

Supplementary Materials: Marginal Adaptation and Internal Fit of 3D-Printed Provisional Crowns and Fixed Dental Prosthesis Resins Compared to CAD/CAM-Milled and Conventional Provisional Resins: A Systematic Review and Meta-Analysis

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Table S1. Search terms and strategy for the electronic databases.

Database	Combination of Search Terms and Strategy	Number of Titles
MEDLINE/PubMed	<p>((("denture, partial, temporary"[MeSH Terms] OR "denture, partial, fixed"[MeSH Terms] OR "crowns"[MeSH Terms] OR "Dental Prosthesis"[MeSH Terms] OR "dental prosthesis, implant supported"[MeSH Terms] OR "Tooth Crown"[MeSH Terms] OR "dental restoration, temporary"[MeSH Terms] OR "Temporary dental restoration"[Title/Abstract] OR "provisional restorations"[Title/Abstract] OR "interim restoration"[Title/Abstract] OR "provisional resin"[Title/Abstract] OR "Provisional dental materials"[Title/Abstract] OR "interim crown"[Title/Abstract] OR "interim resin"[Title/Abstract] OR "interim fixed partial denture"[Title/Abstract] OR "Crown and Bridge materials"[Title/Abstract] OR "provisional fixed partial denture"[Title/Abstract] OR "temporary crown"[Title/Abstract] OR "provisional crown"[Title/Abstract] OR "Temporary Crown and Bridge"[Title/Abstract] OR "provisional dental restoration"[Title/Abstract]) AND ("humans"[MeSH Terms] AND 2000/01/01:2022/12/31[Date—Publication] AND "english"[Language]) AND (("Stereolithography"[MeSH Terms] OR "printing, three dimensional"[MeSH Terms] OR "additive manufactur *"[Title/Abstract] OR "Rapid prototyping"[Title/Abstract] OR "3D print *"[Title/Abstract] OR "3D print *"[Title/Abstract] OR "3 d print *"[Title/Abstract])) AND (("polymethyl methacrylate"[MeSH Terms] OR "bisphenol a-glycidyl methacrylate"[MeSH Terms] OR "Computer-Aided Design"[MeSH Terms] OR "Computer-Assisted Milling"[Title/Abstract] OR "Computer-Assisted manufacturing"[Title/Abstract] OR "Computer-Assisted Designing"[Title/Abstract] OR "computer-aided manufacturing"[Title/Abstract] OR "cad/cam"[Title/Abstract] OR "cad/cam"[Title/Abstract] OR "Subtractive manufacturing"[Title/Abstract] OR "Polymethylmethacrylate"[Title/Abstract] OR "PMMA"[Title/Abstract] OR "methacrylate polymethyl"[Title/Abstract] OR "PEMA"[Title/Abstract] OR "interim resin"[Title/Abstract] OR "provisional resin"[Title/Abstract] OR "poly methyl methacrylate"[Title/Abstract] OR "bis-acryl"[Title/Abstract] OR "Bis-GMA"[Title/Abstract])) AND ((("Dental marginal adaptation"[MeSH Terms] OR "marginal adaptation"[All Fields] OR "Marginal fit"[All Fields] OR "marginal gap size"[All Fields] OR "Marginal accuracy"[All Fields] OR "marginal integrity"[All Fields] OR "crown margin fidelity"[All Fields] OR "marginal gap *"[All Fields] OR "margin quality"[All Fields] OR "marginal discrepance *"[All Fields] OR "fitness"[All Fields] OR "internal fit"[All Fields] OR "internal adaptation"[All Fields] OR "internal gap *"[All Fields] OR "Clinical fit"[All Fields] OR "internal discrepance *"[All Fields] OR "fitting accuracy"[All Fields] OR "Seating discrepancy"[All Fields] OR "Adaptation"[All Fields] OR "Accuracy evaluation"[All Fields] OR "cement film thickness"[All Fields] OR "fit"[All Fields])) AND ((humans[Filter]) AND (2000:2022[pdat]) AND (english[Filter]))</p>	169
Web of Science (Core Collection)	<p>#1 (P)</p> <p>((TS = ((("denture, partial, temporary" OR "denture, partial, fixed" OR "crown *" OR "Dental Prosthesis" OR "dental prosthesis, implant supported" OR "Tooth Crown" OR "dental restoration, temporary" OR "Temporary dental restoration" OR "provisional restorations" OR "interim restoration" OR "provisional resin" OR "Provisional dental material *" OR "interim crown" OR "interim resin" OR "interim fixed partial denture" OR "Crown and Bridge material *" OR "provisional fixed partial denture" OR "temporary crown" OR "provisional crown" OR "Temporary Crown and Bridge" OR "provisional dental restoration"))</p> <p>#2 (I)</p> <p>TS = ((("Stereolithography" OR "printing, three dimensional" OR "additive manufactur *" OR "Rapid prototyping" OR "3D print *" OR "3-D print *"))</p> <p>#3 (C)</p> <p>TS = ((("polymethyl methacrylate" OR "bisphenol a-glycidyl methacrylate" OR "Computer-Aided Design" OR "Computer-Assisted Milling" OR "Computer-Assisted manufacturing" OR "Computer-Assisted Designing" OR "computer-aided manufacturing" OR "cad cam" OR "cad/cam" OR "Subtractive manufacturing" OR "Polymethylmethacrylate" OR "PMMA" OR "methacrylate polymethyl" OR "PEMA" OR "interim resin" OR "provisional resin" OR "poly methyl methacrylate" OR "bis-acryl" OR "Bis-GMA"))</p>	149

#4 (O)

TS = (("Dental marginal adaptation" OR "marginal adaptation" OR "Marginal fit" OR "marginal gap size" OR "Marginal accuracy" OR "marginal integrity" OR "crown margin fidelity" OR "marginal gap *" OR "margin quality" OR "marginal discrepance*" OR "fitness" OR "internal fit" OR "internal adaptation" OR "internal gap *" OR "internal discrepance*" OR "fitting accuracy" OR "Seating discrepancy" OR "Adaptation" OR "cement film thickness" OR "fit"))

#1 AND #2 AND #3 AND #4

Indexes = SCI-EXPANDED, SSCI, A&HCI, CPCI-S, CPCI-SSH, ESCI, CCR-EXPANDED, IC Timespan = 2000:2022 and English (Languages)

#1	MeSH descriptor: [Denture, Partial, Temporary] explode all trees
#2	MeSH descriptor: [Denture, Partial, Fixed] explode all trees
#3	MeSH descriptor: [Crowns] explode all trees
#4	MeSH descriptor: [Dental Prosthesis] explode all trees
#5	MeSH descriptor: [Dental Prosthesis, Implant-Supported] explode all trees
#6	MeSH descriptor: [Tooth Crown] explode all trees
#7	MeSH descriptor: [Dental Restoration, Temporary] explode all trees
#8	temporary dental restoration
#9	provisional restorations
#10	interim restoration
#11	provisional resin
#12	Provisional dental materials
#13	interim crown
#14	interim resi
#15	interim fixed partial denture
#16	Crown and Bridge materials
#17	provisional fixed partial denture
#18	temporary crown
#19	provisional crown
#20	Temporary Crown and Bridge
#21	provisional dental restoration
Cochrane Library #22	MeSH descriptor: [Stereolithography] explode all trees
#23	MeSH descriptor: [Printing, Three-Dimensional] explode all trees
#24	additive manufactur *
#25	Rapid prototyping
#26	3D print *
#27	MeSH descriptor: [Polymethyl Methacrylate] explode all trees
#28	MeSH descriptor: [Bisphenol A-Glycidyl Methacrylate] explode all trees
#29	MeSH descriptor: [Computer-Aided Design] explode all trees
#30	Computer-Assisted Milling
#31	Computer-Assisted manufacturing
#32	Computer-Assisted Designing
#33	computer-aided manufacturing
#34	cad cam
#35	Subtractive manufacturing
#36	Polymethylmethacrylate
#37	PMMA
#38	methacrylate polymethyl
#39	PEMA
#40	interim resin
#41	provisional resin
#42	poly methyl methacrylate
#43	bis-acryl
#44	Bis-GMA

- #45 MeSH descriptor: [Dental Marginal Adaptation] explode all trees
 #46 marginal adaptation
 #47 Marginal fit
 #48 marginal gap size
 #49 Marginal accuracy
 #50 marginal integrity
 #51 crown margin fidelity
 #52 marginal gap *
 #53 margin quality
 #54 marginal discrepanc *
 #55 fitness
 #56 internal fit
 #57 internal adaptation
 #58 internal gap *
 #59 Clinical fit
 #60 internal discrepanc *
 #61 fitting accuracy
 #62 Seating discrepancy
 #63 Adaptation
 #64 cement film thickness
 #65 fit
 #66 #1 OR #2 OR #3 OR #4 OR #5 OR #6 OR #7 OR #8 OR #9 OR #10 OR #11 OR #12 OR #13 OR #14 OR #15 OR #16 OR #17 OR #18 OR #19 OR #20 OR #21
 #67 #22 OR #23 OR #24 OR #25 OR #26
 #68 #27 OR #28 OR #29 OR #30 OR #31 OR #32 OR #33 OR #34 OR #35 OR #36 OR #37 OR #38 OR #39 OR #40 OR #41 OR #42 OR #43 OR #44
 #69 #45 OR #46 OR #47 OR #48 OR #49 OR #50 OR #51 OR #52 OR #53 OR #54 OR #55 OR #56 OR #57 OR #58 OR #59 OR #60 OR #61 OR #62 OR #63 OR #64 OR #65
 #70 #66 AND #67 AND #68 AND #69

(TITLE-ABS-KEY (“denture, partial, temporary” OR “denture, partial, fixed” OR “crown *” OR “Dental Prosthesis” OR “dental prosthesis, implant supported” OR “Tooth Crown” OR “dental restoration, temporary” OR “Temporary dental restoration” OR “provisional restorations” OR “interim restoration” OR “provisional resin” OR “Provisional dental material *” OR “interim crown” OR “interim resin” OR “interim fixed partial denture” OR “Crown and Bridge material *” OR “provisional fixed partial denture” OR “temporary crown” OR “provisional crown” OR “Temporary Crown and Bridge” OR “provisional dental restoration”)) AND TITLE-ABS-KEY (“Stereolithography” OR “printing, three dimensional” OR “additive manufactur *” OR “Rapid prototyping” OR “3D print *” OR “3-D print *”)) AND TITLE-ABS-KEY (“polymethyl methacrylate” OR “bisphenol a-glycidyl methacrylate” OR “Computer-Aided Design” OR “Computer-Assisted Milling” OR “Computer-Assisted manufacturing” OR “Computer-Assisted Designing” OR “computer-aided manufacturing” OR “cad cam” OR “cad/cam” OR “Subtractive manufacturing” OR “Polymethylmethacrylate” OR “PMMA” OR “methacrylate polymethyl” OR “PEMA” OR “interim resin” OR “provisional resin” OR “poly methyl methacrylate” OR “bis-acryl” OR “Bis-GMA”)) AND TITLE-ABS-KEY (“Dental marginal adaptation” OR “marginal adaptation” OR “Marginal fit” OR “marginal gap size” OR “Marginal accuracy” OR “marginal integrity” OR “crown margin fidelity” OR “marginal gap *” OR “margin quality” OR “marginal discrepanc *” OR “fitness” OR “internal fit” OR “internal adaptation” OR “internal gap *” OR “internal discrepanc *” OR “Seating discrepancy” OR “Adaptation” OR “cement film thickness” OR “fit”)) AND (LIMIT-TO (DOCTYPE, “ar”)) AND (LIMIT-TO (SUBJAREA, “DENT”)) OR LIMIT-TO (SUBJAREA, “MEDI”) OR LIMIT-TO (SUBJAREA, “MATE”) OR LIMIT-TO (SUBJAREA, “MULT”)) AND (LIMIT-TO (LANGUAGE, “English”))

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*: Truncation, P: Population, I: Intervention, C: Comparison, O: Outcome.

Table S2. PRISMA 2020 Main Checklist.

Topic	No.	Item	Location where item is reported
TITLE			
Title	1	Identify the report as a systematic review.	Page 1
ABSTRACT			
Abstract	2	See the PRISMA 2020 for Abstracts checklist	Table S3
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of existing knowledge.	Page 2 and 3
Objectives	4	Provide an explicit statement of the objective(s) or question(s) the review addresses.	Page 3
METHODS			
Eligibility criteria	5	Specify the inclusion and exclusion criteria for the review and how studies were grouped for the syntheses.	Page 3
Information sources	6	Specify all databases, registers, websites, organisations, reference lists and other sources searched or consulted to identify studies. Specify the date when each source was last searched or consulted.	Page 4
Search strategy	7	Present the full search strategies for all databases, registers and websites, including any filters and limits used.	Page 4 & Table S1
Selection process	8	Specify the methods used to decide whether a study met the inclusion criteria of the review, including how many reviewers screened each record and each report retrieved, whether they worked independently, and if applicable, details of automation tools used in the process.	Page 4
Data collection process	9	Specify the methods used to collect data from reports, including how many reviewers collected data from each report, whether they worked independently, any processes for obtaining or confirming data from study investigators, and if applicable, details of automation tools used in the process.	Page 4
Data items	10a	List and define all outcomes for which data were sought. Specify whether all results that were compatible with each outcome domain in each study were sought (e.g. for all measures, time points, analyses), and if not, the methods used to decide which results to collect.	Page 4
	10b	List and define all other variables for which data were sought (e.g. participant and intervention characteristics, funding sources). Describe any assumptions made about any missing or unclear information.	Page 4 to 13
Study risk of bias assessment	11	Specify the methods used to assess risk of bias in the included studies, including details of the tool(s) used, how many reviewers assessed each study and whether they worked independently, and if applicable, details of automation tools used in the process.	Page 4 & 20
Effect measures	12	Specify for each outcome the effect measure(s) (e.g. risk ratio, mean difference) used in the synthesis or presentation of results.	Page 4
Synthesis methods	13a	Describe the processes used to decide which studies were eligible for each synthesis (e.g. tabulating the study intervention characteristics and comparing against the planned groups for each synthesis (item 5)).	Page 4
	13b	Describe any methods required to prepare the data for presentation or synthesis, such as handling of missing summary statistics, or data conversions.	Page 4 to 18
	13c	Describe any methods used to tabulate or visually display results of individual studies and syntheses.	Page 4 to 18
	13d	Describe any methods used to synthesize results and provide a rationale for the choice(s). If meta-analysis was performed, describe the model(s), method(s) to identify the presence and extent of statistical heterogeneity, and software package(s) used.	Page 20-21
	13e	Describe any methods used to explore possible causes of heterogeneity among study results (e.g. subgroup analysis, meta-regression).	Page 20-21
	13f	Describe any sensitivity analyses conducted to assess robustness of the synthesized results.	-
Reporting bias assessment	14	Describe any methods used to assess risk of bias due to missing results in a synthesis (arising from reporting biases).	Page 20

Topic	No.	Item	Location where item is reported
Certainty assessment	15	Describe any methods used to assess certainty (or confidence) in the body of evidence for an outcome.	Page 20
RESULTS			
Study selection	16a	Describe the results of the search and selection process, from the number of records identified in the search to the number of studies included in the review, ideally using a flow diagram.	Page 21 & 22
	16b	Cite studies that might appear to meet the inclusion criteria, but which were excluded, and explain why they were excluded.	Page 21 7 22
Study characteristics	17	Cite each included study and present its characteristics.	Page 22-33
Risk of bias in studies	18	Present assessments of risk of bias for each included study.	Page 21-22
Results of individual studies	19	For all outcomes, present, for each study: (a) summary statistics for each group (where appropriate) and (b) an effect estimate and its precision (e.g. confidence/credible interval), ideally using structured tables or plots.	Page 22-33
Results of syntheses	20a	For each synthesis, briefly summarise the characteristics and risk of bias among contributing studies.	Page 22-22
	20b	Present results of all statistical syntheses conducted. If meta-analysis was done, present for each the summary estimate and its precision (e.g. confidence/credible interval) and measures of statistical heterogeneity. If comparing groups, describe the direction of the effect.	Page 22-33
	20c	Present results of all investigations of possible causes of heterogeneity among study results.	Page 22-33
	20d	Present results of all sensitivity analyses conducted to assess the robustness of the synthesized results.	-
Reporting biases	21	Present assessments of risk of bias due to missing results (arising from reporting biases) for each synthesis assessed.	-
Certainty of evidence	22	Present assessments of certainty (or confidence) in the body of evidence for each outcome assessed.	Page 22-33
DISCUSSION			
Discussion	23a	Provide a general interpretation of the results in the context of other evidence.	Page 33-35
	23b	Discuss any limitations of the evidence included in the review.	Page 33-35
	23c	Discuss any limitations of the review processes used.	Page 35
	23d	Discuss implications of the results for practice, policy, and future research.	Page 35
OTHER INFORMATION			
Registration and protocol	24a	Provide registration information for the review, including register name and registration number, or state that the review was not registered.	Page 3
	24b	Indicate where the review protocol can be accessed, or state that a protocol was not prepared.	Page 3
	24c	Describe and explain any amendments to information provided at registration or in the protocol.	-
Support	25	Describe sources of financial or non-financial support for the review, and the role of the funders or sponsors in the review.	Page 36
Competing interests	26	Declare any competing interests of review authors.	Page 36
Availability of data, code and other materials	27	Report which of the following are publicly available and where they can be found: template data collection forms; data extracted from included studies; data used for all analyses; analytic code; any other materials used in the review.	Page 36

Table S3. PRISMA Abstract Checklist.

Topic	No.	Item	Reported?
TITLE			
Title	1	Identify the report as a systematic review.	Yes
BACKGROUND			

Topic	No.	Item	Reported?
Objectives	2	Provide an explicit statement of the main objective(s) or question(s) the review addresses.	Yes
METHODS			
Eligibility criteria	3	Specify the inclusion and exclusion criteria for the review.	Yes
Information sources	4	Specify the information sources (e.g. databases, registers) used to identify studies and the date when each was last searched.	Yes
Risk of bias	5	Specify the methods used to assess risk of bias in the included studies.	Yes
Synthesis of results	6	Specify the methods used to present and synthesize results.	Yes
RESULTS			
Included studies	7	Give the total number of included studies and participants and summarise relevant characteristics of studies.	Yes
Synthesis of results	8	Present results for main outcomes, preferably indicating the number of included studies and participants for each. If meta-analysis was done, report the summary estimate and confidence/credible interval. If comparing groups, indicate the direction of the effect (i.e. which group is favoured).	Yes
DISCUSSION			
Limitations of evidence	9	Provide a brief summary of the limitations of the evidence included in the review (e.g. study risk of bias, inconsistency and imprecision).	Yes
Interpretation	10	Provide a general interpretation of the results and important implications.	Yes
OTHER			
Funding	11	Specify the primary source of funding for the review.	No
Registration	12	Provide the register name and registration number.	No