR (maxillary hypoplasia) OR (mandibular hyperplasia) (Word variations have been searched)	736
#15	(mandibular protrusion) OR (maxillary retrusion) (Word variations have been searched)	158
#16	#12 OR #13 OR #14 OR #15	1,916
#17	MeSH descriptor: [Randomized Controlled Trial] explode all trees	119
#18	MeSH descriptor: [Controlled Clinical Trial] explode all trees	128
#19	(non-randomized trial) OR (randomized controlled study) OR (controlled clinical study) (Word variations have been searched)	1,130,390
#20	#17 OR #18 OR #19	1,060,960
#21	#9 AND #11	73
#22	#21 AND #16 AND #20	22
Web of Science	#1 (((((((((((TOPIC: (orthodontic anchorage) OR TOPIC: (orthodontic anchor)) OR TOPIC: (orthodontic anchorage procedures)) OR TOPIC: (orthodontic anchorage procedures)) OR TOPIC: (miniscrew)) OR TOPIC: (manipulate)) OR TOPIC: (bone screw)) OR TOPIC: (bone plate)) OR TOPIC: (skeletal anchorage)) OR TOPIC: (skeletal anchor)) OR TOPIC: (bone anchorage)) OR TOPIC: (bone anchor)) OR TOPIC: (mini implant))	226,759
	#2 (((((((((((TOPIC: (orthodontic headgear) OR TOPIC: (face mask)) OR TOPIC: (extraoral traction appliances)) OR TOPIC: (maxillary protraction)) OR TOPIC: (reverse headgear)) OR TOPIC: (reverse head gear)) OR TOPIC: (protraction headgear)) OR TOPIC: (protraction head gear)) OR TOPIC: (facemask)) OR TOPIC: (mpa)) OR TOPIC: (delaire)) OR TOPIC: (class iii elastics)) OR TOPIC: (intermaxillary traction))	158,473
	#3 #1 AND #2	1,638
	#4 TOPIC: (skeletal class iii malocclusion) OR TOPIC: (maxillary hypoplasia) OR TOPIC: (angle class iii) OR TOPIC: (anterior crossbite) OR TOPIC: (reverse occlusion) OR TOPIC: (mandibular prognathism) OR TOPIC: (mandibular hyperplasia) OR TOPIC: (mandibular protrusion) OR TOPIC: (maxillary retrusion) OR TOPIC: (habsburg jaw) OR TOPIC: (habsburg jaw) OR TOPIC: (underbite)	16,809
	#5 TOPIC: (randomized controlled trial) OR TOPIC: (randomized controlled study) OR TOPIC: (controlled clinical trial) OR TOPIC: (controlled clinical study) OR TOPIC: (controlled study)	5,603,397
	#6 #5 AND #4 AND #3	49
SCOPUS	#1 (ALL ("orthodontic anchorage") OR ALL ("orthodontic anchor") OR ALL ("orthodontic anchorage procedures") OR ALL ("miniscrew") OR ALL ("miniplate") OR ALL ("bone screw") OR ALL ("bone plate") OR ALL ("skeletal anchorage") OR ALL ("skeletal anchor") OR ALL ("bone anchorage") OR ALL ("bone anchor") OR ALL ("mini implant"))	61,427
	#2 (ALL ("orthodontic headgear") OR ALL ("face mask") OR ALL ("extraoral traction appliances") OR ALL ("maxillary protraction") OR ALL ("reverse headgear") OR ALL ("reverse head gear") OR ALL ("protraction head gear") OR ALL ("facemask") OR ALL ("mpa") OR ALL ("delaire") OR ALL ("class iii elastics") OR ALL ("intermaxillary traction"))	303,663

Supplementary Table 1. Continued

No.	Query	Results
#3	((ALL ("orthodontic headgear") OR ALL ("face mask") OR ALL ("extraoral traction appliances") OR ALL ("maxillary protraction") OR ALL ("reverse headgear") OR ALL ("reverse head gear") OR ALL ("protraction head gear") OR ALL ("facemask") OR ALL ("mpa") OR ALL ("delaire") OR ALL ("class iii elastics") OR ALL ("intermaxillary traction"))) AND ((ALL ("orthodontic anchorage") OR ALL ("orthodontic anchor") OR ALL ("orthodontic anchorage procedures") OR ALL ("miniscrew") OR ALL ("miniplate") OR ALL ("bone screw") OR ALL ("bone plate") OR ALL ("skeletal anchorage") OR ALL ("skeletal anchor") OR ALL ("bone anchorage") OR ALL ("bone anchor") OR ALL ("mini implant"))))	1,188
#4	(ALL ("skeletal class iii malocclusion") OR ALL ("angle class iii") OR ALL ("anterior crossbite") OR ALL ("reverse occlusion") OR ALL ("mandibular prognathism") OR ALL ("mandibular hyperplasia") OR ALL ("mandibular protrusion") OR ALL ("maxillary hypoplasia") OR ALL ("maxillary retrusion") OR ALL ("habsburg jaw") OR ALL ("habsburg jaw") OR ALL ("underbite"))	10,666
#5	(ALL ("randomized controlled trial") OR ALL ("controlled clinical trial") OR ALL ("randomized controlled study") OR ALL ("controlled clinical study") OR ALL ("controlled study"))	2,150,507
#6	(((ALL ("orthodontic headgear") OR ALL ("face mask") OR ALL ("extraoral traction appliances") OR ALL ("maxillary protraction") OR ALL ("reverse headgear") OR ALL ("reverse head gear") OR ALL ("protraction head gear") OR ALL ("facemask") OR ALL ("mpa") OR ALL ("delaire") OR ALL ("class iii elastics") OR ALL ("intermaxillary traction"))) AND ((ALL ("orthodontic anchorage") OR ALL ("orthodontic anchor") OR ALL ("orthodontic anchorage procedures") OR ALL ("miniscrew") OR ALL ("miniplate") OR ALL ("bone screw") OR ALL ("bone plate") OR ALL ("skeletal anchorage") OR ALL ("skeletal anchor") OR ALL ("bone anchorage") OR ALL ("bone anchor") OR ALL ("mini implant")))) AND ((ALL ("skeletal class iii malocclusion") OR ALL ("angle class iii") OR ALL ("anterior crossbite") OR ALL ("reverse occlusion") OR ALL ("mandibular prognathism") OR ALL ("mandibular hyperplasia") OR ALL ("mandibular protrusion") OR ALL ("maxillary hypoplasia") OR ALL ("maxillary retrusion") OR ALL ("habsburg jaw") OR ALL ("habsburg jaw") OR ALL ("underbite"))) AND ((ALL ("randomized controlled trial") OR ALL ("controlled clinical trial") OR ALL ("randomized controlled study") OR ALL ("controlled clinical study") OR ALL ("controlled study"))))	80
CNKI	#1 KY='骨性III类+骨性三类' OR FT='骨性三+骨性反+安氏III+安氏三+前牙反'	504,406
	#2 (KY='上颌前牵引' OR FT='前牵引+前方牵引+颌间牵引+III类牵引') AND (KY='骨支抗' OR FT='微螺钉种植体+微螺钉支抗')	270
	#3 (KY='骨性III类+骨性三类' OR FT='骨性三+骨性反+安氏III+安氏三+前牙反') AND ((KY='上颌前牵引' OR FT='前牵引+前方牵引+颌间牵引+III类牵引') AND (KY='骨支抗' OR FT='微螺钉种植体+微螺钉支抗'))	94
Wanfang	#1 题名或关键词:(骨性III类)+全部:(骨性三类+骨性三+骨性反+安氏III+安氏三+前牙反)	29,163
	#2 题名或关键词:(上颌前牵引)+全部:(前牵引+前方牵引+颌间牵引+III类牵引)	61,801
	#3 题名或关键词:(骨支抗)+全部:(微螺钉种植体+微螺钉支抗)	829
	#4 (题名或关键词:(骨性III类)+全部:(骨性三类+骨性三+骨性反+安氏III+安氏三+前牙反)) AND ((题名或关键词:(上颌前牵引)+全部:(前牵引+前方牵引+颌间牵引+III类牵引)) AND (题名或关键词:(骨支抗)+全部:(微螺钉种植体+微螺钉支抗)))	21
Total		374

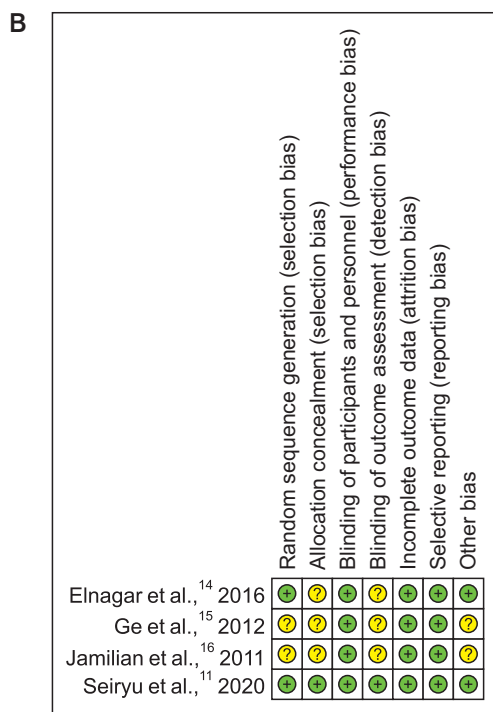
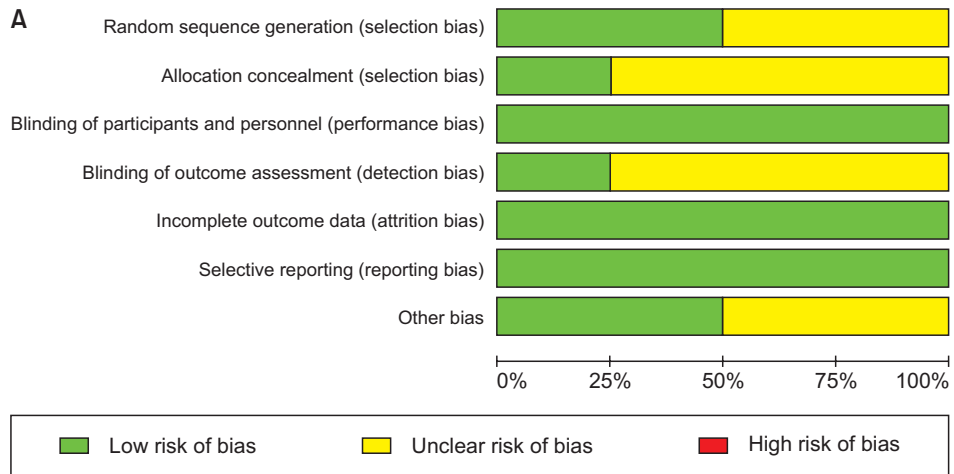
Supplementary Table 2. Description of the interventions

Group	Description
Control group	This group included patients with untreated Class III malocclusion.
Tooth-anchored group	Interventions in this group were identified as facemasks. The facemask was protracted with the bonded or banded intraoral appliance.
Bone-anchored group	Interventions that only used bone anchorage, such as miniplates or miniscrews, were classified into the bone-anchored group; these included bone anchorage with facemask appliance (BAFM) and bone anchorage with intermaxillary protraction (BAIP).
BAFM	Miniplates or miniscrews were placed on both sides of the lateral nasal wall (A), the posterior areas, or the zygomatic buttress areas of the maxilla (B). The protraction sites were at the canine regions on both sides. The bone anchorages were protracted with the facemask by elastics.
BAIP	Two miniscrews were placed on both sides of the posterior areas or the zygomatic areas in the maxilla, and two other miniscrews were placed on the canine regions on both sides of the mandible. The miniscrews were protracted with Class III intermaxillary protraction (C).
	
Mixed-anchored group	Interventions that combined bone anchorage and bonds or bands were classified into a mixed-anchored group. These included mixed anchorage with a facemask (MAFM) and mixed anchorage with intermaxillary protraction (MAIP).
MAFM	Interventions in this group were categorized into two types: 1) Hybrid Hyrax expansion appliance protracted with a facemask. The Hybrid Hyrax expansion appliance combined two bands on the first molars on both sides with two miniscrews implanted in the palate. The protraction sites were at the canine regions on both sides. 2) A lingual arch attached to a miniscrew protracted with a facemask. This kind of intervention was applied by Seiryu et al. ¹¹ They set a lingual arch on the maxilla with two bands on the first molars on both sides. A miniscrew was inserted into the palate. The miniscrew was combined with the lingual arch by a wire and resin. A facemask was protracted with the intraoral device through the solder hooks on the arch. The protraction sites were at the canine regions on both sides.
MAIP	Patients in this group were treated with Class III elastics. 1) In the study by Sar et al. ²⁴ , two miniplates were placed in the symphyseal region. The elastic was between the miniplate and the bonded rapid maxillary expansion appliance. 2) In the study by Willmann et al. ²⁰ , the mentoplate was inserted in the mandibular anterior region. The class III elastic was between the Hybrid Hyrax expansion appliance and the mentoplate.

Supplementary Table 3. Quality assessment of RCTs and CCTs

Study	Selection	Comparability	Exposure	Total	Assessment
Aglarci et al., ¹⁷ 2016	4	1	3	8	Good
Bozkaya et al., ⁷ 2017	4	0	3	7	Satisfactory
de Souza et al., ⁸ 2019	4	2	3	9	Good
Koh and Chung, ⁴ 2014	4	2	3	9	Good
Lee et al., ¹⁰ 2012	4	1	3	8	Good
Lee et al., ¹⁸ 2020	4	2	3	9	Good
Ngan et al., ¹² 2015	4	0	3	7	Satisfactory
Sar et al., ¹⁹ 2014	4	1	3	8	Good
Willmann et al., ²⁰ 2018	4	2	3	9	Good
Cha and Ngan, ²¹ 2011	4	0	3	7	Satisfactory
Eid et al., ²² 2016	4	1	3	8	Good
Tripathi et al., ²³ 2016	4	0	3	7	Satisfactory
Sar et al., ²⁴ 2011	4	1	3	8	Good
Nienkemper et al., ²⁵ 2015	4	2	3	9	Good

RCT, randomized controlled trial; CCT, controlled clinical trial.



Supplementary Figure 1. A, Quality assessment of RCTs: Risk-of-bias graph. **B**, Quality assessment of RCTs: Risk-of-bias summary.

RCT, randomized controlled trial; CCT, controlled clinical trial.

Supplementary Table 4. Pairwise results of the network meta-analysis for outcomes

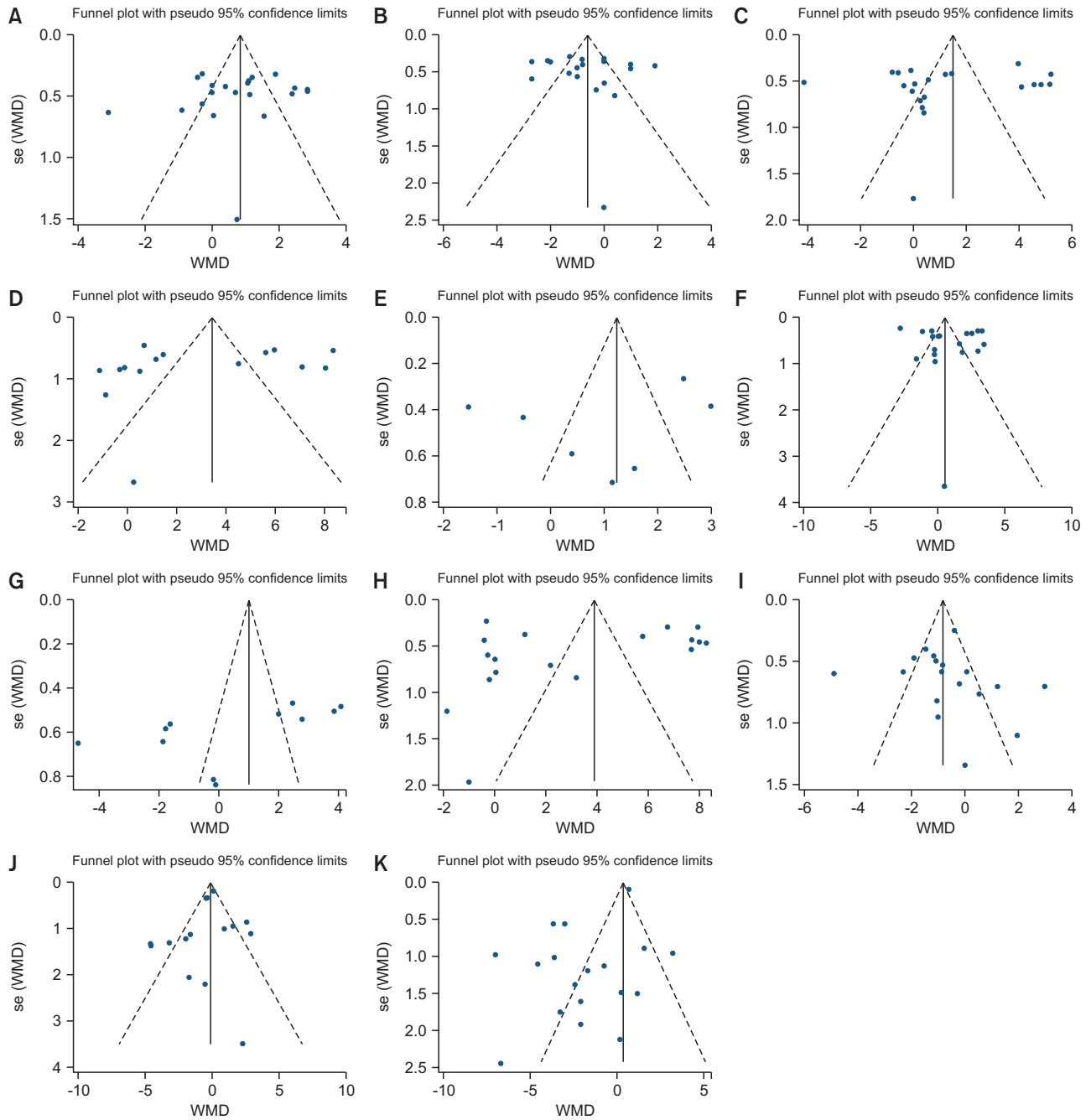
SNA					
BAFM					
0.19 (-0.59,0.97)	BAIP				
2.33 (1.88,2.87)	2.14 (1.37,2.98)	CONTROL			
0.72 (0.34,1.11)	0.53 (-0.18,1.25)	-1.61 (-2.16,-1.14)	FM		
-0.20 (-0.83,0.47)	-0.38 (-1.27,0.54)	-2.53 (-3.20,-1.88)	-0.91 (-1.48,-0.31)	MAFM	
-0.08 (-0.73,0.62)	-0.27 (-1.20,0.71)	-2.41 (-3.13,-1.73)	-0.80 (-1.45,-0.11)	0.12 (-0.61,0.85)	MAIP
SNB					
BAFM					
-0.13 (-0.99,0.80)	BAIP				
-1.96 (-2.68,-1.22)	-1.83 (-2.71,-1.01)	CONTROL			
0.23 (-0.29,0.78)	0.36 (-0.54,1.22)	2.19 (1.44,2.95)	FM		
-0.05 (-1.01,0.93)	0.08 (-1.10,1.22)	1.91 (0.91,2.91)	-0.28 (-1.15,0.58)	MAFM	
-0.87 (-2.18,0.54)	-0.74 (-2.23,0.79)	1.09 (-0.28,2.54)	-1.10 (-2.34,0.21)	-0.82 (-1.96,0.41)	MAIP
ANB					
BAFM					
-1.17 (-2.46,0.26)	BAIP				
2.86 (2.02,3.76)	4.03 (2.62,5.35)	CONTROL			
0.87 (-0.16,1.97)	2.03 (0.67,3.34)	-1.99 (-3.14,-0.83)	FM		
0.45 (-1.15,2.08)	1.62 (-0.35,3.46)	-2.40 (-4.08,-0.78)	-0.41 (-1.91,1.02)	MAFM	
-0.34 (-1.74,1.11)	0.84 (-1.04,2.61)	-3.20 (-4.64,-1.75)	-1.20 (-2.75,0.32)	-0.79 (-2.29,0.73)	MAIP
Wits					
BAFM					
-0.17 (-2.43,2.20)	BAIP				
6.56 (4.78,8.33)	6.72 (4.25,9.09)	CONTROL			
0.02 (-1.61,1.58)	0.18 (-2.11,2.30)	-6.54 (-8.52,-4.62)	FM		
1.01 (-1.83,3.79)	1.18 (-2.13,4.32)	-5.55 (-8.21,-2.94)	0.99 (-1.63,3.64)	MAFM	
1.68 (-2.65,5.93)	1.85 (-2.78,6.36)	-4.87 (-9.09,-0.71)	1.67 (-2.51,5.86)	0.67 (-2.60,3.92)	MAIP
SNOr					
BAFM					
-0.51 (-2.63,1.62)	BAIP				
2.48 (0.43,4.54)	2.99 (0.91,5.09)	CONTROL			
1.22 (0.06,2.29)	1.72 (-0.71,4.08)	-1.27 (-3.62,1.02)	FM		
SN/MP					
BAFM					
2.39 (0.46,4.14)	BAIP				
2.17 (0.95,3.38)	-0.22 (-1.87,1.57)	CONTROL			
-1.16 (-2.29,0.04)	-3.55 (-5.48,-1.38)	-3.33 (-4.77,-1.80)	FM		
-0.13 (-1.98,1.84)	-2.52 (-4.91,0.18)	-2.30 (-4.30,-0.15)	1.03 (-0.57,2.69)	MAFM	
-0.98 (-2.64,0.75)	-3.37 (-5.59,-0.89)	-3.15 (-4.91,-1.29)	0.18 (-1.49,1.84)	-0.84 (-2.80,1.04)	MAIP

Supplementary Table 4. Continued

ANS-Me					
BAFM					
-2.77 (-7.34,1.77)	BAIP				
2.21 (0.07,4.35)	4.98 (0.16,9.84)	CONTROL			
-2.61 (-4.80,-0.44)	0.16 (-3.83,4.19)	-4.82 (-7.54,-2.12)	FM		
2.31 (-2.22,6.83)	5.08 (-1.17,11.36)	0.10 (-3.91,4.11)	4.91 (0.11,9.76)	MAFM	
-1.76 (-5.26,1.77)	1.01 (-4.63,6.72)	-3.97 (-7.48,-0.44)	0.85 (-3.16,4.90)	-4.06 (-9.41,1.27)	MAIP
Overjet					
BAFM					
-0.52 (-1.96,0.90)	BAIP				
7.22 (6.24,8.13)	7.74 (6.23,9.20)	CONTROL			
-0.30 (-1.24,0.64)	0.22 (-1.12,1.58)	-7.52 (-8.62,-6.36)	FM		
2.85 (1.01,4.72)	3.37 (1.27,5.53)	-4.37 (-6.12,-2.51)	3.15 (1.40,4.94)	MAFM	
0.79 (-1.01,2.58)	1.31 (-0.89,3.52)	-6.43 (-8.17,-4.62)	1.09 (-0.87,3.04)	-2.07 (-4.55,0.38)	MAIP
Overbite					
BAFM					
-0.30 (-1.37,0.85)	BAIP				
-1.35 (-2.16,-0.53)	-1.05 (-2.23,0.06)	CONTROL			
0.01 (-0.76,0.88)	0.31 (-0.71,1.37)	1.36 (0.47,2.35)	FM		
-1.09 (-2.65,0.49)	-0.80 (-2.54,0.93)	0.26 (-1.21,1.75)	-1.11 (-2.65,0.39)	MAFM	
3.35 (1.55,5.07)	3.65 (1.58,5.59)	4.70 (2.93,6.40)	3.34 (1.38,5.14)	4.44 (2.15,6.65)	MAIP
U1/PP					
BAFM					
-1.11 (-4.59,1.66)	BAIP				
-0.33 (-2.65,1.93)	0.79 (-1.73,3.94)	CONTROL			
-3.27 (-6.95,-0.10)	-2.15 (-5.49,1.32)	-2.95 (-6.43,0.08)	FM		
-0.50 (-5.37,4.41)	0.66 (-4.33,6.17)	-0.16 (-4.67,4.39)	2.80 (-2.34,8.35)	MAFM	
-2.87 (-6.56,0.87)	-1.74 (-5.61,2.85)	-2.55 (-5.97,1.04)	0.42 (-3.56,4.87)	-2.37 (-6.83,2.15)	MAIP
IMPA					
BAFM					
-4.54 (-7.11,-2.28)	BAIP				
-3.87 (-5.58,-2.21)	0.68 (-1.41,3.00)	CONTROL			
1.08 (-0.39,2.37)	5.65 (3.00,8.30)	4.96 (2.92,6.81)	FM		
-1.86 (-4.76,1.02)	2.71 (-0.66,6.27)	2.01 (-0.78,4.81)	-2.94 (-5.69,-0.05)	MAFM	
-5.33 (-9.36,-1.41)	-0.76 (-5.20,3.72)	-1.46 (-5.56,2.53)	-6.40 (-10.23,-2.54)	-3.47 (-7.09,0.07)	MAIP

FM, facemask; BAFM, bone anchorage with facemask appliance; MAFM, mixed anchorage with a facemask; BAIP, bone anchorage with intermaxillary protraction; MAIP, mixed anchorage with intermaxillary protraction.

See Figure 1 for descriptions of the indicators.



Supplementary Figure 2. Funnel diagrams. **A**, SNA. **B**, SNB. **C**, ANB. **D**, Wits. **E**, SNOr. **F**, SN/MP. **G**, ANS-Me. **H**, Overjet. **I**, Overbite. **J**, U1/PP. **K**, IMPA.

WMD, weighted mean difference.

See Figure 1 for descriptions of the indicators.