Supplementary content

Contents

PICO/Eligibility Criteria/Search strategy

Table S1. PICO, eligibility criteria and research question formulation

PICO model for formulation a research question

PICO component	Description	Eligibility criteria
P (problem)	bonding accuracy	Studies investigating bracket transfer accuracy in buccal bracket bonding
I (Intervention)	indirect bonding	Studies investigating indirect bonding on plaster or printed models (objects) or on patients (subjects)
C (comparison)	planned bracket position	Actual status of the bracket position was confirmed by comparing to the planned bracket position
O (outcome)	mean transfer error, accuracy measurement	At least one of the measurements in the linear (mesiodistal, buccolingual, vertical) and/or angular (angulation, rotation, torque) directions was reported
S (study design)	-	Prospective and retrospective in-vivo and ex-vivo studies
Research question: To asses the accuracy of indirect bracket bonding by means of the deviations between planned and achieved bracket position in buccal bracket bonding.		

Excluded studies

Table S2. List of excluded studies with reasons for exclusion.

Reason for exclusion	Study
Out of subject	El Nigoumi et al. (2016); Hiro et al. (2008); Brignardello-Petersen et al. (2020); Mazzeo et al. (2013); Mota Júnior et al. (2018)
Missing data	Duarte et al. (2020); Israel et al. (2011); Gayake et al. 2013; Nichols et al. (2013); Nojima et al. (2015)
Lingual bonding	Schubert et al. (2013)
Reported data not comparable due to applied method	Wendl et al. (2008); Zhang et al. (2020); Mohlhenrich et al. (2020); De Oliveira et al. (2019); Mota Júnior et al. (2015); Oliveira et al. (2019); Shin et al. (2021)
Insufficient reporting of the methodology	Aguirre et al. (1982)

Risk of bias assessment tool

Table S3. Risk of bias assessment tool

Signalling questions	Risk of Bias	Description of the criteria		
Selection bias				
Outset bias 1. Was the indirect bracket placement affected by the malocclusion?	Indicators for low RoB	Indirect placement of brackets was not affected by the malocclusion (e.g. severe crowding or rotations).		
	Indicators for high RoB	Indirect placement of brackets was affected by the malocclusion (e.g. severe crowding or rotations).		
	Response options	Yes (Low RoB)	No (High RoB)	Unclear
Spectrum bias 2. Is an appropriate spectrum of teeth selected?	Indicators for low RoB	A relevant group of teeth is assessed (e.g. Incisors, canines, premolars, molars). Number of assessed brackets per group or teeth reported.		
	Indicators for high RoB	Non-tooth related assessment. Number of assessed brackets per group or teeth not reported.		
	Response options	Yes (Low RoB)	No (High RoB)	Unclear
Sample size 3. Is the sample size appropriate?	Indicators for low RoB	The sample size was statistically determined/the sample size is approptiate		
	Indicators for high RoB	No sample size calculation/ the sample size is not approptiate		

	Response options	Yes (Low RoB)	No (High RoB)	Unclear
Bonding procedure bias				
Bonding procedure *4.* Is procedure correctly performed and described?	Indicators for low RoB	Bonding procedure applied according to the state of the art (justified on basis of references). Same material and method used in all samples of one group. Sufficient description of the bonding procedure.		
	Indicators for high RoB	Modifications of bonding procedure which could bias the assessment. Insufficient description.		
	Response options	Yes (Low RoB)	No (High RoB)	Unclear
Training bias 5. Were the bonding clinicians trained/calibrated to perform the bonding procedure?	Indicators for low RoB	Reporting of experience. Bonding clinician(s) were experienced/trained for the bonding procedure (e.g. instructions for bonding procedure, predefined workflow for bonding procedure). Ideally full calibration procedure was performed on a separate sample & intra-/interoperator reproducibility values for calibration are given.		
	Indicators for high RoB	Experience not reported or possible bias due to lack of experience. No training performed or insufficiently reported.		
	Response options	Yes (Low RoB)	No (High RoB)	Unclear
Accuracy assessment bias				
Accuracy assessment procedure 6. Does the accuracy assessment method correctly measure transfer errors?	Indicators for low RoB	Precise data collection (CBCT, intraoral or model scan) with indication of the system used and its accuracy. No inaccuracys due to further steps within assessment process. Assessment independent from operator (e.g. algorithm-based).		
	Indicators for high RoB	Data collection not precise (impression or photography, caliper), inaccuracy due to further steps in assessment (transfer jigs, tracing, transfer via orthodontic archwires). Assessment dependent on operator (manual measurement).		

	Response options	Yes (Low RoB)	No (High RoB)	Unclear
Blinding bias ***(Accuracy assessment procedure)*** 7. Is the ***accuracy assessment*** data interpreted independently of the bonding procedure?	Indicators for low RoB	Appropriate blinding of the examiners who are assessing accuracy. E.g. randomized/ shuffled allocation of the order of specimen/ images and/or inclusion of multiple examiners, wash-out period between examinations.		
	Indicators for high RoB	Insufficient/no blinding of the examiner/operator.		
	Response options	Yes (Low RoB)	No (High RoB)	Unclear
Training/Calibration bias ***(***Accuracy assessment procedure***)*** 8. Are the examiners/the used computation tool calibrated for performing the accuracy assessment procedure?	Indicators for low RoB	For operator dependent methods (manual measurements/tracings) and non-operator dependent methods (computed accuracy assessment), details and outcomes of training/calibration are given. Calibration training must include an independent sample of individuals or teeth. Calibration data should not interpreted/ misunderstood as intra-examiner reliability.		
	Indicators for high RoB	Calibration not performed or sufficiently reported.		
	Response options	Yes (Low RoB)	No (High RoB)	Unclear
Verification bias				
Partial verification bias 9. Do all patients/ teeth undergo both the bonding and accuracy assessment procedure?	Indicators for low RoB	Ensure that all patients/teeth/surfaces undergo both procedures (bonding and accuracy assessment).		
	Indicators for high RoB	When a non-random set of patients/teeth/surfaces does not undergo the bonding/accuracy assessment.		
	Categories of RoB	Yes (Low RoB)	No (High RoB)	Unclear

Differential verification bias 10. Do all patients/ teeth receive the same accuracy assessment procedure?	Indicators for low RoB	Ensure that all patients/teeth/surfaces received the same accuracy assessment procedure.		
	Indicators for high RoB	When a non-random set of patients/teeth/surfaces is verified with a second or third accuracy assessment procedure.		
	Response options	Yes (Low RoB)	No (High RoB)	Unclear
Bias in the analysis 11. Are all patient/ teeth, uninterpretable or intermediate test results and withdrawals included in the analysis?	Indicators for low RoB	All patients/teeth who entered the study are accounted for, all uninterpretable or intermediate test results and withdrawals are explained including lost specimen of the brackets/teeth. Numbers of assessed teeth/brackets per group are reported or possible to calculate.		
	Indicators for high RoB	Not all patients/teeth who entered the study are accounted for and not all uninterpretable or intermediate test results and withdrawals are explained including lost specimen of the teeth. Number of assessed teeth/brackets per group are not reported or not possible to calculate.		
	Response options	Yes (Low RoB)	No (High RoB)	Unclear
Outcome bias				
Validity bias 12. Are the validation of results for the test method(s) included in the analysis?	Indicators for low RoB	Full presentation of results: data distribution; according to distribution, correct selection and application of the statistical method; indication of all relevant results		
	Indicators for high RoB	Insufficient/ incomplete presentation of results: no indication of data distribution, statistical method insufficiently described or incorrectly selected/applied, relevant results not reported		
	Response options	Yes (Low RoB)	No (High RoB)	Unclear
Reproducibility bias	Indicators for low RoB	Adequate method for reproducibility assessement; correct choice and use of statistical a methods and sufficient reporting of intra-/ inter-examiner reliability, reproducibility (repeated measurements). Data from calibration not missinterpreted as reliability.		

13. Are the reliability data of results for the test method(s) included in analysis?	Indicators for high RoB	Insufficient method for reproducibility assessment; incorrect statistical analysis or insufficient reporting. Assessment of intra-/inter-examiner reliability, reproducibility (repeated measurements) not performed or reported. Data from calibration purposes only. Biased interpretation.		
	Response options	Yes (Low RoB)	No (High RoB)	Unclear

Extracted data from the studies

Table S4.1. Overall mean transfer errors

Author/ Year	Type of study	Type of IDB tray	N	Mesiodistal (mm)		Buccolingual (mm)		Vertical (mm)		Angulation (°)		Rotation (°)		Torque (°)	
				Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Jungbauer et al. (2021)	ex vivo	3D printed	560	0.06	0.32	0.18	0.24	0.07	0.29	2.26	1.87	-	-	3.07	3.01
Faus-Matoses et al. (2021)	ex vivo	3D printed	335	0.065	0.081	0.129	0.067	0.094	0.147	0.271	0.92	0.707	0.648	0.826	1.712
Park et al. (2021b)	ex vivo	3D printed (group A1)	76	0.018	0.014	0.047	0.038	0.137	0.091	0.662	0.405	0.437	0.318	0.636	0.340
		3D printed (group B1)	76	0.043	0.056	0.043	0.028	0.127	0.066	0.644	0.435	0.433	0.230	0.542	0.255
		3D printed (group A2)	81	0.023	0.024	0.038	0.032	0.077	0.059	0.502	0.357	0.382	0.272	0.571	0.323
		3D printed (group B2)	81	0.041	0.025	0.052	0.049	0.090	0.080	0.628	0.462	0.515	0.370	0.602	0.359
		3D printed (group A3)	68	0.019	0.018	0.036	0.038	0.094	0.097	0.549	0.337	0.377	0.328	0.592	0.217
		3D printed (group B3)	68	0.023	0.018	0.038	0.030	0.097	0.042	0.555	0.439	0.342	0.235	0.587	0.359
Niu et al. (2021)	ex vivo	3D printed	108	0.07	0.06	0.13	0.15	0.19	0.2	2.25	1.97	3.14	2.91	1.22	0.9
		Vacuum Form	104	0.1	0.1	0.23	0.19	0.1	0.12	1.86	1.72	3.09	2.78	1.44	1.05
Süpple et al. (2021)	ex vivo	Vacuum Form (group H)	729	0.06	0.06	0.03	0.03	0.08	0.06	0.55	0.55	0.62	0.64	0.65	0.51
		Vacuum Form (group V)	724	0.06	0.06	0.02	0.04	0.08	0.07	0.56	0.55	0.59	0.61	0.67	0.57
Pottier et al. (2020)	ex vivo	Silicone	97	0.088	0.071	0.113	0.101	0.085	0.08	0.677	0.489	1.011	0.691	1.21	0.742
		3D printed tray	98	0.198	0.11	0.2	0.111	0.197	0.233	1.422	1.067	1.336	0.782	1.566	1.1
Kalra et al. (2018)	ex vivo	Vacuum Form	100	0.252	0.2	-	-	0.395	0.337	3.099	2.477	-	-	-	-
Kim et al. (2018)	ex vivo	3D printed tray	30	0.09	0.09	0.08	0.05	0.14	0.14	1.53	1,57	1.1	1.19	2.65	2,91
		3D printed tray	30	0.05	0.01	0.11	0.07	0.19	0.2	1.52	1.37	1.46	1.26	3.36	3.15
Schmid et al. (2018)	ex vivo	Silicone	132	0.029	0.022	0.045	0.031	0.071	0,052	0.414	0.882	0.306	0.234	0.382	0.292
		Vacuum form	134	0.046	0.039	0.048	0.035	0.105	0.078	0.647	0.755	0.438	0.42	0.703	0.913
Grünheid et al. (2016)	ex vivo	Silicone	136	0.07	0.117	0.001	0.131	0.025	0.160	0.159	1.574	0.197	1.374	0.120	1.757

Author/ Year	Type of study	Type of IDB tray	N	Mesiodistal (mm)		Buccolingual (mm)		Vertical (mm)		Angulation (°)		Rotation (°)		Torque (°)	
				Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Castilla et al. (2014)*	ex vivo	Silicone	120	0.085	0.1	0.1	0.12	0.115	0.095	-	-	-	-	-	-
		Vacuum form	116	0.085	0.8	0.095	0.8	0.225	0.25	-	-	-	-	-	-
		Silicone + VF	60	0.09	0.08	0.09	0.06	0.14	0.11	-	-	-	-	-	-
Koo et al. (1999)	ex vivo	Silicone	180	0.18	0.14	-	-	0.31	0.25	2.43	2.03	-	-	-	-
Xue et al. (2020)	in vivo	3D printed	205	0.009	0.091	0.060	0.131	0.087	0.047	0.061	0.806	0.015	0.903	0.286	1.276
Grunheid et al. (2016)	in vivo	Silicone	136	0.007	0.117	0.001	0.131	0.025	0.160	0.159	1.574	0.197	1.374	0.120	1.757
Hodge et al. (2004)	in vivo	Vacuum Form	156	0.05	0.10	-	-	0.20	0.08	0.02	0.05	-	-	-	-
Chaudhary et al. (2021)	in vivo	Silicone	300	0.061	0.024	0.015	0.012	0.050	0.032	0.004	0.004	0.011	0.006	0.010	0.008
		3D printed	300	0.010	0.022	0.005	0.003	0.026	0.010	0.001	0.002	0.003	0.005	0.007	0.003

* Data was collected from graphs using a data extraction software

Table S4.2 Mean transfer errors in relation to Tooth group

Author/ Year	Type of study	Type of IDB tray	Tooth group	N	Mesiodistal (mm)		Buccolingual (mm)		Vertical (mm)		Angulation (°)		Rotation (°)		Torque (°)	
					Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Jungbauer et al. (2021)	ex vivo	3D printed (hard, crowding)	Canines	20	0.06	0.21	0.22	0.09	0.20	0.18	4.66	2.38	-	-	3.12	1.49
		3D printed (hard, no crowding)	Canines	20	0.08	0.34	0.28	0.17	0.18	0.27	4.21	1.37	-	-	4.23	2.09
		3D printed (soft, crowding)	Canines	20	0.06	0.30	0.24	0.16	0.02	0.25	2.03	1.49	-	-	3.34	2.94
		3D printed (soft, no crowding)	Canines	20	0.00	0.31	0.27	0.21	0.1	0.25	2.38	1.44	-	-	3.87	2.64
Niu et al. (2021)	ex vivo	3D printed	Canines	19	0.05	0.03	0.1	0.08	0.16	0.06	2.53	2.11	1.48	1.13	2.38	2.56
		Vacuum Form	Canines	18	0.12	0.08	0.07	0.06	0.15	0.07	1.85	1.09	1.65	1.16	2.6	2.4
Süpple et al. (2021)	ex vivo	Vacuum Form	Canines	107	0.07	0.06	0.03	0.05	0.07	0.07	0.72	0.65	0.82	0.8	0.64	0.55
		Vacuum Form	Canines	106	0.06	0.06	0.03	0.03	0.07	0.07	0.67	0.54	0.72	0.69	0.64	0.53
Pottier et al. (2020)	ex vivo	Silicone	Canines	20	0.087	0.065	0.082	0.06	0.067	0.041	0.666	0.431	0.994	0.849	1.403	0.758
		3D printed	Canines	19	0.2	0.091	0.175	0.072	0.239	0.035	1.176	0.931	1.318	0.907	1.478	0.654
Kalra et al. (2018)*	ex vivo	Vacuum Form	Canines	10	0.255	0.171	-	-	0.49	0.221	3.377	2.076	-	-	-	-
Schmid et al. (2018)	ex vivo	Silicone	Canines	24	0.024	0.016	0.04	0.036	0.076	0.066	0.225	0.199	0.237	0.166	0.456	0.298
		Vacuum form	Canines	29	0.054	0.042	0.054	0.04	0.094	0.088	0.867	1.321	0.338	0.275	0.59	0.559
Koo et al. (1999)*	ex vivo	Silicone	Canines	26	0.16	0.1	-	-	0.34	0.22	2.78	1.87	-	-	-	-
Hodge et al. (2004)*	in vivo	Vacuum Form	Canines	52	0.075	0.025	-	-	0.27	0.17	0.025	0.16	-	-	-	-
Grünheid et al. (2016)	in vivo	Silicone	Canines	26	0.013	0.009	0.053	0.031	0.034	0.005	0.198	0.055	0.210	0	0.228	0.050
Xue et al. (2020)	in vivo	3D printed	Canines	36	0.016	0.097	0.033	0.126	0.083	0.041	0.087	0.912	0.007	0.909	0.343	1.152

Author/ Year	Type of study	Type of IDB tray	Tooth group	N	Mesiodistal (mm)		Buccolingual (mm)		Vertical (mm)		Angulation (°)		Rotation (°)		Torque (°)	
					Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Chaudhary et al. (2021)*	in vivo	PVS	Canines	60	0.059	0.028	0.007	0.006	0.044	0.034	0	0	0	0	0	0
		3D printed		60	0.006	0.012	0.002	0.001	0.057	0.026	0	0	0	0	0	0
Jungbauer et al. (2021)	ex vivo	3D printed (hard, crowding)	Incisors	40	0.07	0.14	0.29	0.12	0.04	0.21	2.69	1.62	-	-	3.12	1.49
		3D printed (hard, no crowding)		40	0.10	0.30	0.33	0.15	0.20	0.34	1.96	1.05	-	-	2.54	1.86
		3D printed (soft, crowding)		40	0.10	0.22	0.27	0.18	0.07	0.28	1.62	1.49	-	-	1.89	1.49
		3D printed (soft, no crowding)		40	0.03	0.25	0.23	0.19	0.18	0.34	1.74	0.99	-	-	2.26	1.97
Niu et al. (2021)	ex vivo	3D printed	Incisors	37	0.06	0.04	0.08	0.06	0.19	0.11	2.2	1.13	1.28	1.03	3.14	2.77
		Vacuum Form		31	0.06	0.06	0.11	0.08	0.2	0.13	1.32	0.73	1.32	0.97	2.92	2.65
Süpple et al. (2021)	ex vivo	Vacuum Form	Incisors	210	0.05	0.04	0.02	0.02	0.07	0.05	0.77	0.61	0.53	0.47	0.49	0.36
		Vacuum Form		209	0.05	0.04	0.02	0.02	0.07	0.06	0.79	0.6	0.55	0.46	0.5	0.4
Pottier et al. (2020)	ex vivo	Silicone	Incisors	38	0.082	0.065	0.134	0.12	0.072	0.054	0.459	0.335	0.652	0.538	1.011	0.711
		3D printed		40	0.181	0.095	0.179	0.104	0.151	0.102	1.245	0.724	1.013	0.709	1.41	0.659
Kalra et al. (2018)*	ex vivo	Vacuum Form	Incisors	20	0.266	0.188	-	-	0.47	0.279	2.479	1.697	-	-	-	-
Schmid et al. (2018)	ex vivo	Silicone	Incisors	54	0.021	0.016	0.04	0.021	0.063	0.04	0.345	0.474	0.299	0.258	0.331	0.291
		Vacuum form		52	0.046	0.04	0.046	0.033	0.113	0.073	0.525	0.455	0.499	0.396	0.641	0.534
Grünheid et al. (2016)	ex vivo	Silicone	Incisors	54	0.12	0.009	0.054	0.041	0.026	0.013	0.061	0.005	0.235	0.010	0.103	0.085
Koo et al. (1999)*	ex vivo	Silicone	Incisors	72	0.16	0.13	-	-	0.33	0.23	2.34	1.67	-	-	-	-
Hodge et al. (2004)*	in vivo	Vacuum Form	Incisors	104	0.16	0.18	-	-	0.04	0.20	0.02	0.11	-	-	-	-
Grünheid et al. (2016)	in vivo	Silicone	Incisors	54	0.12	0.009	0.054	0.041	0.026	0.013	0.061	0.005	0.235	0.010	0.103	0.085
Xue et al. (2020)	in vivo	3D printed	Incisors	71	0.013	0.079	0.123	0.064	0.088	0.041	0.061	0.660	0.014	0.821	0.371	0.742

Author/ Year	Type of study	Type of IDB tray	Tooth group	N	Mesiodistal (mm)		Buccolingual (mm)		Vertical (mm)		Angulation (°)		Rotation (°)		Torque (°)	
					Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Chaudhary et al. (2021)*	in vivo	PVS	Incisors	120	0.059	0.020	0.036	0.028	0.053	0.030	0.010	0.013	0.025	0.008	0.010	0.014
		3D printed		120	0.019	0.043	0.012	0.009	0.060	0.029	0.003	0.005	0.002	0.006	0.001	0.001
Jungbauer et al. (2021)	ex vivo	3D printed (hard, crowding)	Molars	40	0.04	0.29	0.04	0.25	0.01	0.21	1.96	1.70	-	-	3.08	2.05
		3D printed (hard, no crowding)		40	0.10	0.37	0.15	0.17	0.02	0.27	2.41	1.81	-	-	3.73	2.68
		3D printed (soft, crowding)		40	0.00	0.42	0.06	0.28	0.13	0.35	2.41	2.73	-	-	3.97	3.73
		3D printed (soft, no crowding)		40	0.01	0.44	0.09	0.22	0.03	0.29	2.15	1.85	-	-	2.89	2.02
Park et al. (2021a)	ex vivo	3D printed (A)	Molars	158	0,03	0,027	0,057	0,062	0,131	0,084	0,671	0,545	0,435	0,3	0,679	0,358
		3D printed (B)		158	0,065	0,08	0,097	0,054	0,111	0,103	0,633	0,531	0,447	0,344	0,726	0,436
Niu et al. (2021)	ex vivo	3D printed	Molars	20	0.1	0.08	0.25	0.28	0.29	0.39	1.29	0.8	1.18	0.71	4.4	4.45
		Vacuum Form		20	0.13	0.16	0.18	0.22	0.33	0.24	3.52	2.81	1.29	1.18	3.32	4.03
Süpple et al. (2021)	ex vivo	Vacuum Form	Molars	205	0.06	0.07	0.03	0.03	0.09	0.06	0.23	0.26	0.56	0.62	0.68	0.49
		Vacuum Form		203	0.06	0.07	0.03	0.03	0.1	0.08	0.26	0.37	0.56	0.64	0.79	0.68
Grünheid et al. (2016)	ex vivo	Silicone	Molars	10	0.063	0.033	0.045	0.074	0.035	0.017	0.213	0.445	0.405	0.335	0.268	0.520
Xue et al. (2020)	in vivo	3D printed	Molars	36	0.007	0.094	0.125	0.087	0.091	0.054	0.060	0.900	0.047	0.906	0.690	1.473
Niu et al. (2021)	ex vivo	3D printed	Premolars	32	0.07	0.08	0.16	0.13	0.13	0.19	2.68	2.18	0.98	0.66	2.77	1.72
		Vacuum Form		35	0.11	0.1	0.07	0.03	0.23	0.18	1.36	0.36	3.32	3.05	1.52	1.06
Süpple et al. (2021)	ex vivo	Vacuum Form	Premolars	207	0.07	0.07	0.02	0.02	0.09	0.07	0.55	0.48	0.67	0.69	0.8	0.59
		Vacuum Form		206	0.06	0.07	0.02	0.05	0.08	0.06	0.56	0.54	0.59	0.67	0.74	0.58
Pottier et al. (2020)	ex vivo	Silicone	Premolars	39	0.095	0.74	0.109	0.083	0.108	0.113	0.895	0.56	1.371	0.545	1.305	0.722
		3D printed		39	0.215	0.134	0.234	0.137	0.225	0.249	1.724	1.335	1.677	0.653	1.769	1.53
Kalra et al. (2018)*	ex vivo	Vacuum Form	Premolars	20	0.238	0.16	-	-	0.266	0.202	3.247	2.239	-	-	-	-

Author/ Year	Type of study	Type of IDB tray	Tooth group	N	Mesiodistal (mm)		Buccolingual (mm)		Vertical (mm)		Angulation (°)		Rotation (°)		Torque (°)	
					Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Schmid et al. (2018)	ex vivo	Silicone	Premolars	54	0.04	0.026	0.052	0.037	0.077	0.056	0.568	1.28	0.344	0.23	0.401	0.286
		Vacuum form		53	0.043	0.036	0.046	0.034	0.102	0.077	0.647	0.522	0.431	0.496	0.825	1.288
Koo et al. (1999)*	ex vivo	Silicone	Premolars	72	0.21	0.14	-	-	0.27	0.18	2.74	2.23	-	-	-	-
Grünheid et al. (2016)	in vivo	Silicone	Premolars	46	0.380	0.003	0.492	0.062	0.216	0.053	0.047	0.145	0.040	0.010	0.401	0.415
Xue et al. (2020)	in vivo	3D printed	Premolars	62	0.001	0.099	0.031	0.152	0.089	0.049	0.078	0.823	0.064	0.986	0.794	1.359
Chaudhary et al. (2021)*	in vivo	PVS	Premolars	120	0.066	0.025	0.001	0.003	0.054	0.032	0	0	0.009	0.012	0.022	0.009
		3D printed		120	0.005	0.012	0.003	0	0.070	0.025	0	0	0.008	0.009	0.020	0.007
Park et al. (2021a)	ex vivo	3D printed (A)	Premolars	122	0,022	0,026	0,053	0,07	0,1	0,055	0,545	0,442	0,467	0,396	0,551	0,299
		3D printed (B)		122	0,034	0,033	0,06	0,071	0,092	0,085	0,639	0,488	0,459	0,342	0,598	0,414

*Data was calculated on the basis of published data for individual teeth

Table S4.3. Mean transfer errors in relation to side (left vs. right)

Author/ Year	Type of study	Type of IDB tray	Left/Right	N	Mesiodistal (mm)		Buccolingual (mm)		Vertical (mm)		Angulation (°)		Rotation (°)		Torque (°)	
					Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Kalra et al. (2018)*	ex vivo	Vacuum Form	left	100	0.2743	0.2	-	-	0.34	0.22	3.28	2.11	-	-	-	-
Castilla et al. (2014)	ex vivo	Silicone	left	60	0.085	0.093	0.094	0.141	0.135	0.109	-	-	-	-	-	-
Castilla et al. (2014)	ex vivo	Vacuum Form	left	60	0.089	0.095	0.110	0.089	0.256	0.267	-	-	-	-	-	-
Castilla et al. (2014)	ex vivo	Silicone + VF	left	30	0.090	0.069	0.141	0.098	0.101	0.069	-	-	-	-	-	-
Koo et al. (1999)*	ex vivo	Silicone	left	180	0.163	0.124	-	-	0.286	0.168	2,571	1,958	-	-	-	-
Kalra et al. (2018)*	ex vivo	Vacuum Form	right	100	0.2305	0.15	-	-	0.44	0.25	2.65	1.87	-	-	-	-
Castilla et al. (2014)	ex vivo	Silicone	right	56	0.081	0.103	0.095	0.07	0.091	0.074	-	-	-	-	-	-
Castilla et al. (2014)	ex vivo	Vacuum Form	right	56	0.081	0.060	0.079	0.069	0.20	0.194	-	-	-	-	-	-
Castilla et al. (2014)	ex vivo	Silicone + VF	right	30	0.103	0.074	0.143	0.127	0.090	0.058	-	-	-	-	-	-
Koo et al. (1999)*	ex vivo	Silicone	right	180	0.191	0.131	-	-	0.333	0.243	2,661	1,909	-	-	-	-

*Data was calculated on the basis of published data for individual teeth

Table S4.4. Mean transfer errors in relation to jaw (upper vs. lower)

Author/ Year	Type of study	Type of IDB tray	Upper/ Lower	N	Mesiodistal (mm)		Buccolingual (mm)		Vertical (mm)		Angulation (°)		Rotation (°)		Torque (°)	
					Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Kalra et al. (2018)*	ex vivo	Vacuum Form	lower	100	0.28	0.19	-	-	0.3849	0.213	3.07	1.89	-	-	-	-
Koo et al. (1999)*	ex vivo	Silicone	lower	180	0.18	0.13	-	-	0.28	0.17	2.74	1.78	-	-	-	-
Park et al. (2021b)	ex vivo	3D printed (A)	lower	109	0.005	0.048	0.009	0.052	0.097	0.096	0.095	0.649	0.001	0.540	0.168	0.651
		3D printed (B)		109	0.012	0.038	0.002	0.064	0.119	0.087	0.091	0.781	0.016	0.598	0.195	0.677
Pottier et al. (2020)	ex vivo	Silicone	upper	97	0.088	0.071	0.113	0.101	0.085	0.08	0.677	0.489	1,011	0.691	1,210	0.742
		3D printed tray		98	0.198	0.110	0.2	0.111	0.197	0.233	1,422	1,067	1,336	0.782	1,566	1.1
Kalra et al. (2018)*	ex vivo	Vacuum Form	upper	100	0.21	0.16	-	-	0.40	0.2605	2.86	2.09	-	-	-	-
Castilla et al. (2014)	ex vivo	Silicone	upper	120	0.085	0.1	0.1	0.12	0.115	0.095	-	-	-	-	-	-
		Vacuum Form		116	0.085	0.8	0.095	0.8	0.225	0.25	-	-	-	-	-	-
		Silicone + VF		60	0.09	0.08	0.09	0.06	0.14	0.11	-	-	-	-	-	-
Koo et al. (1999)*	ex vivo	Silicone	upper	180	0.16	0.12	-	-	0.29	0.17	2.52	1.96	-	-	-	-
Park et al. (2021b)	ex vivo	3D printed (A)	upper	116	0.004	0.048	0.010	0.051	0.071	0.095	0.139	0.691	0.029	0.458	0.151	0.680
		3D printed (B)		116	0.012	0.029	0.008	0.052	0.075	0.056	0.014	0.754	0.007	0.467	0.004	0.627

* Data was calculated on the basis of published data for individual teeth

Table S4.5. Mean transfer errors in relation to accuracy assessment method

Author/ Year	Type of study	Accuracy assessment method	N	Mesiodistal (mm)		Buccolingual (mm)		Vertical (mm)		Angulation (°)		Rotation (°)		Torque (°)	
				Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Jungbauer et al. (2021)	ex vivo	3D	560	0.06	0.32	0.18	0.24	0.07	0.29	2.26	1.87	-	-	3.07	3.01
Faus-Matoses et al. (2021)	ex vivo	3D	335	0.065	0.081	0.129	0.067	0.094	0.147	0.271	0.92	0.707	0.648	0.826	1.712
Park et al. (2021b)	ex vivo	3D	76	0.018	0.014	0.047	0.038	0.137	0.091	0.662	0.405	0.437	0.318	0.636	0.340
			76	0.043	0.056	0.043	0.028	0.127	0.066	0.644	0.435	0.433	0.230	0.542	0.255
			81	0.023	0.024	0.038	0.032	0.077	0.059	0.502	0.357	0.382	0.272	0.571	0.323
			81	0.041	0.025	0.052	0.049	0.090	0.080	0.628	0.462	0.515	0.370	0.602	0.359
			68	0.019	0.018	0.036	0.038	0.094	0.097	0.549	0.337	0.377	0.328	0.592	0.217
			68	0.023	0.018	0.038	0.030	0.097	0.042	0.555	0.439	0.342	0.235	0.587	0.359
Niu et al. (2021)	ex vivo	3D	108	0.07	0.06	0.13	0.15	0.19	0.2	2.25	1.97	3.14	2.91	1.22	0.9
			104	0.1	0.1	0.23	0.19	0.1	0.12	1.86	1.72	3.09	2.78	1.44	1.05
Süpple et al. (2021)	ex vivo	3D	729	0.06	0.06	0.03	0.03	0.08	0.06	0.55	0.55	0.62	0.64	0.65	0.51
			724	0.06	0.06	0.02	0.04	0.08	0.07	0.56	0.55	0.59	0.61	0.67	0.57
Pottier et al. (2020)	ex vivo	3D	97	0.088	0.071	0.113	0.101	0.085	0.08	0.677	0.489	1.011	0.691	1.21	0.742
			98	0.198	0.11	0.2	0.111	0.197	0.233	1.422	1.067	1.336	0.782	1.566	1.1
Kim et al. (2018)	ex vivo	3D	30	0.09	0.09	0.08	0.05	0.14	0.14	1.53	1,57	1.1	1.19	2.65	2,91
			30	0.05	0.01	0.11	0.07	0.19	0.2	1.52	1.37	1.46	1.26	3.36	3.15
Schmid et al. (2018)	ex vivo	3D	132	0.029	0.022	0.045	0.031	0.071	0,052	0.414	0.882	0.306	0.234	0.382	0.292
			134	0.046	0.039	0.048	0.035	0.105	0.078	0.647	0.755	0.438	0.42	0.703	0.913
Grünheid et al. (2016)	in vivo	3D	136	0.07	0.117	0.001	0.131	0.025	0.160	0.159	1.574	0.197	1.374	0.120	1.757
Xue et al. (2020)	in vivo	3D	205	0.009	0.091	0.060	0.131	0.087	0.047	0.061	0.806	0.015	0.903	0.286	1.276
Chaudhary et al. (2021)	in vivo	3D	300	0.010	0.022	0.005	0.003	0.026	0.010	0.001	0.002	0.003	0.005	0.007	0.003
			300	0.061	0.024	0.015	0.012	0.050	0.032	0.004	0.004	0.011	0.006	0.010	0.008
Kalra et al. (2018)	ex vivo	Photography	100	0.252	0.2	-	-	0.395	0.337	3.099	2.477	-	-	-	-

Author/ Year	Type of study	Accuracy assessment method	N	Mesiodistal (mm)		Buccolingual (mm)		Vertical (mm)		Angulation (°)		Rotation (°)		Torque (°)	
				Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Castilla et al. (2014)	ex vivo	Photography	60	0.09	0.14	0.1	0.07	0.11	0.1	-	-	-	-	-	-
			60	0.08	0.06	0.1	0.17	0.12	0.09	-	-	-	-	-	-
			60	0.09	0.08	0.09	0.06	0.14	0.11	-	-	-	-	-	-
			58	0.08	0.07	0.09	0.07	0.21	0.22	-	-	-	-	-	-
			58	0.09	0.09	0.1	0.09	0.24	0.28	-	-	-	-	-	-
Koo et al. (1999)	ex vivo	Photography	180	0.18	0.14	-	-	0.31	0.25	2.43	2.03	-	-	-	-

Table S4.6. Mean transfer errors in relation to type of tray

Author/ Year	Type of study	Type of tray	N	Mesiodistal (mm)		Buccolingual (mm)		Vertical (mm)		Angulation (°)		Rotation (°)		Torque (°)	
				Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Jungbauer et al. (2021)	ex vivo	3D printed (hard)	280	0,08	0,3	0,2	0,22	0,1	0,27	2,55	1,85	-	-	3,27	2,36
		3D printed (soft)	280	0,04	0,35	0,17	0,25	0,03	0,3	1,98	1,85	-	-	2,86	3,54
Faus-Matoses et al. (2021)	ex vivo	3D printed	335	0.065	0.081	0.129	0.067	0.094	0.147	0.271	0.92	0.707	0.648	0.826	1.712
Park et al. (2021b)	ex vivo	3D printed (group A1)	76	0.018	0.014	0.047	0.038	0.137	0.091	0.662	0.405	0.437	0.318	0.636	0.340
		3D printed (group B1)	76	0.043	0.056	0.043	0.028	0.127	0.066	0.644	0.435	0.433	0.230	0.542	0.255
		3D printed (group A2)	81	0.023	0.024	0.038	0.032	0.077	0.059	0.502	0.357	0.382	0.272	0.571	0.323
		3D printed (group B2)	81	0.041	0.025	0.052	0.049	0.090	0.080	0.628	0.462	0.515	0.370	0.602	0.359
		3D printed (group A3)	68	0.019	0.018	0.036	0.038	0.094	0.097	0.549	0.337	0.377	0.328	0.592	0.217
		3D printed (group B3)	68	0.023	0.018	0.038	0.030	0.097	0.042	0.555	0.439	0.342	0.235	0.587	0.359
Niu et al. (2021)	ex vivo	3D printed	108	0.07	0.06	0.13	0.15	0.19	0.2	2.25	1.97	3.14	2.91	1.22	0.9

Author/ Year	Type of study	Type of tray	N	Mesiodistal (mm)		Buccolingual (mm)		Vertical (mm)		Angulation (°)		Rotation (°)		Torque (°)	
				Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Pottier et al. (2020)	ex vivo	3D printed	98	0.198	0.110	0.200	0.111	0.197	0.233	1.422	1.067	1.336	0.782	1.566	1.100
Kim et al. (2018) *	ex vivo	3D printed	30	0.09	0.09	0.08	0.05	0.14	0.14	1.53	1.57	1.1	1.19	2.65	2.91
		3D printed	30	0.05	0.01	0.11	0.07	0.19	0.2	1.52	1.37	1.46	1.26	3.36	3.15
Xue et al. (2020)	in vivo	3D printed	205	0.009	0.091	0.060	0.131	0.087	0.047	0.061	0.806	0.015	0.903	0.286	1.276
Chaudhary et al. (2021)*	in vivo	3D printed	300	0.010	0.022	0.005	0.003	0.026	0.010	0.001	0.002	0.003	0.005	0.007	0.003
Pottier et al. (2020)	ex vivo	Silicone	97	0.088	0.071	0.113	0.101	0.085	0.08	0.677	0.489	1.011	0.691	1.210	0.742
Schmid et al. (2018)	ex vivo	Silicone	132	0.029	0.022	0.045	0.031	0.071	0.052	0.414	0.882	0.306	0.234	0.382	0.292
Grünheid et al. (2016)	in vivo	Silicone	136	0.07	0.117	0.001	0.131	0.025	0.160	0.159	1.574	0.197	1.374	0.120	1.757
Castilla et al. (2014)	ex vivo	Silicone	120	0.085	0.1	0.1	0.12	0.115	0.095	-	-	-	-	-	-
Koo et al. (1999)*	ex vivo	Silicone	180	0.18	0.14	-	-	0.31	0.25	2.43	2.03	-	-	-	-
Chaudhary et al. (2021)*	in vivo	Silicone	300	0.061	0.024	0.015	0.012	0.050	0.032	0.004	0.004	0.011	0.006	0.010	0.008
Castilla et al. (2014)	ex vivo	Silicone + VF	60	0.09	0.08	0.09	0.06	0.14	0.11	-	-	-	-	-	-
Niu et al. (2021)	ex vivo	Vacuum Form	104	0.1	0.1	0.23	0.19	0.1	0.12	1.86	1.72	3.09	2.78	1.44	1.05
Süpple et al. (2021)	ex vivo	Vacuum Form	729	0.06	0.06	0.03	0.03	0.08	0.06	0.55	0.55	0.62	0.64	0.65	0.51
		Vacuum Form	724	0.06	0.06	0.02	0.04	0.08	0.07	0.56	0.55	0.59	0.61	0.67	0.57
Kalra et al. (2018)*	ex vivo	Vacuum Form	100	0.252	0.2	-	-	0.395	0.337	3.099	2.477	-	-	-	-
Schmid et al. (2018)	ex vivo	Vacuum Form	134	0.046	0.039	0.048	0.035	0.105	0.078	0.647	0.755	0.438	0.420	0.703	0.913
Castilla et al. (2014)	ex vivo	Vacuum Form	116	0.085	0.8	0.095	0.8	0.225	0.25	-	-	-	-	-	-
Hodge et al. (2004)*	in vivo	Vacuum Form	156	0.05	0.10	-	-	0.20	0.08	0.02	0.05	-	-	-	-

* Data was calculated on the basis of published data for individual teeth

Risk of bias assessment

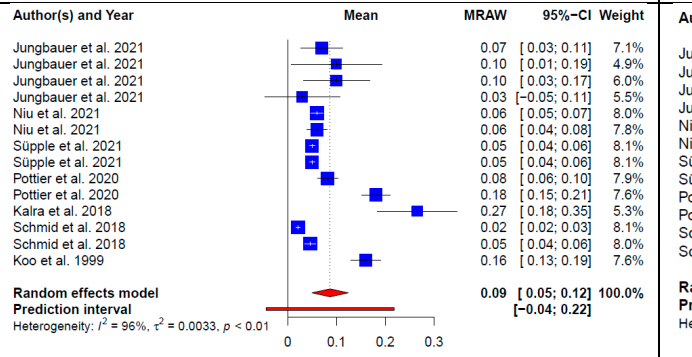
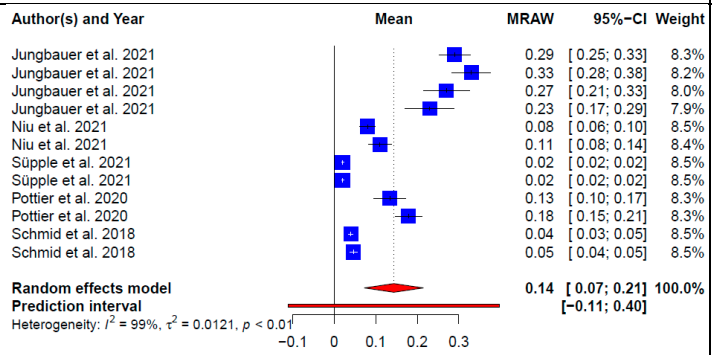
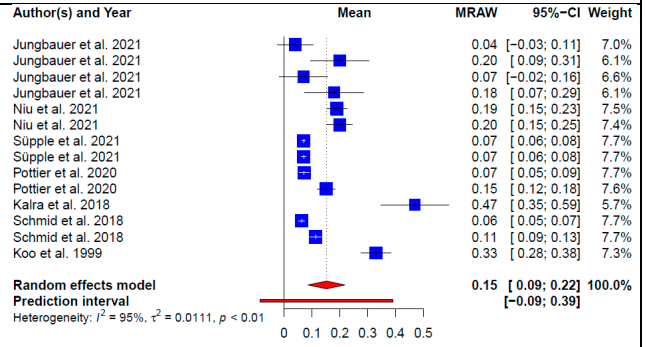
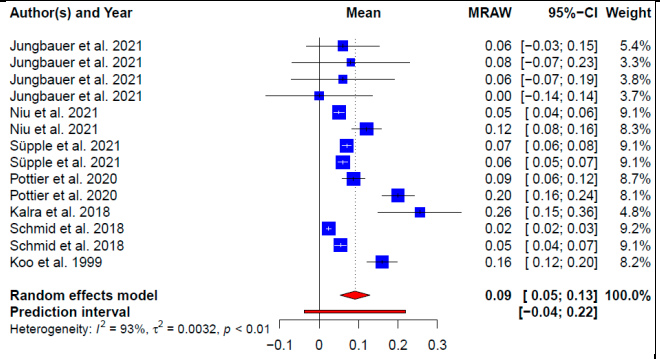
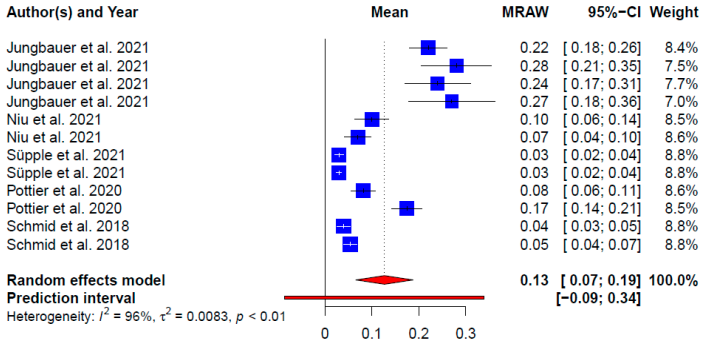
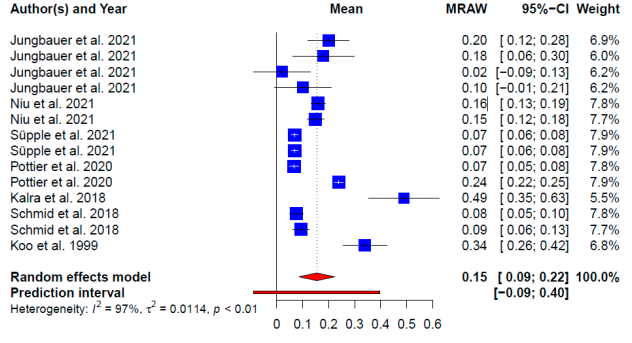
Table S5. Results of risk of bias assessment of individual bracket placement accuracy studies

Visual examination of *in vitro* validation studies on proximal surfaces	Signaling questions												
	Selection bias			Bonding procedure bias		Accuracy assessment bias			Verification bias			Outcome bias	
	Outset bias	Spectrum bias	Sample size	Bonding procedure	Training bias	Accuracy assess. procedure	Blinding bias	Calibration bias	Partial ver. bias	Differential ver. bias	Bias in the Analysis	Validity bias	Reproducibility bias
Jungbauer et al. Appl Sci 2021	-	+	+	+	+	+	-	-	+	+	+	+	+
Faus-Matoses et al. JPM 2021	+	+	-	+	+	+	-	-	+	+	?	+	-
Park et al. KJO 2021	-	?	+	+	-	+	-	-	+	+	+	+	+
Park et al. Sensors 2021	-	+	-	+	-	+	-	-	+	+	+	+	+
Castilla et al. Angle Orthod 2014	+	+	-	+	-	?	-	-	+	+	-	?	-
Grünheid et al. Angle Orthod 2016	?	+	-	+	-	+	?	-	+	+	+	+	?
Hodge et al. J Orthod 2004	+	-	+	+	-	-	+	-	+	+	+	+	?
Kalra et al. J Clin Diagn Res 2018	+	+	-	+	+	?	-	-	+	+	-	+	+
Kim et al. Am J Orthod Dentofacial Orthop 2018	-	-	-	+	-	+	-	-	+	+	+	?	+
Koo et al. Am J Orthod Dentofacial Orthop 1999	?	+	-	+	+	?	-	-	+	+	+	+	-
Niu et al. Angle Ortho. 2021	+	+	-	+	-	+	?	-	+	+	+	+	+
Pottier et al. Clin Oral Investig 2020	+	+	+	+	?	+	-	-	+	+	+	+	+
Schmid et al. Eur J Orthod 2018	?	+	+	+	?	+	-	-	+	+	+	+	-
Süpple et al. J Clin Med 2021	+	+	-	+	?	+	-	-	+	+	+	+	-
Xue et al. Am J Orthod Dentofacial Orthop 2020	+	+	+	+	-	+	-	-	+	+	+	+	+
Chaudhary et. al J Orthod 2021	?	+	+	+	-	+	+	-	+	+	+	-	?

Legend: +=Low risk of bias (Yes); -=High risk of bias (Probably No, No); ?=Unclear (No information, Incomplete reporting, Probably Yes) x=Question for in vivo studies

Meta analytic statistics- Forest Plots

Table S6.1. Linear parameters: Tooth group comparison

Analysed linear parameters	Mesiodistal	Buccolingual	Vertical
Incisors			
Canines			

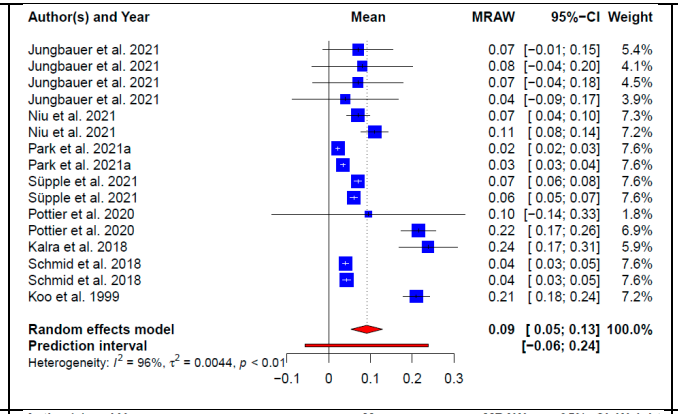
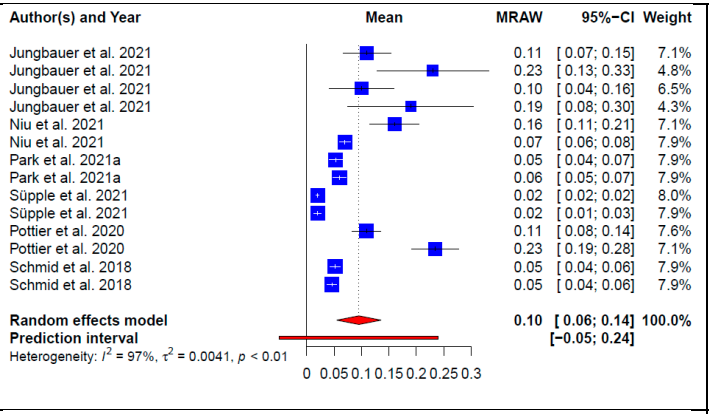
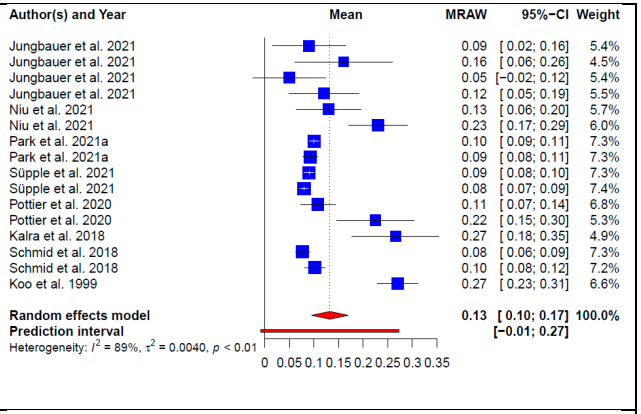
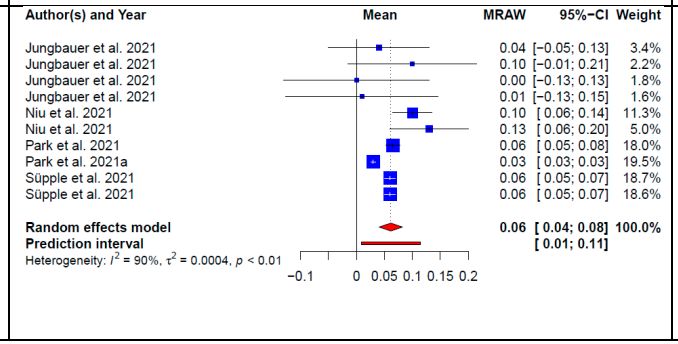
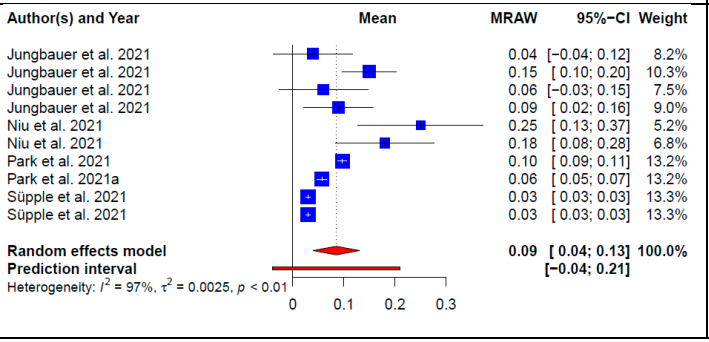
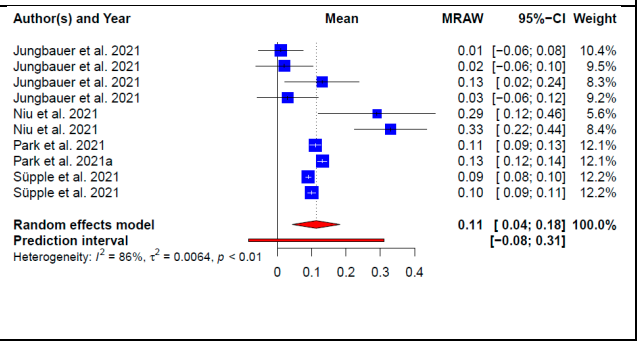
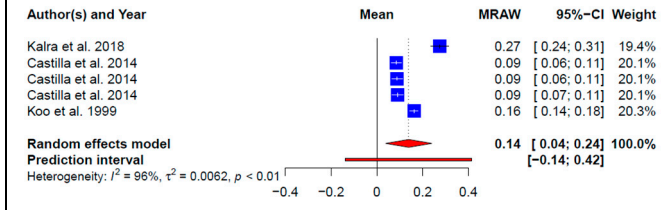
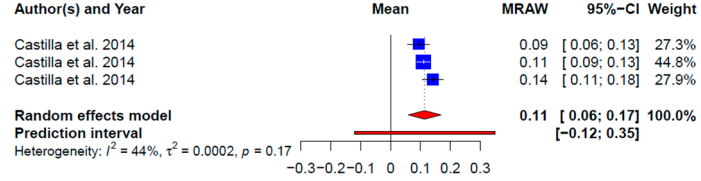
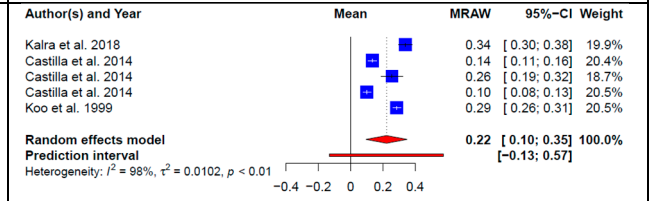
Premolars			
Molars			

Table S6.2. Linear parameters: Left vs. Right side

Analysed linear parameters	Mesiodistal	Buccolingual	Vertical
Left			

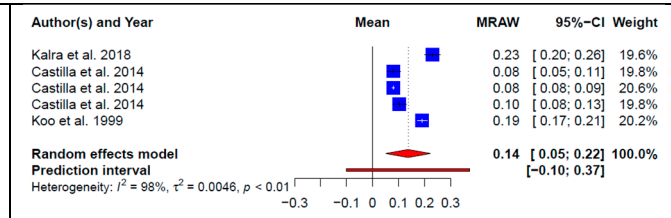
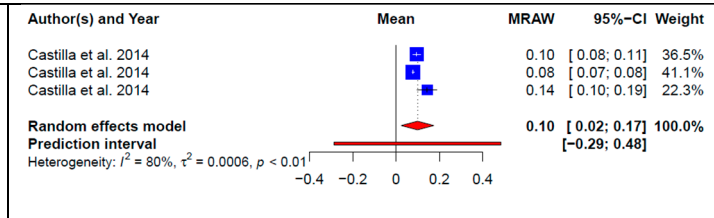
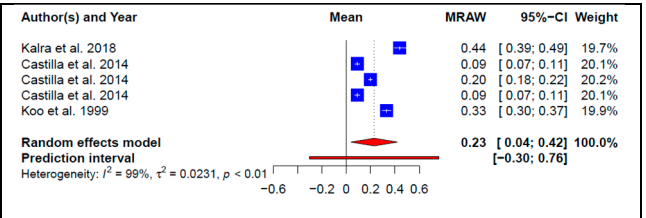
Right			

Table S6.3. Linear parameters: Upper vs. Lower jaw

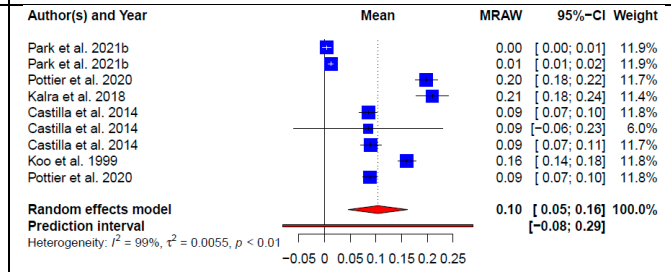
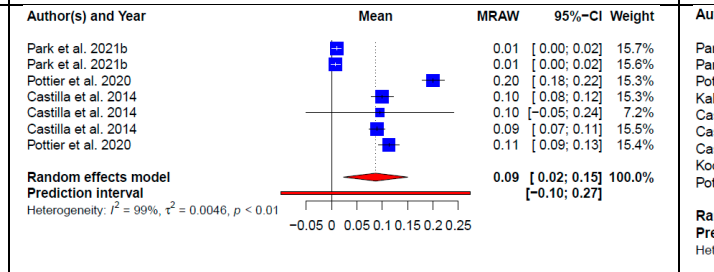
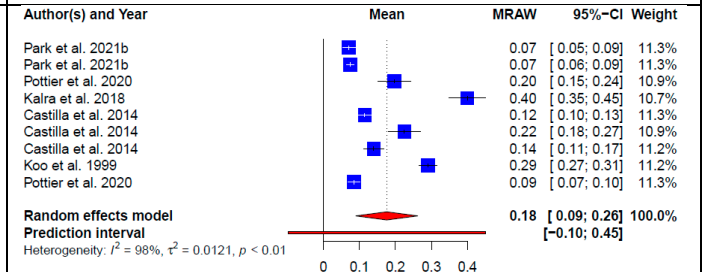
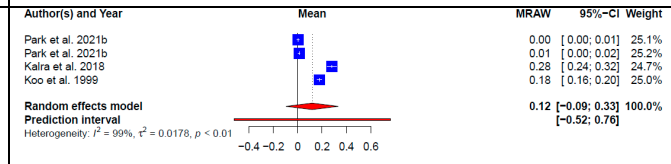
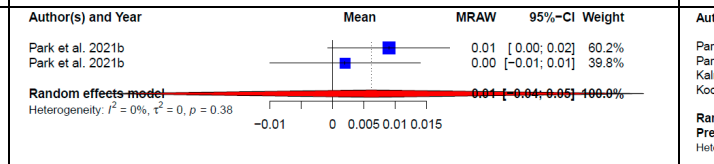
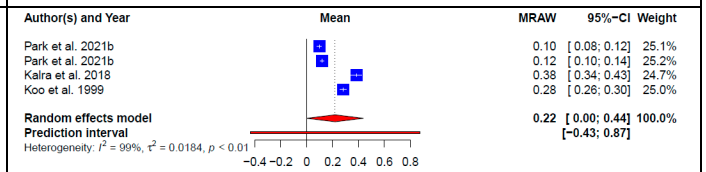
Analysed linear parameters	Mesiodistal	Buccolingual	Vertical
Upper jaw			
Lower jaw			

Table S6.4. Linear parameters: Accuracy assessment method

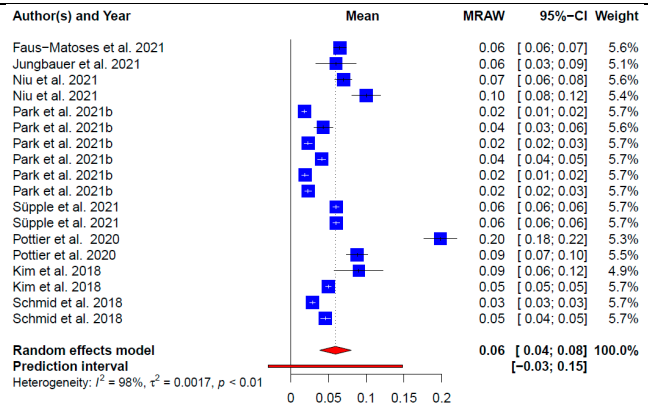
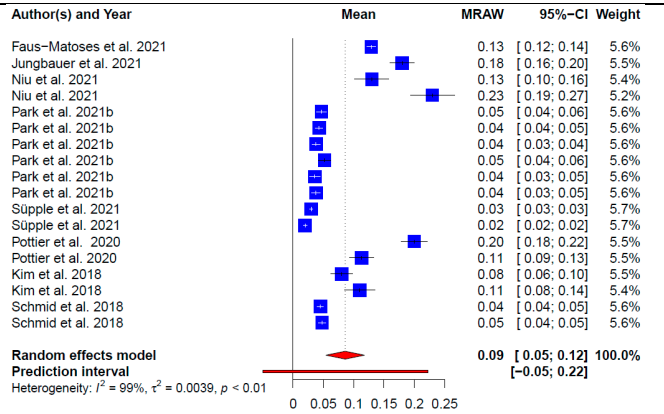
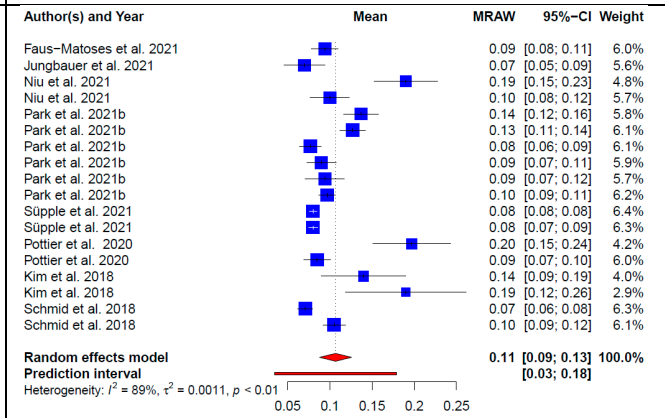
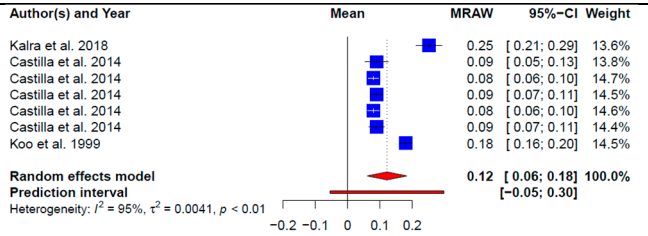
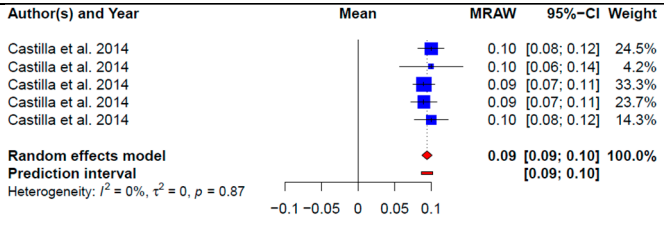
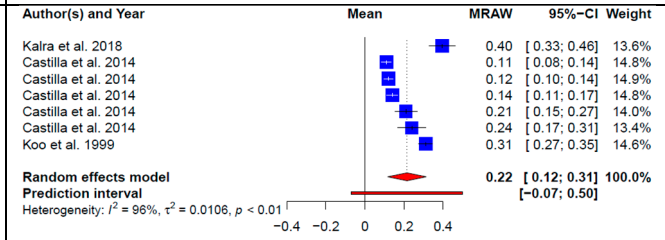
Analysed linear parameters	Mesiodistal	Buccolingual	Vertical
3D			
Photography			

Table S6.5. Linear parameters: Type of tray

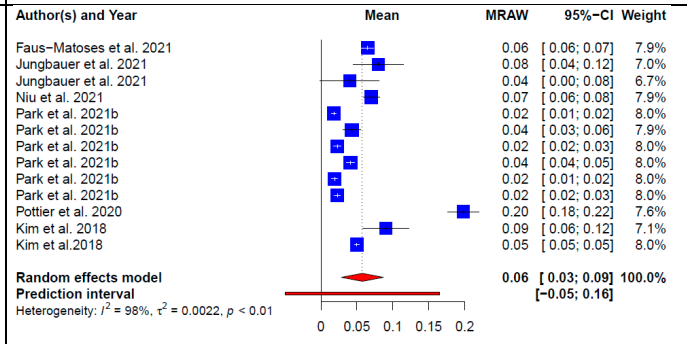
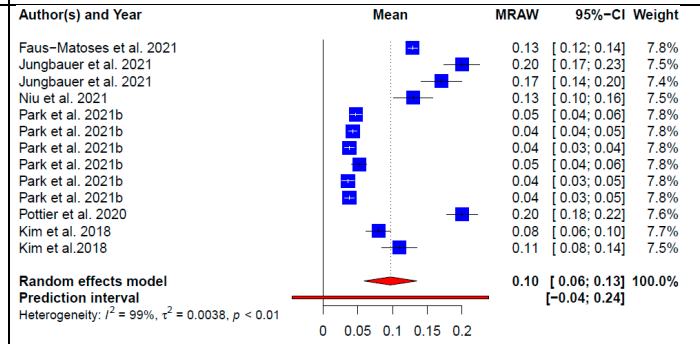
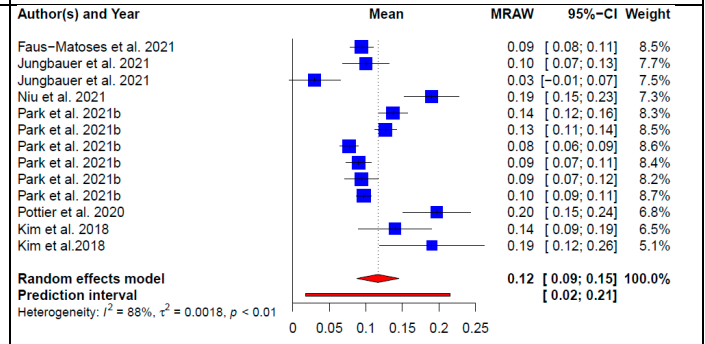
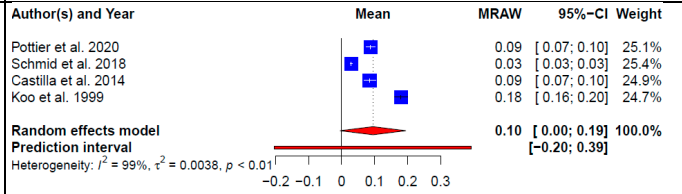
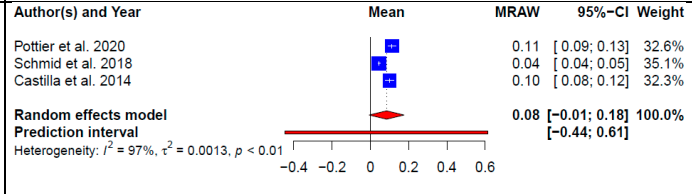
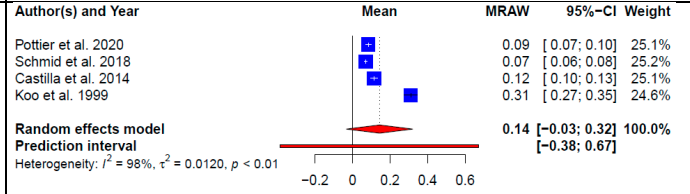
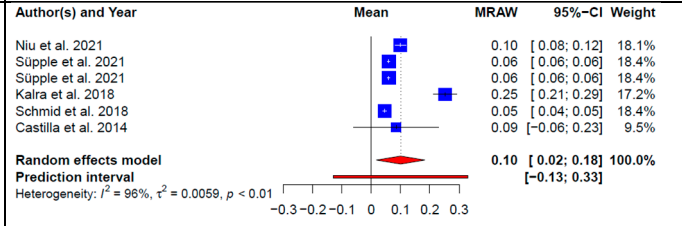
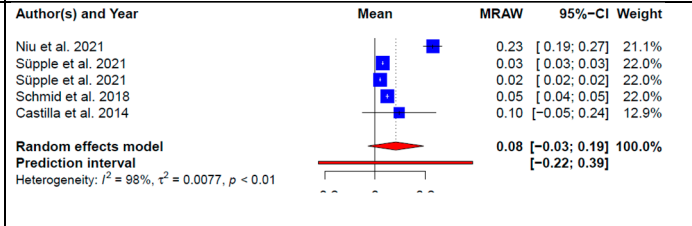
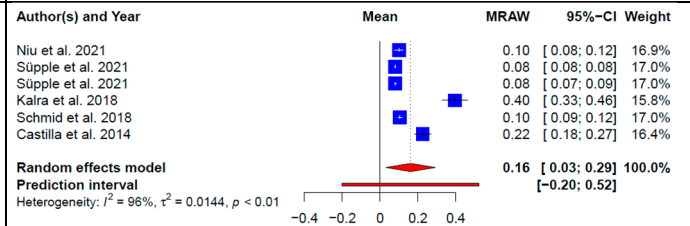
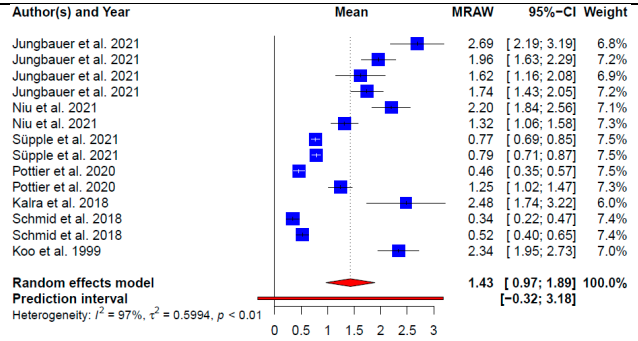
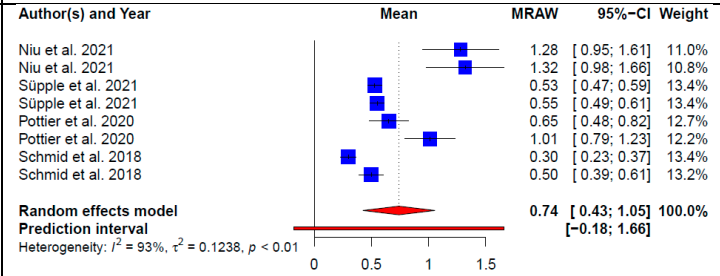
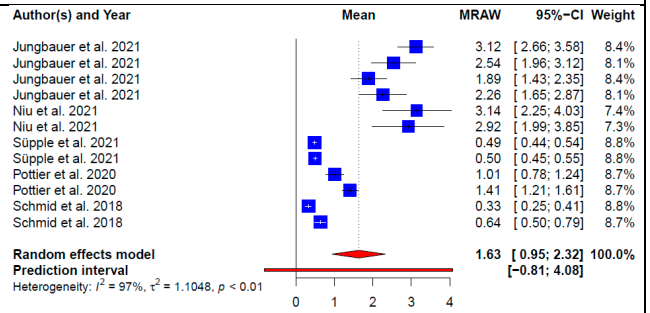
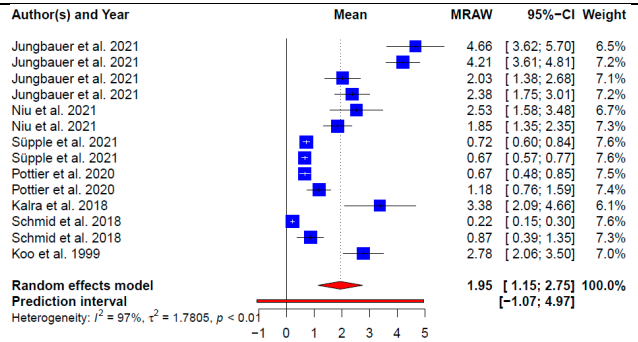
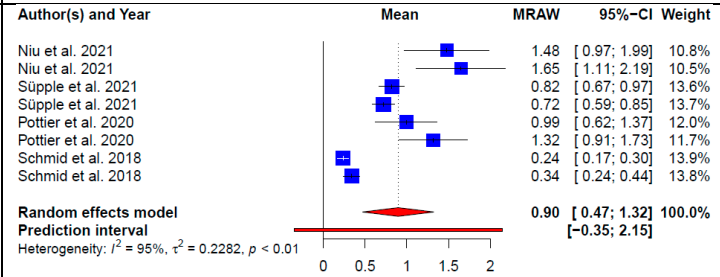
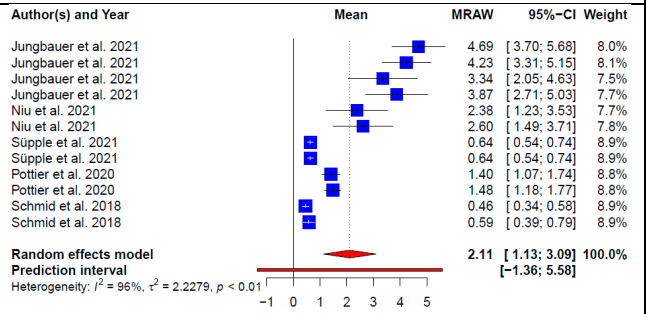
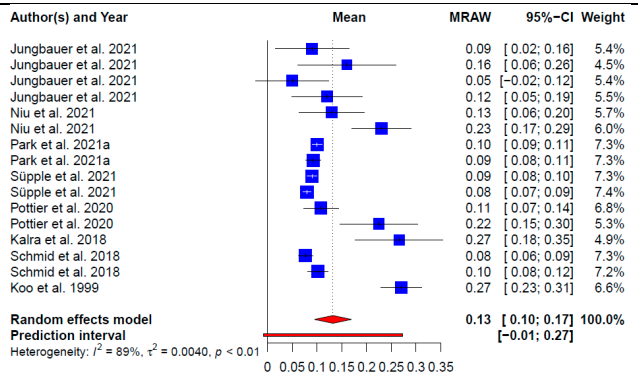
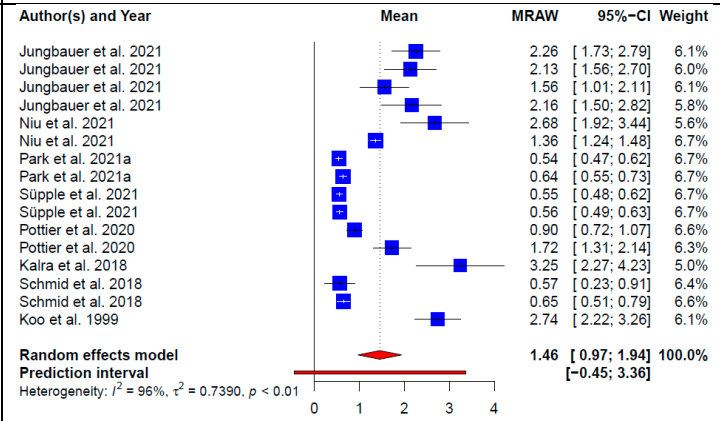
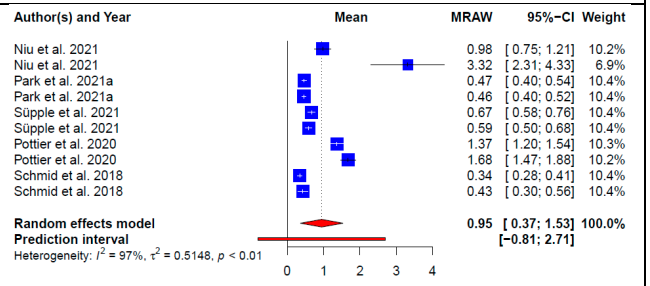
Analysed linear parameters	Mesiodistal	Buccolingual	Vertical
3D printed			
Silicone			
Vacuum form			
Combined Silicone/ Vacuum Form			

Table S6.6. Angular parameters: Tooth group comparison

Analysed linear parameters	Angulation	Rotation	Torque
Incisors			
Canines			
Premolars			

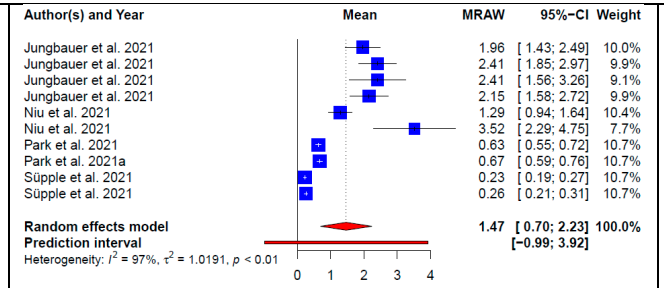
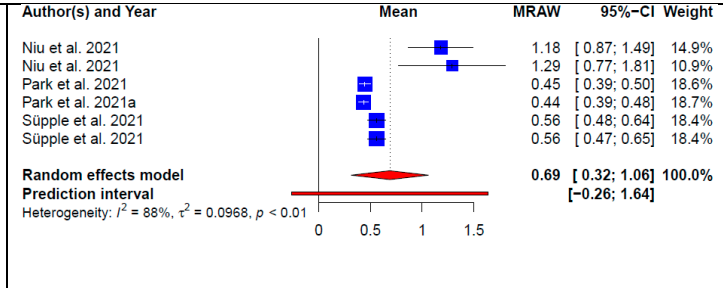
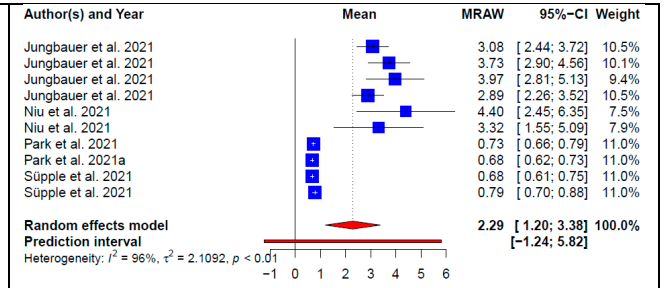
Molars			

Table S6.7. Angular parameters: Left vs. Right side

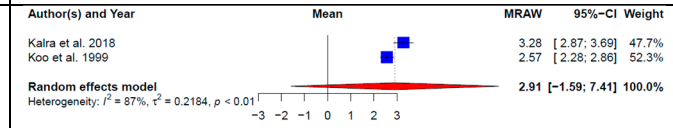
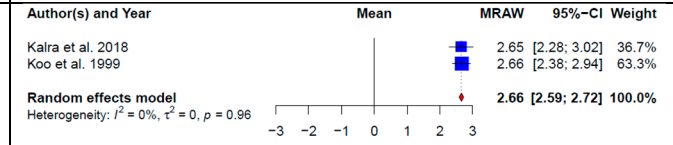
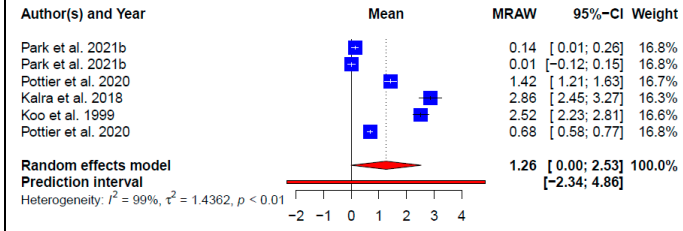
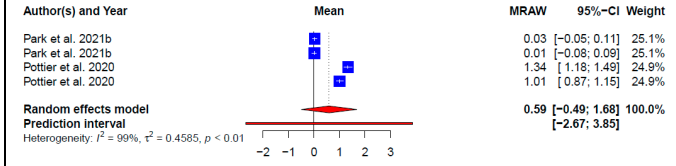
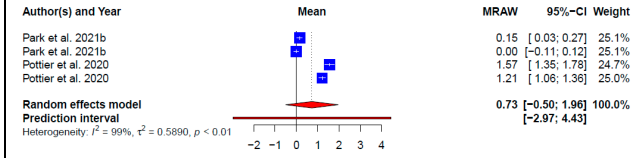
Analysed linear parameters	Angulation	Rotation	Torque
Left			
Right			

Table S6.8. Angular parameters: Upper vs. Lower jaw

Analysed linear parameters	Angulation	Rotation	Torque
Upper jaw			

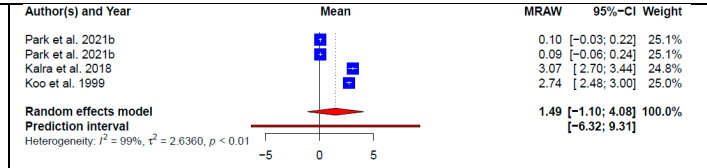
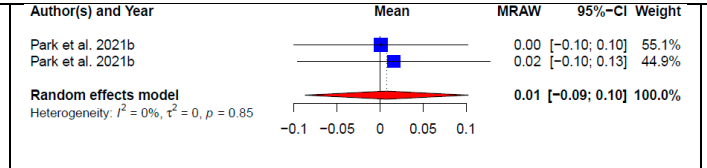
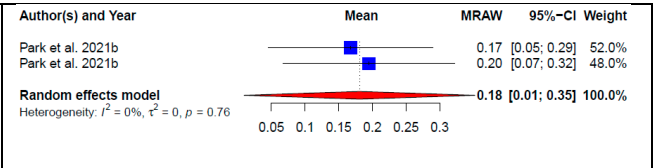
Lower jaw			

Table S6.9. Angular parameters: Accuracy assessment method

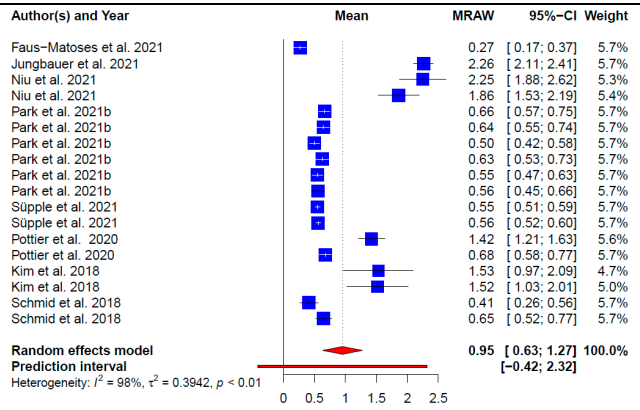
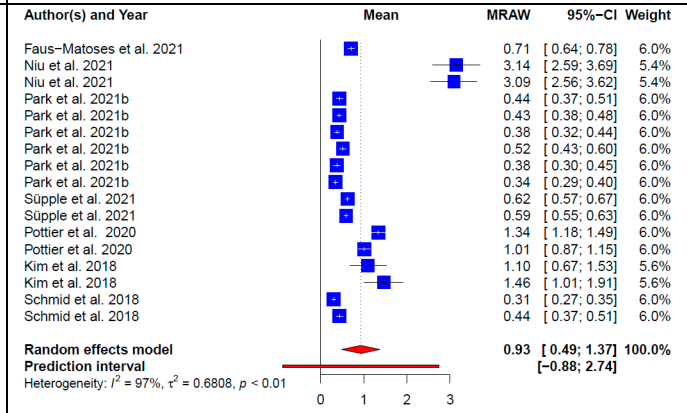
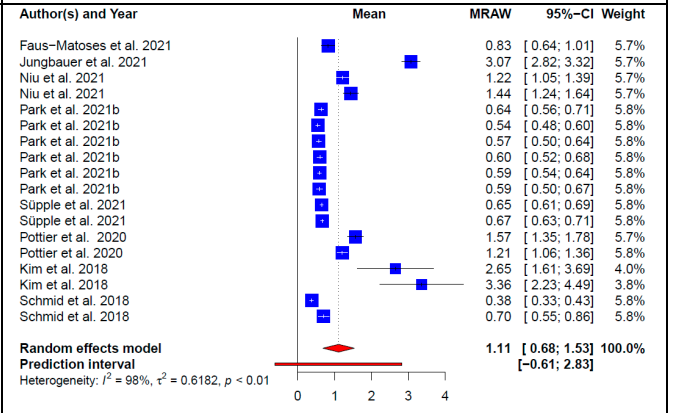
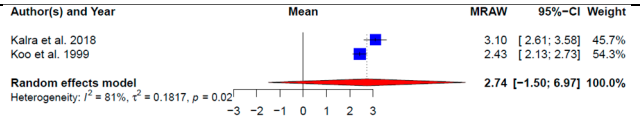
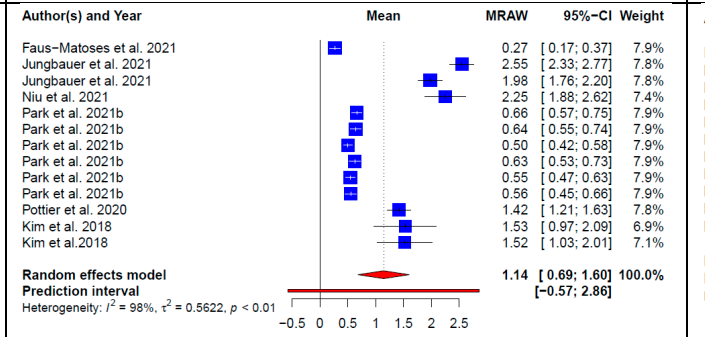
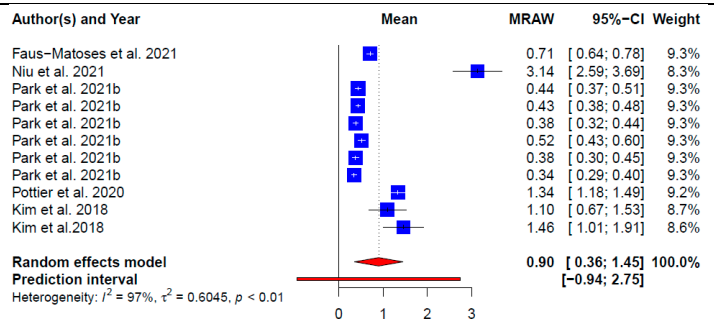
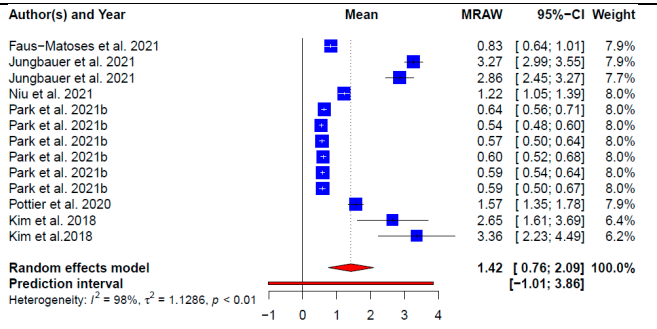
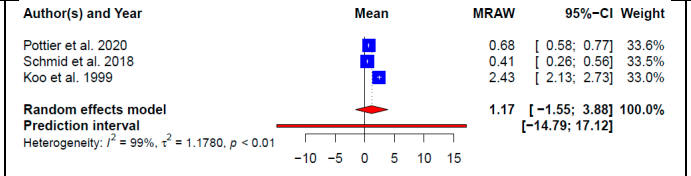
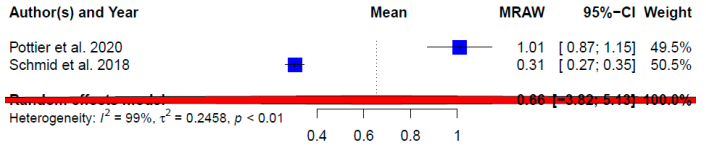
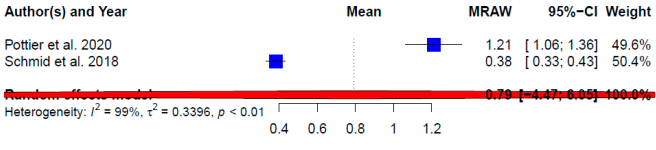
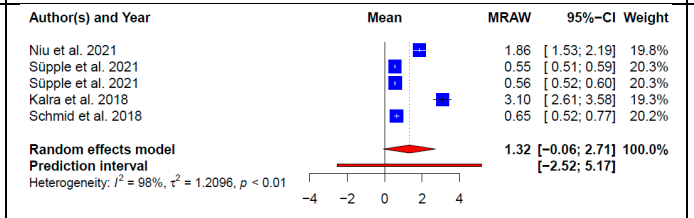
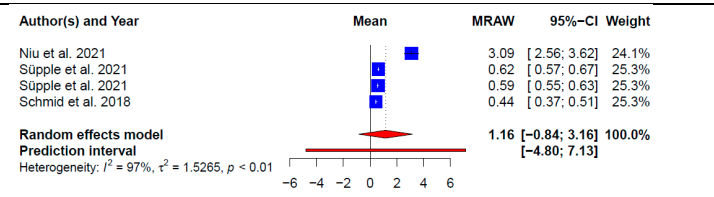
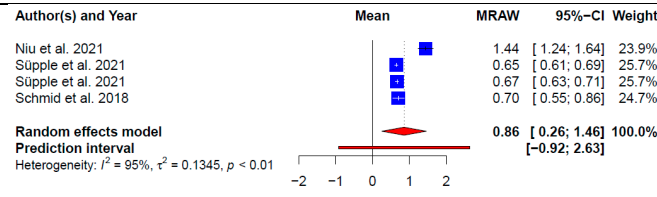
Analysed linear parameters	Angulation	Rotation	Torque
3D			
Photography			

Table S6.10. Angular parameters: Type of tray

Analysed linear parameters	Angulation	Rotation	Torque
3D printed			
Silicone			
Vacuum form			
Combined Silicone/ Vacuum Form			

Meta analytic statistics – Funnel Plots

Table S7.1. Linear parameters: Overall accuracy

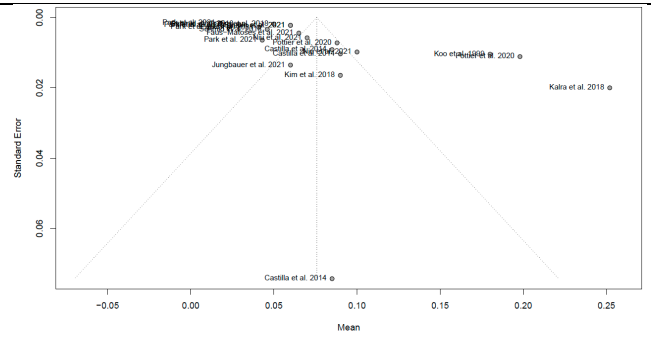
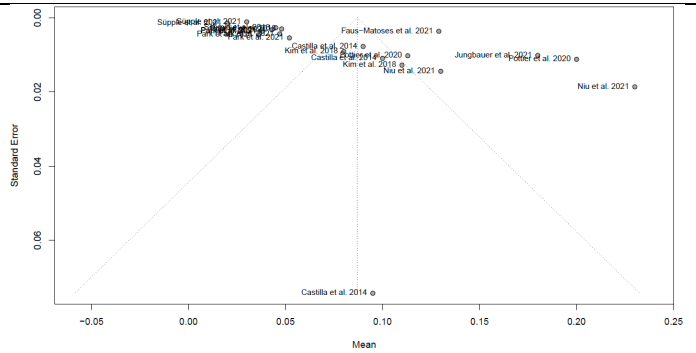
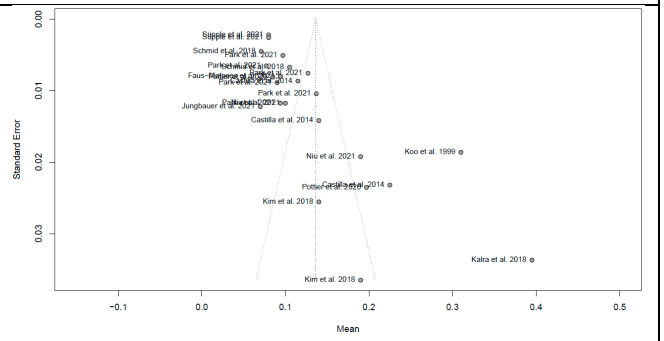
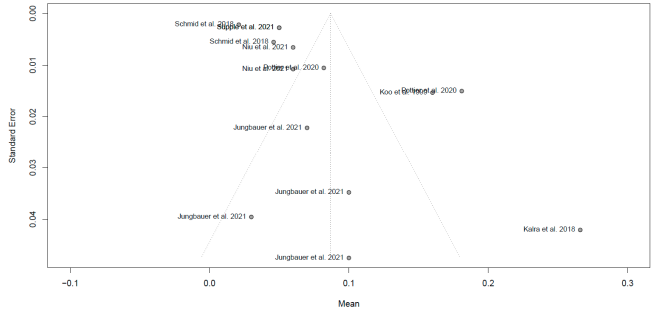
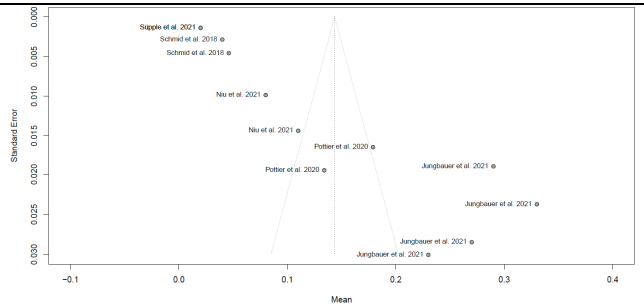
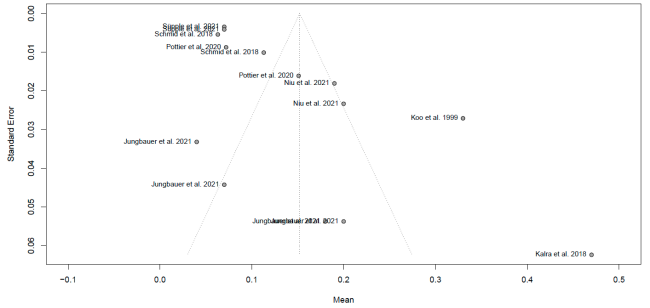
Analysed parameters	Mesiodistal	Buccolingual	Vertical
Overall accuracy			

Table S7.2. Linear parameters: Tooth group comparison

Analysed linear parameters	Mesiodistal	Buccolingual	Vertical
Incisors			

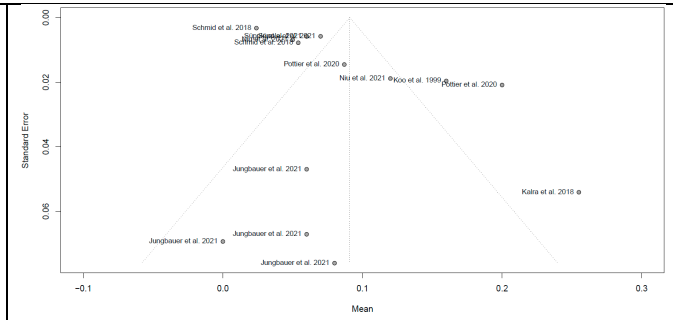
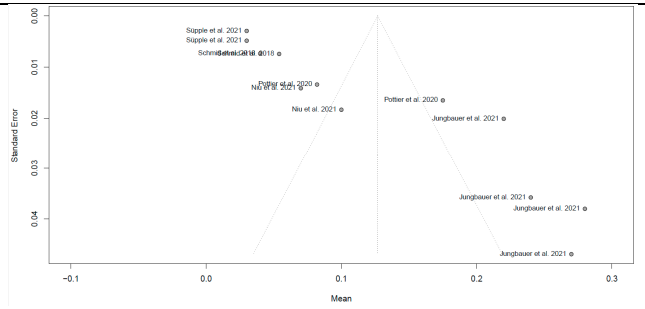
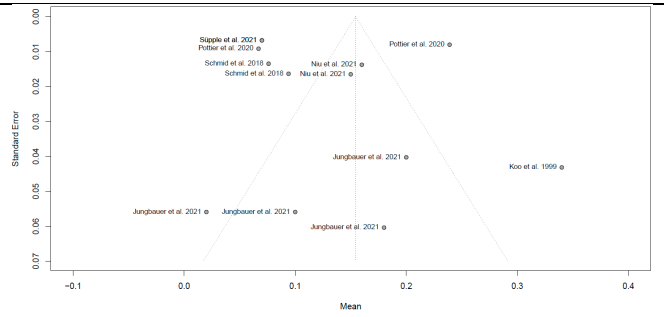
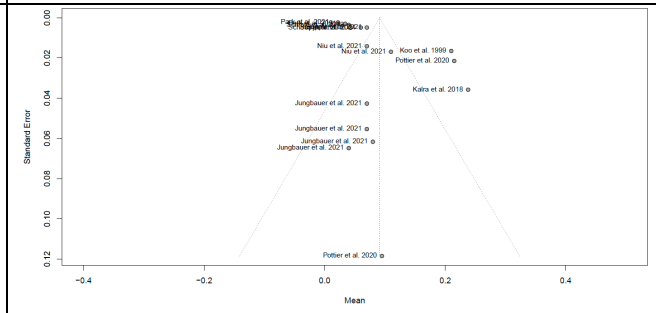
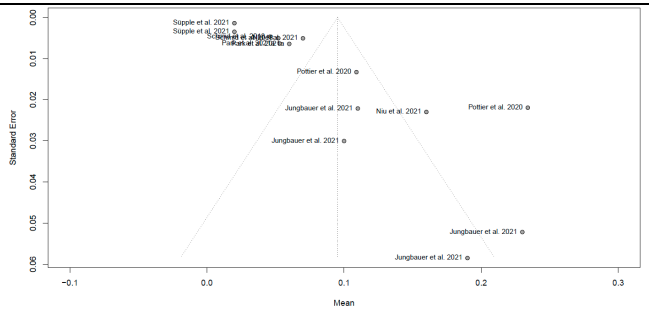
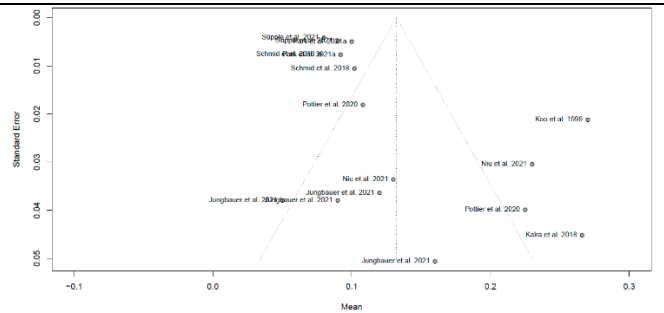
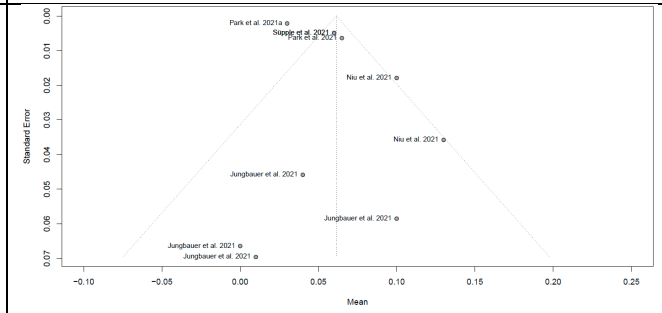
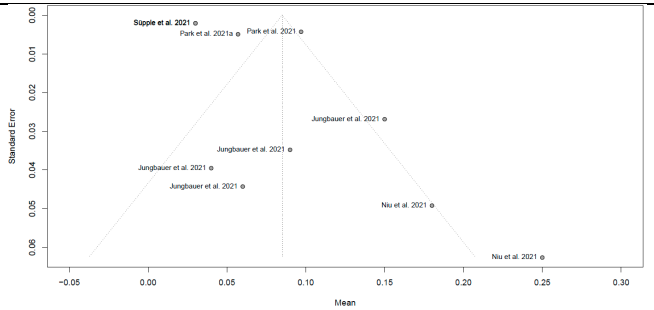
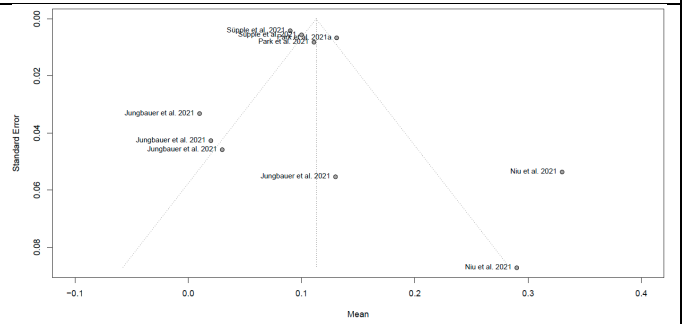
Canines			
Premolars			
Molars			

Table S7.3. Linear parameters: Left vs. Right side

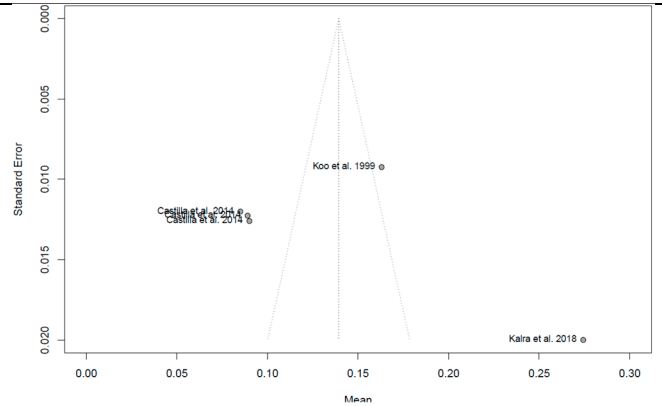
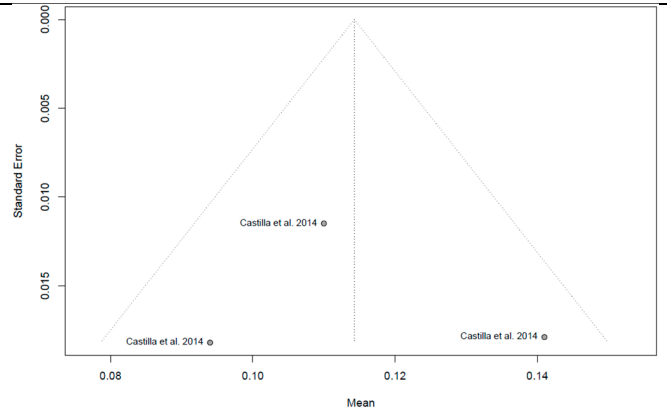
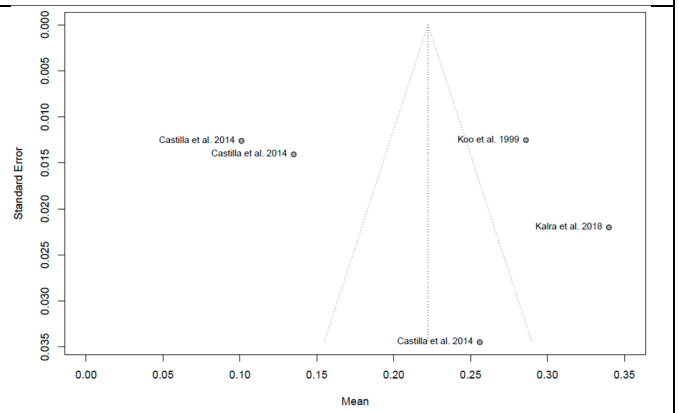
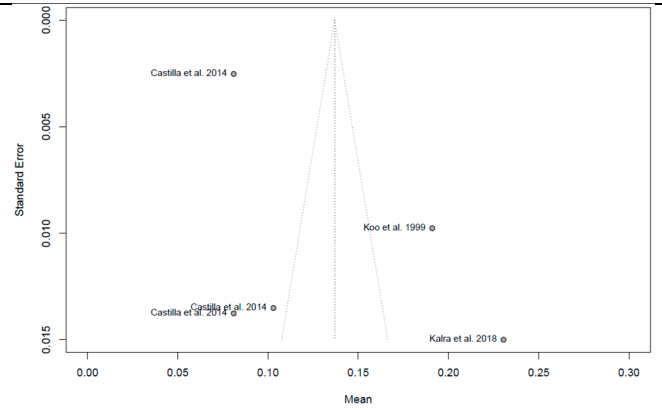
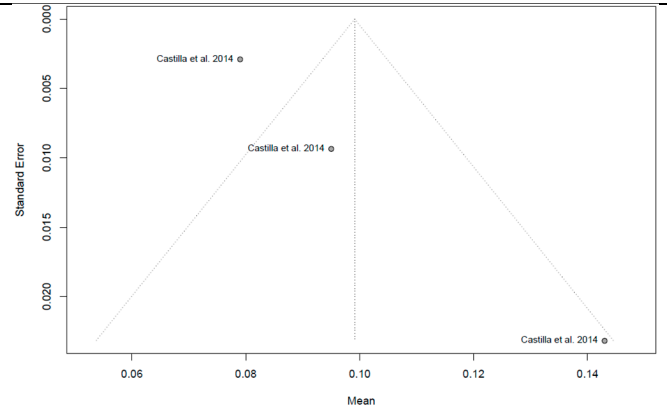
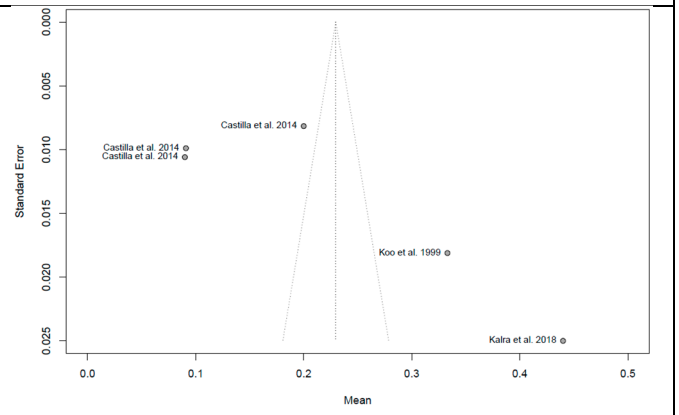
Analysed linear parameters	Mesiodistal	Buccolingual	Vertical
Left			
Right			

Table S7.4. Linear parameters: Upper vs. Lower jaw

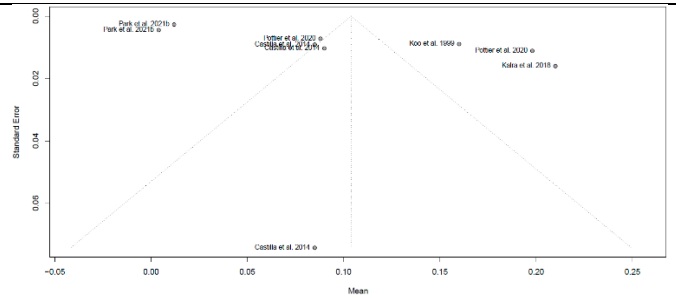
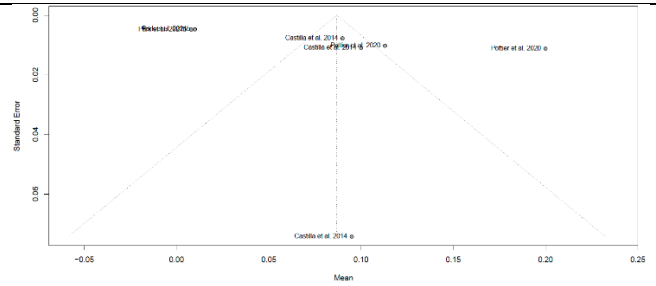
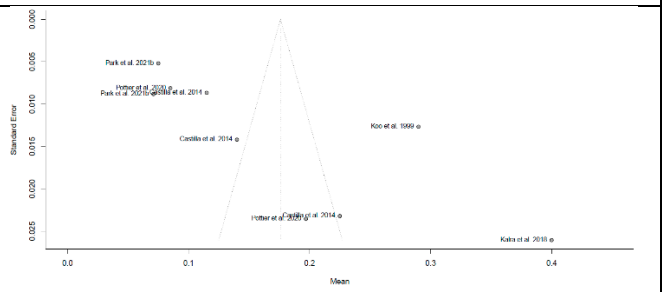
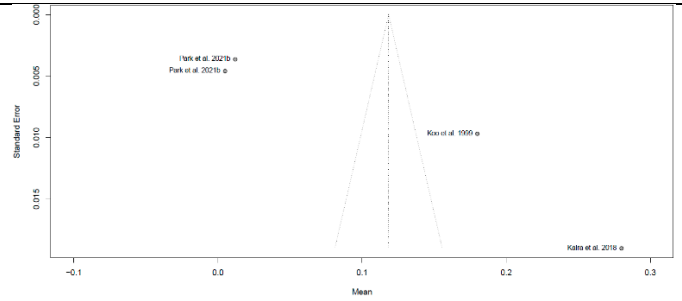
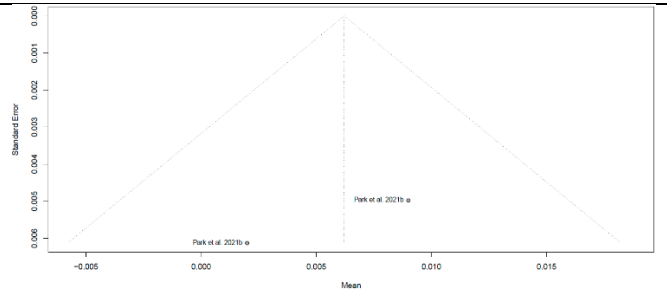
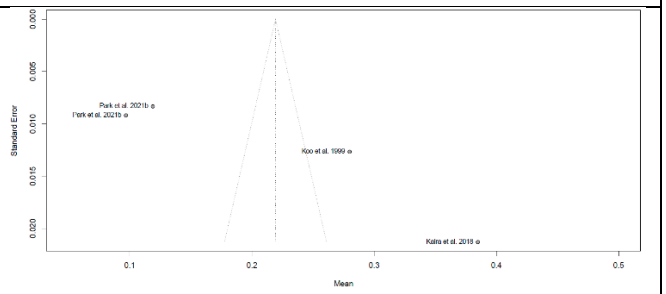
Analysed linear parameters	Mesiodistal	Buccolingual	Vertical
Upper jaw			
Lower jaw			

Table 7.5. Linear parameters: Accuracy assessment method

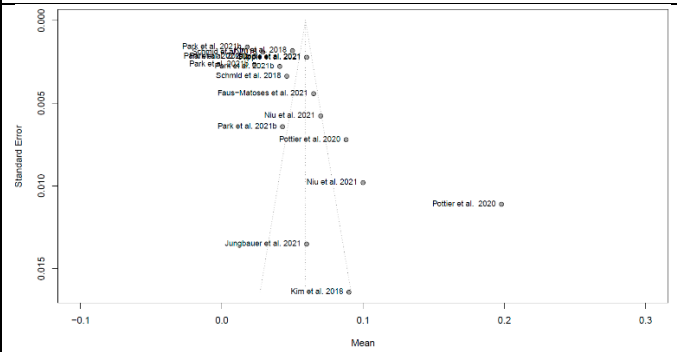
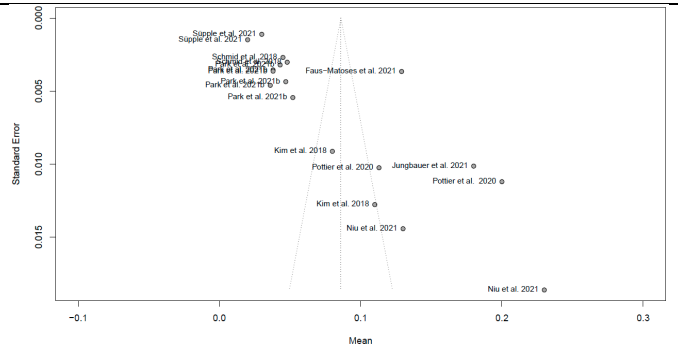
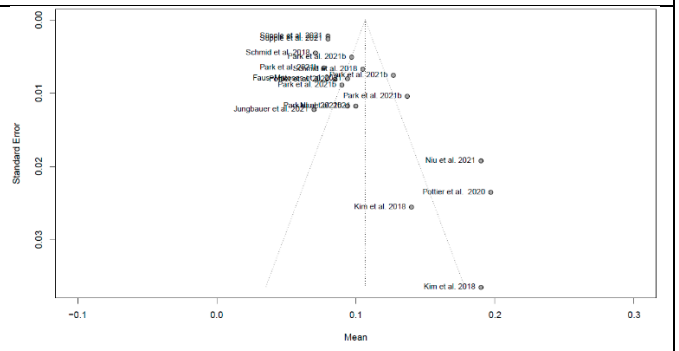
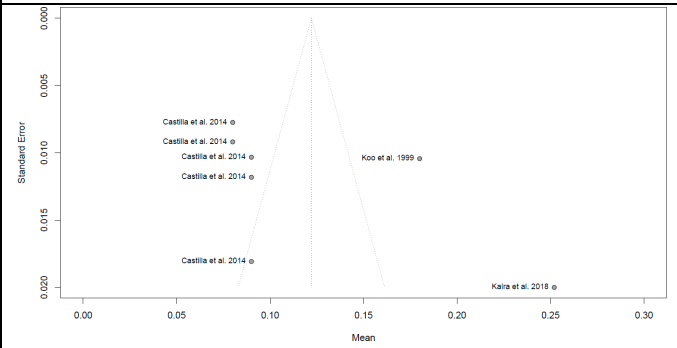
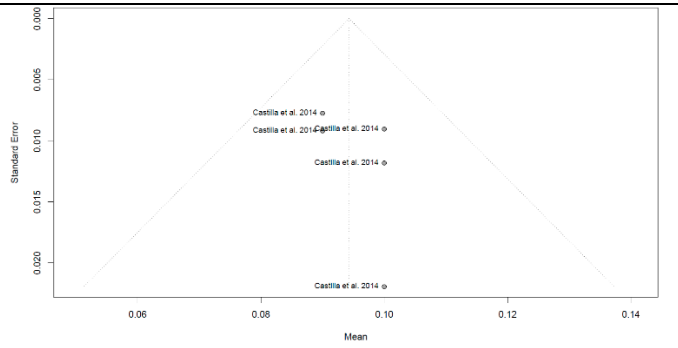
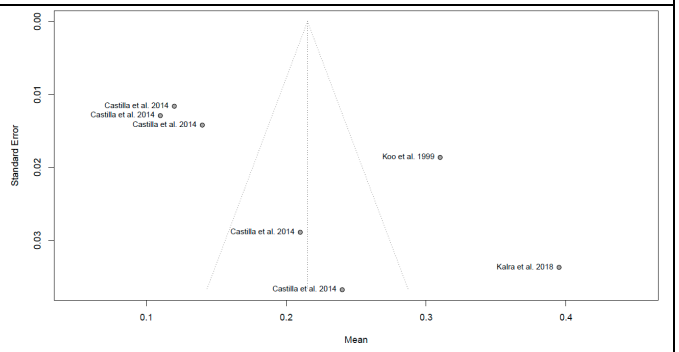
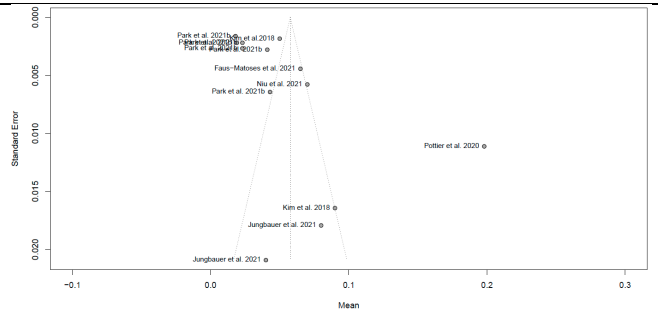
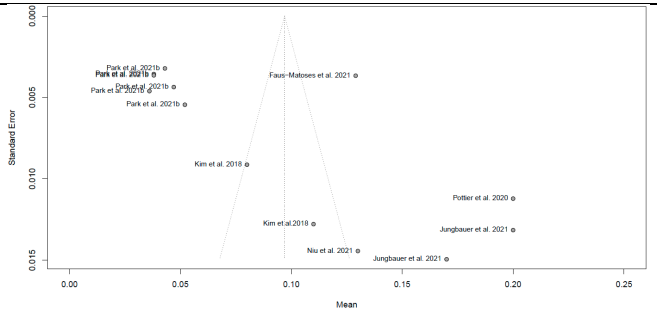
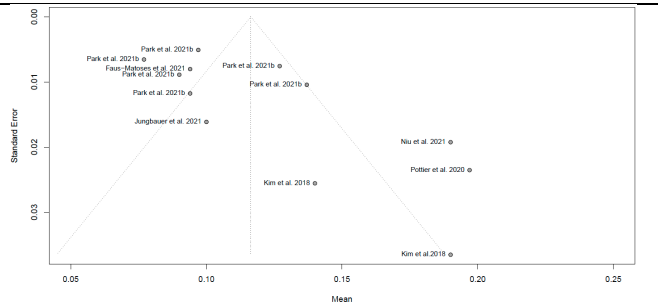
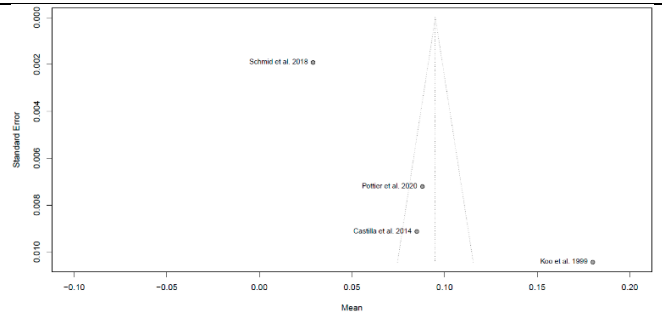
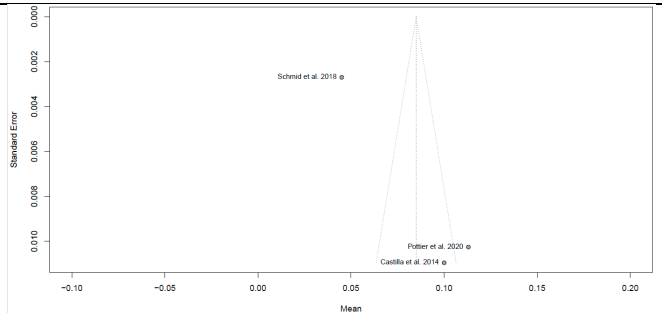
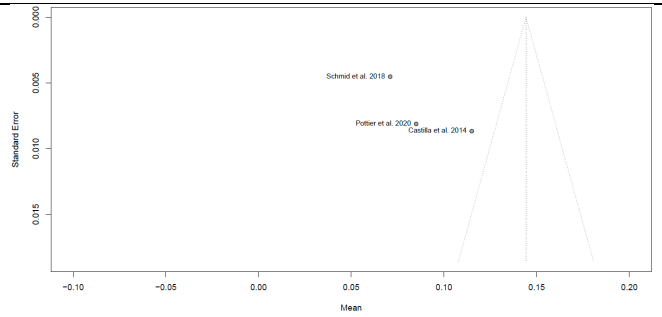
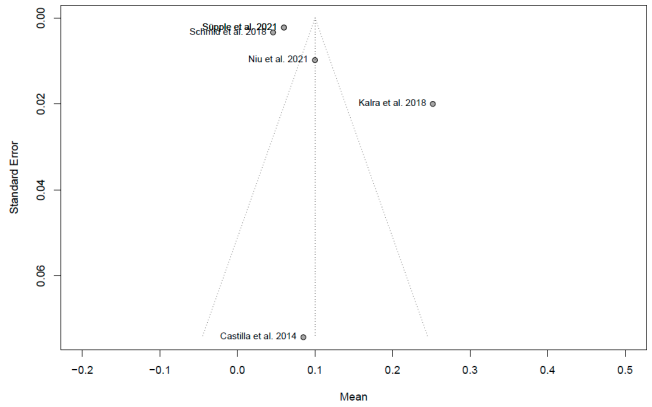
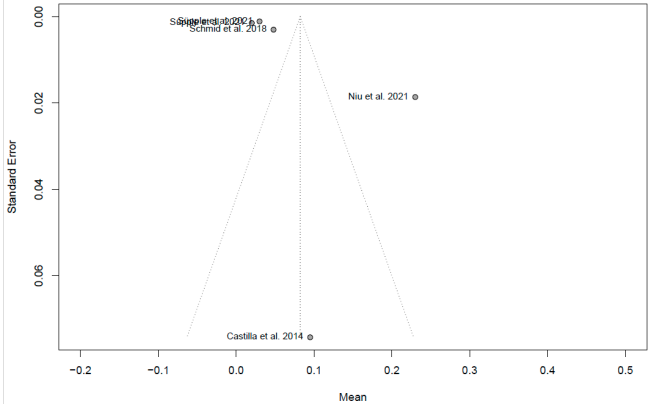
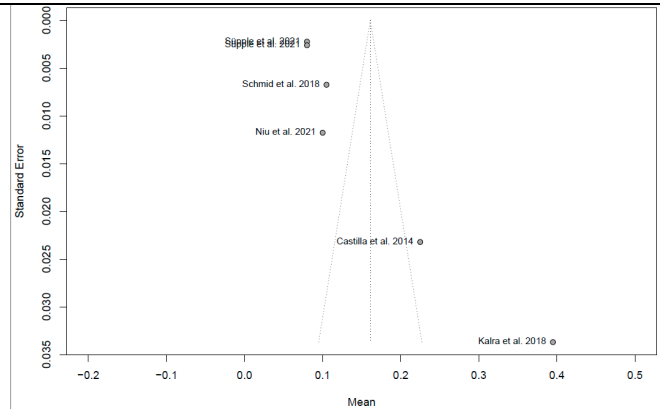
Analysed linear parameters	Mesiodistal	Buccolingual	Vertical
3D			
Photography			

Table 7.6. Linear parameters: Type of tray

Analysed linear parameters	Mesiodistal	Buccolingual	Vertical
3D printed			
Silicone			
Vacuum form			
Combined Silicone/			

Vacuum Form			

Table S7.7. Angular parameters: Overall accuracy

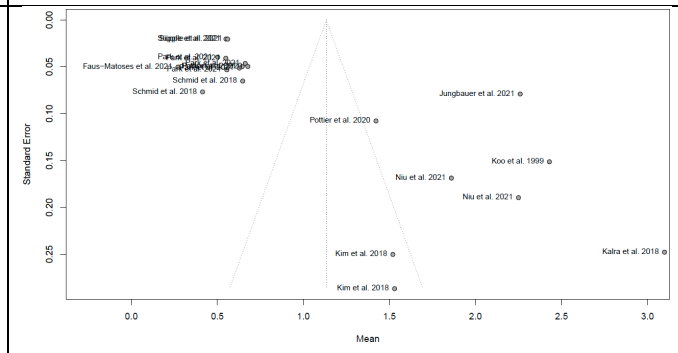
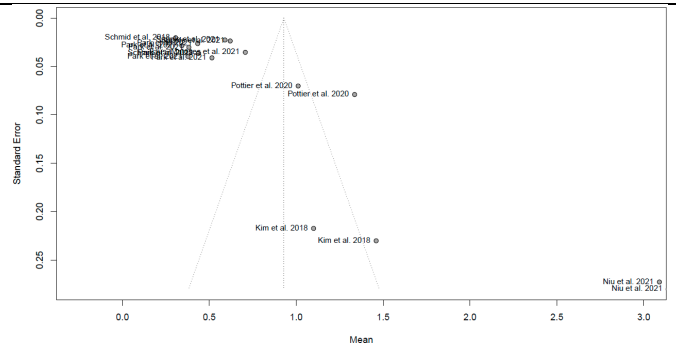
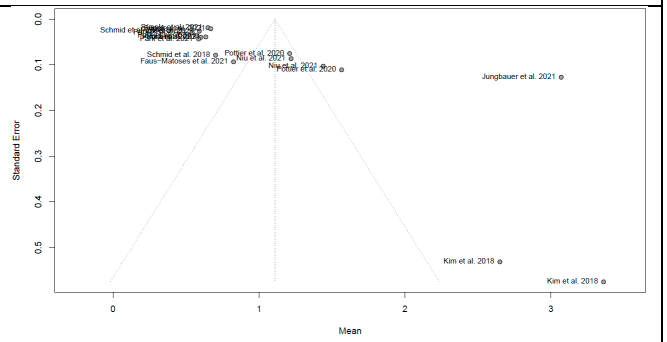
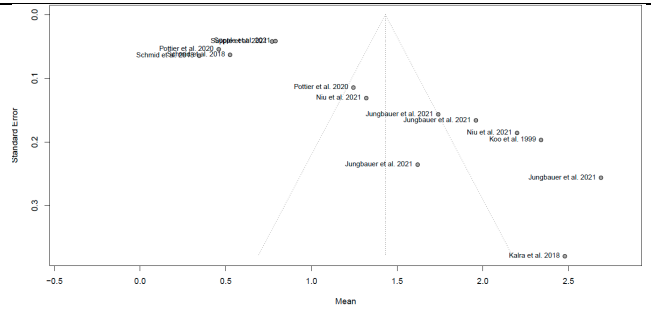
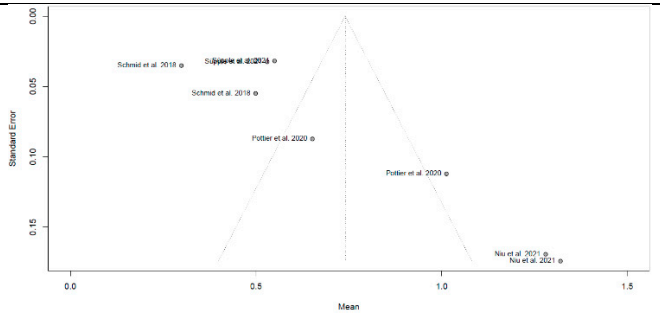
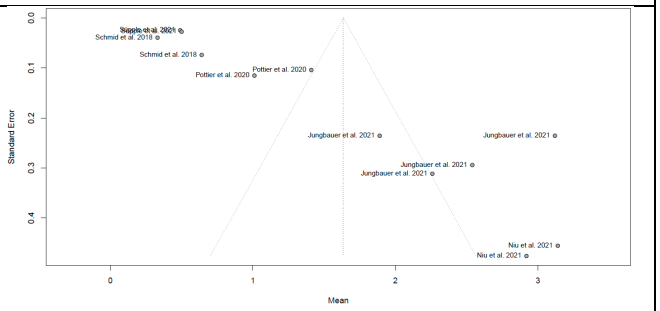
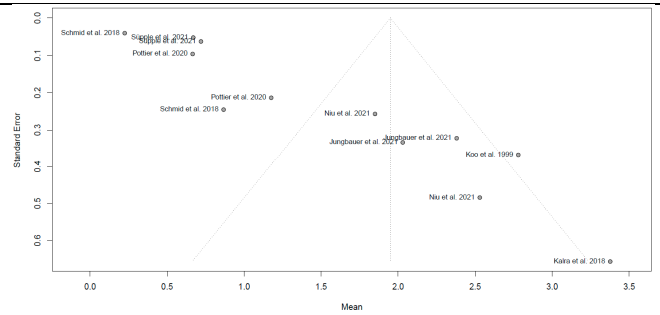
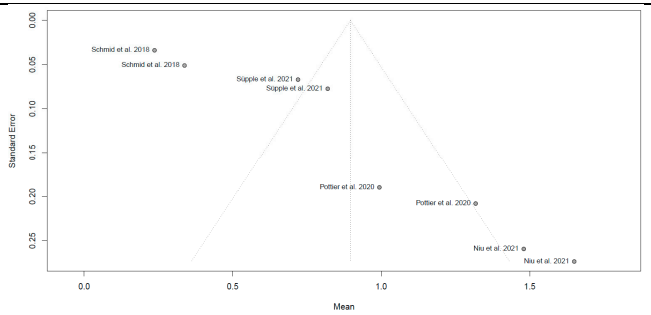
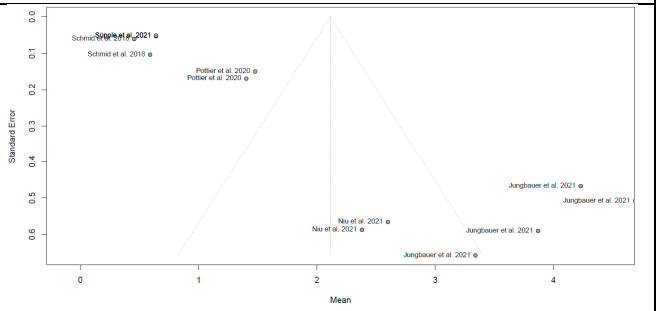
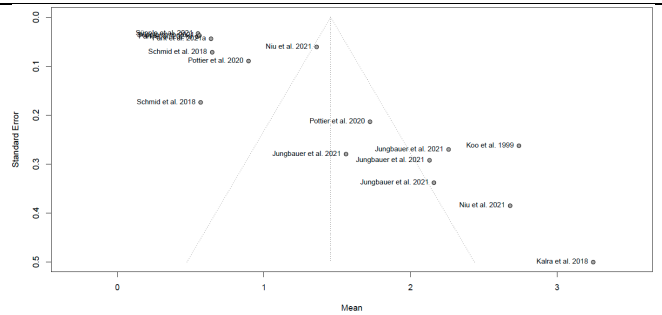
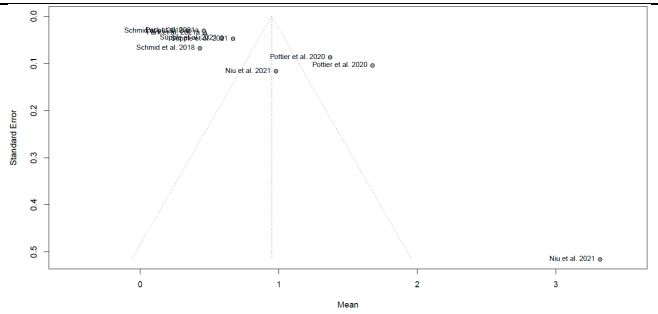
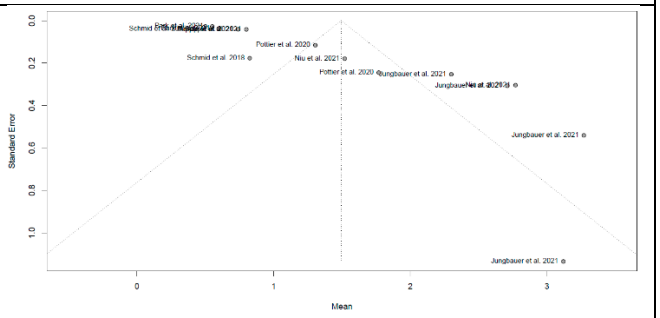
Analysed parameters	Angulation	Rotation	Torque
Overall accuracy			

Table S7.8. Angular parameters: Tooth group comparison

Analysed linear parameters	Angulation	Rotation	Torque
Incisors			
Canines			
Premolars			

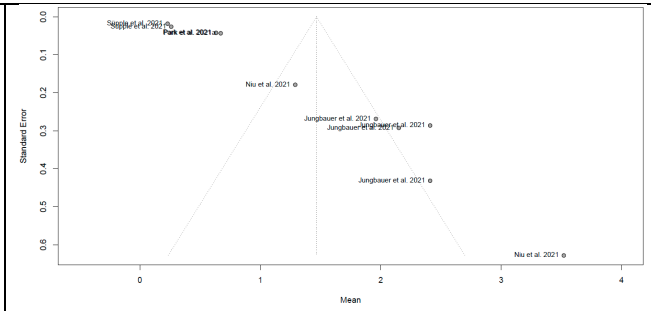
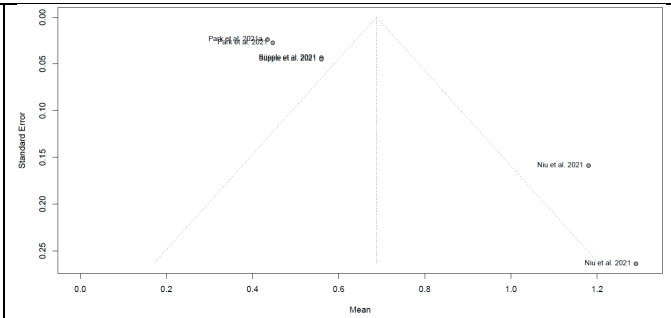
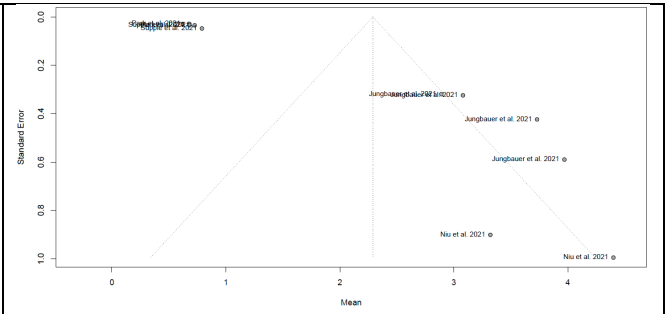
Molars			

Table S7.9. Angular parameters: Left vs. Right side

Analysed linear parameters	Angulation	Rotation	Torque
Left			
Right			

Table S7.10. Angular parameters: Upper vs. Lower jaw

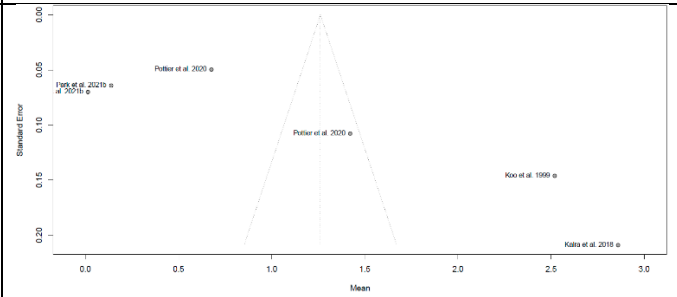
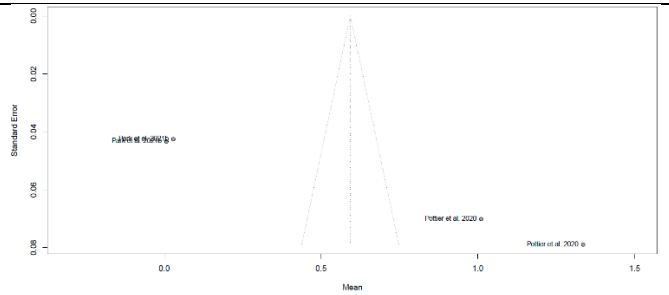
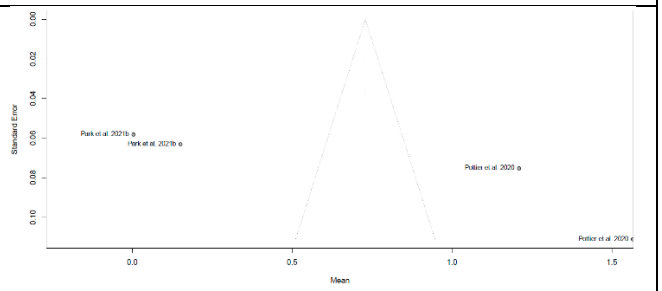
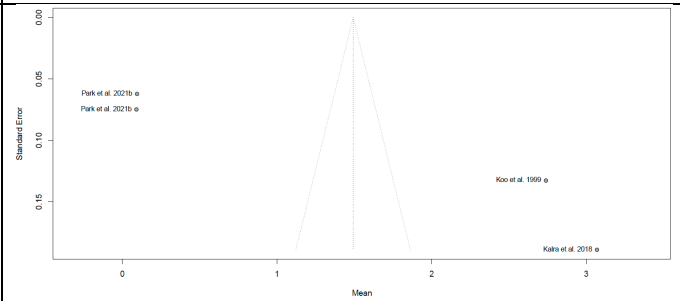
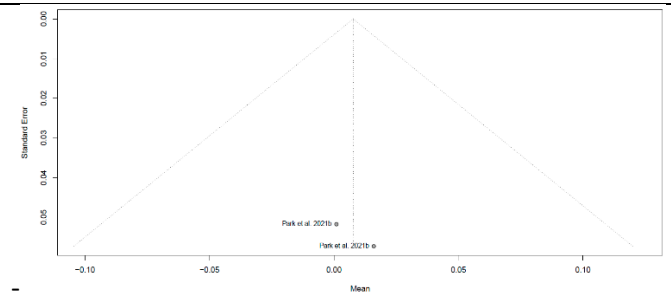
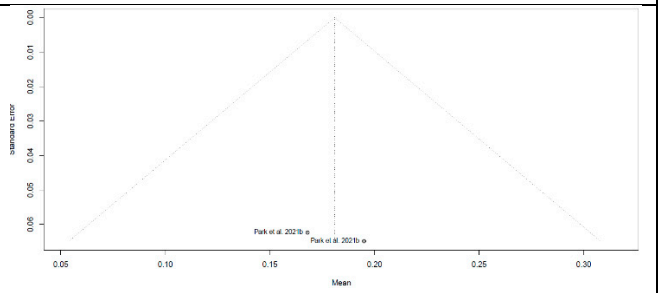
Analysed linear parameters	Angulation	Rotation	Torque
Upper jaw			
Lower jaw			

Table S7.11. Angular parameters: Accuracy assessment method

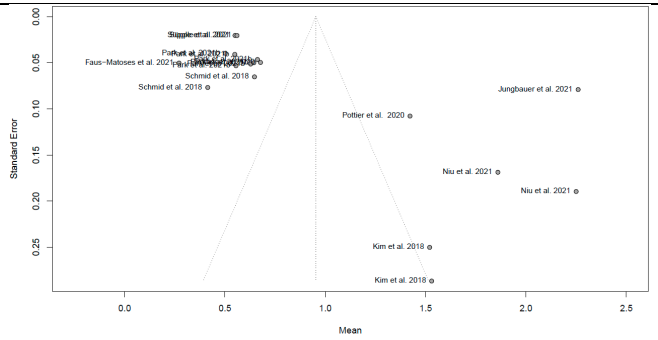
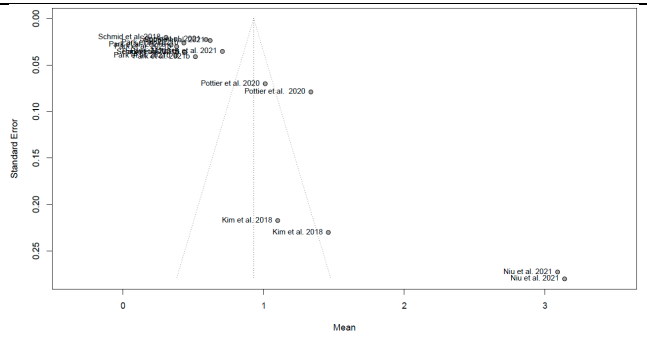
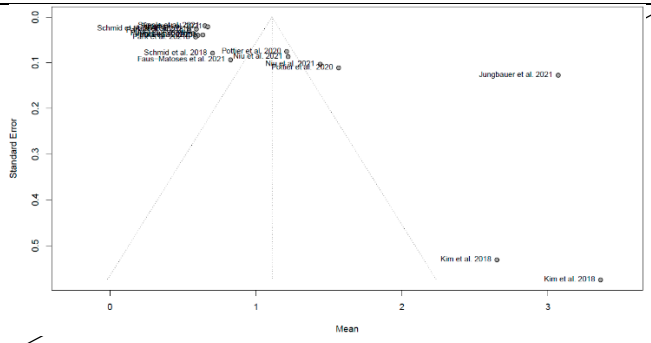
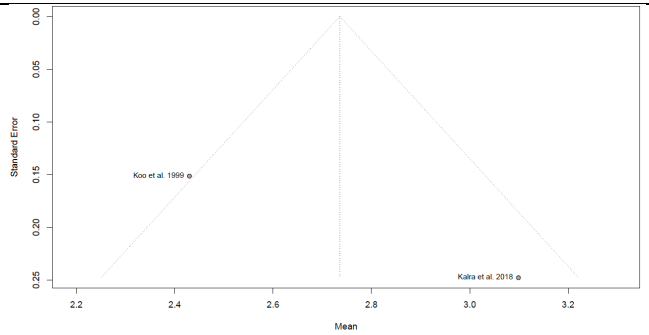
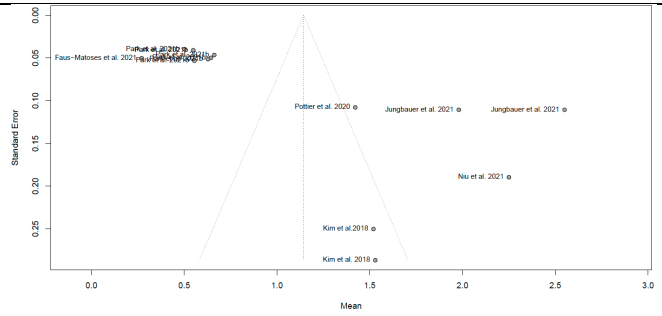
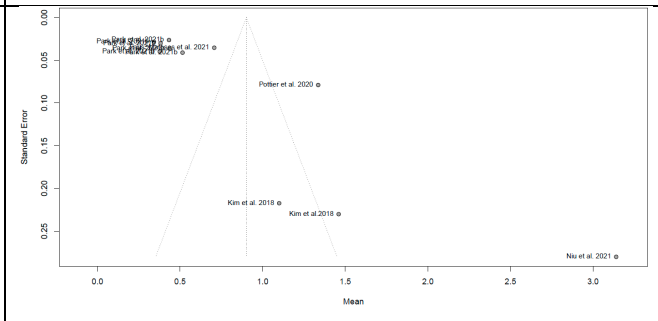
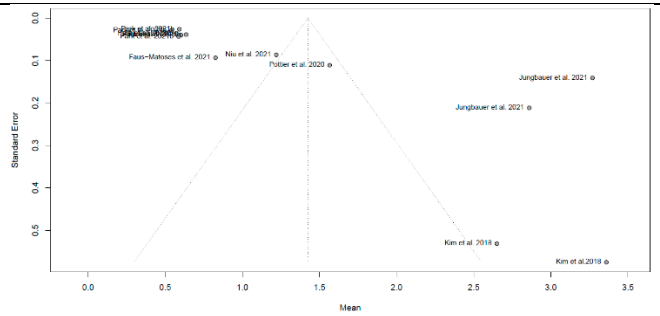
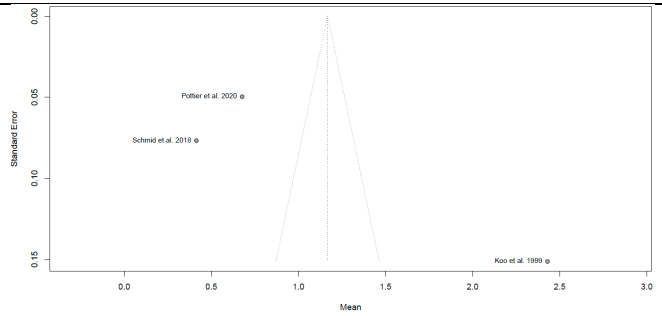
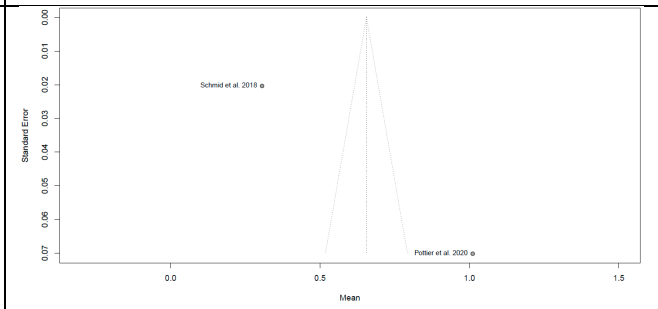
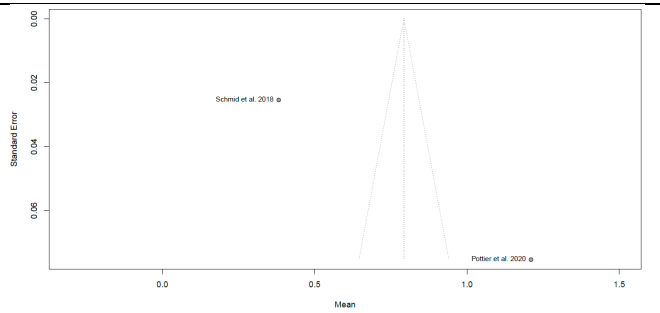
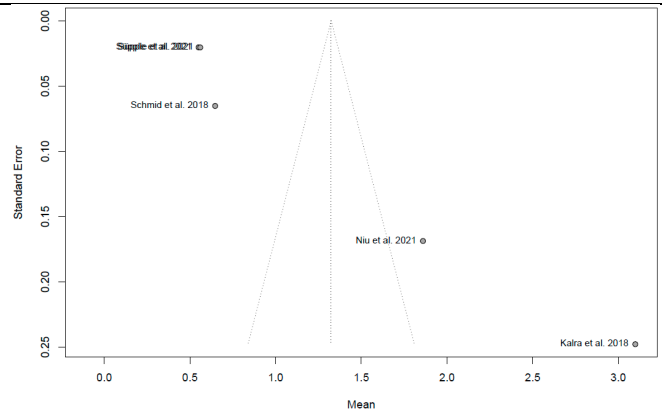
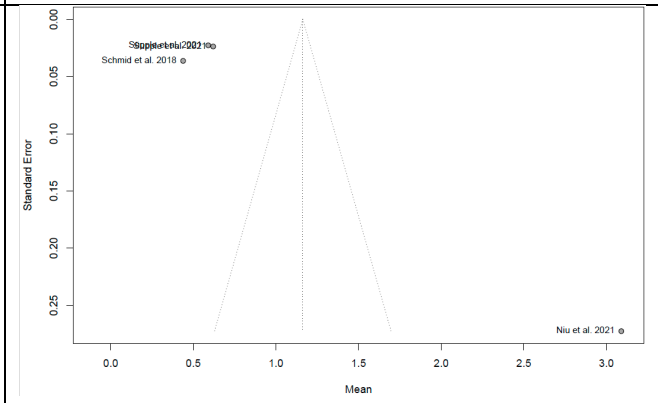
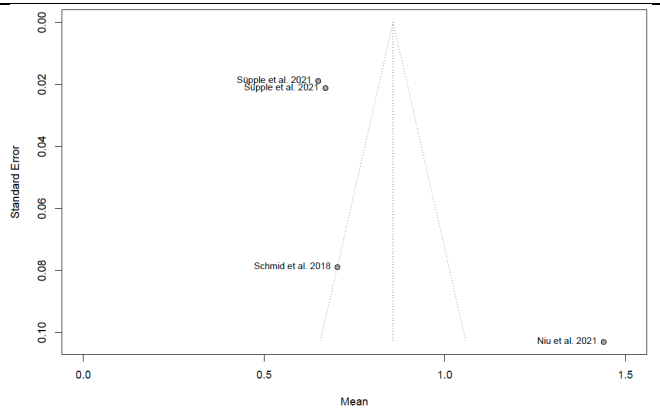
Analysed linear parameters	Angulation	Rotation	Torque
3D			
Photography			

Table S7.12. Angular parameters: Type of tray

Analysed linear parameters	Angulation	Rotation	Torque
3D printed			
Silicone			
Vacuum form			
Combined Silicone/			

Vacuum Form			

Meta analytic statistics – Drapery Plots

Table S8.1. Linear parameters: Overall accuracy

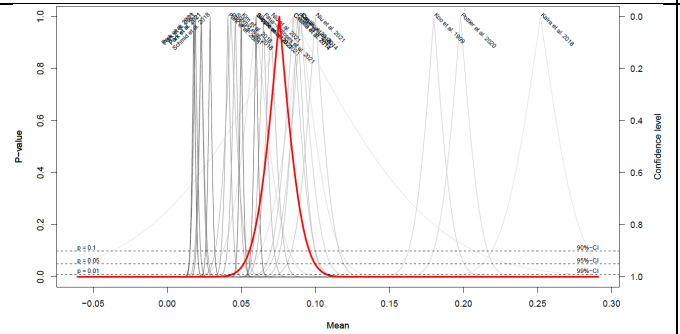
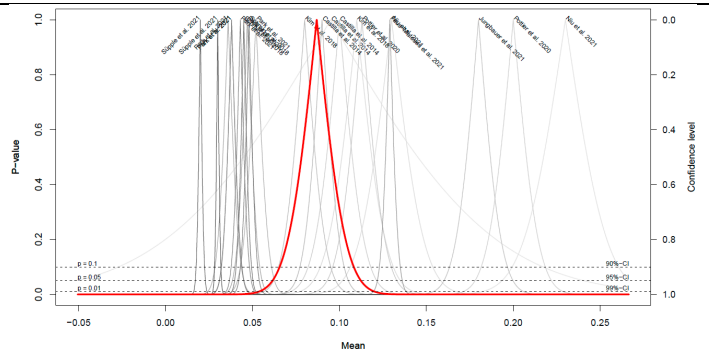
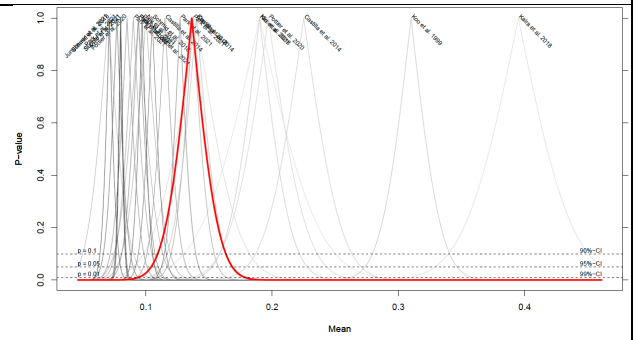
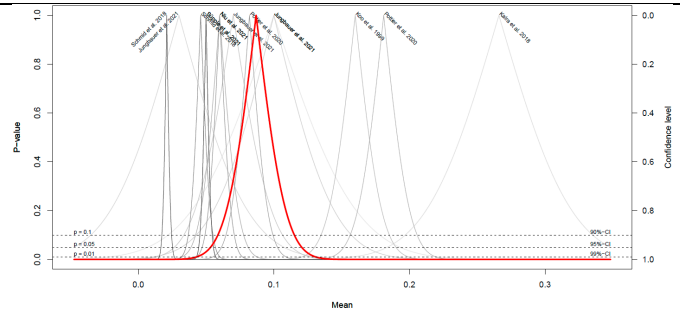
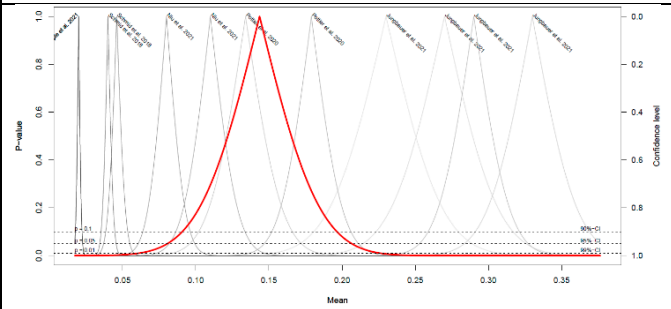
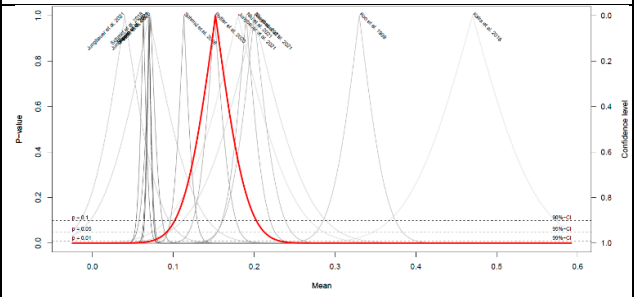
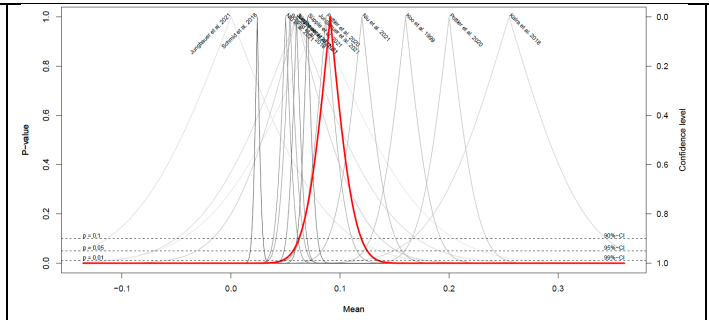
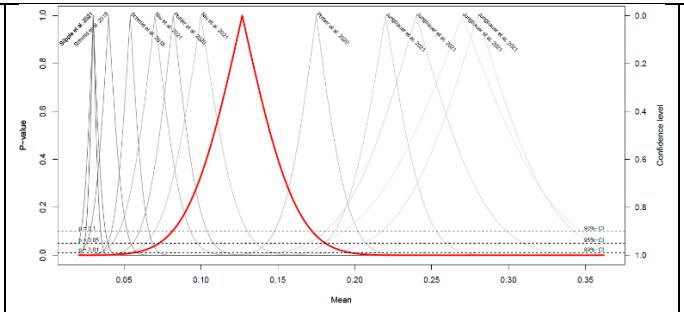
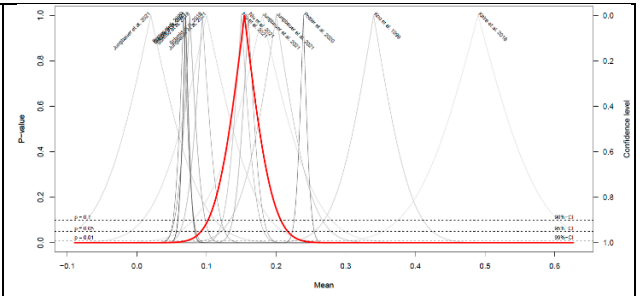
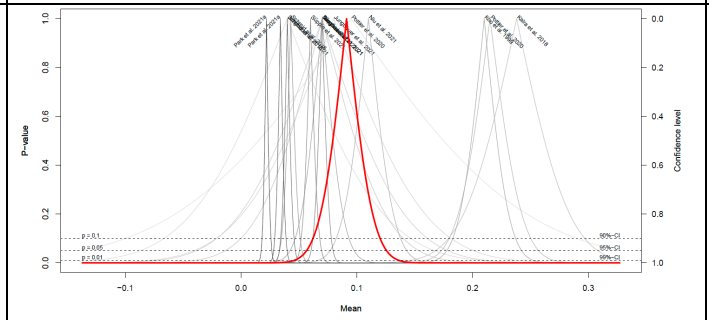
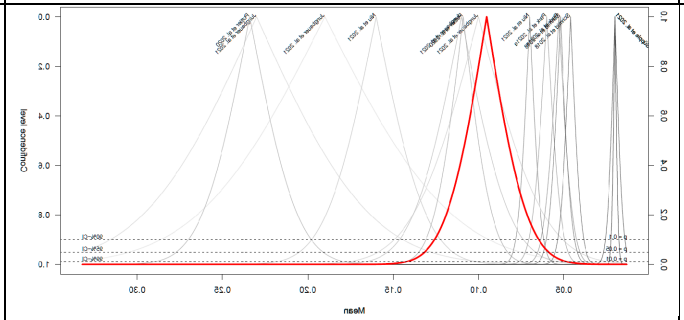
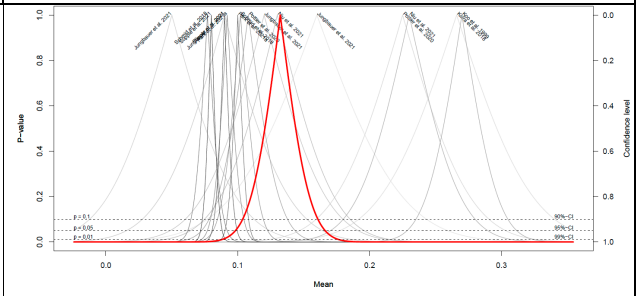
Analysed parameters	Mesiodistal	Buccolingual	Vertical
Overall accuracy			

Table S8.2. Linear parameters: Tooth group comparison

Analysed linear parameters	Mesiodistal	Buccolingual	Vertical
Incisors			

Canines			
Premolars			
Molars