

Supplementary Appendix A - Search Results

PubMed – 3.17.2021		
Search #	Query	Results
#1	(Co-Design[tiab] OR Co-Creation[tiab] OR Co-Production[tiab] OR Participatory Design[tiab] OR Human Factors[tiab] OR User-Centered Design[mesh] OR User-Centered Design[tiab] OR Participatory Approach[tiab] OR Human-Centered Design[tiab] OR Universal design[mesh] OR Patient Participation[mesh] OR patient participation[tiab])	38,538
#2	(Aged[mesh] OR Older Adults[tiab] OR Older People[tiab] OR Elderly[tiab] OR Geriatric[tiab] OR Aged over 60[tiab] OR aged 60[tiab] OR Seniors[tiab] OR Over 65[tiab])	3,333,143
#3	(Electronic Health Records[mesh] OR Electronic Health Records[tiab] OR Electronic Health Record[tiab] OR Electronic Healthcare[tiab] OR eHealth[tiab] OR “mHealth”[tiab] OR Decision Aid[tiab] OR decision aids[tiab] OR Electronic Healthcare Aid[tiab] OR Healthcare Application[tiab] OR digital health[tiab] OR health information technology[tiab] OR health information technologies[tiab] OR health technology[tiab] OR health technologies[tiab])	59,271
#4	#1 AND #2 AND #3	495

Embase – 3.17.2021		
Search #	Query	Results
#1	('human factors research'/exp OR 'user-centered design'/exp OR 'Universal design'/exp OR 'Patient Participation'/exp OR ('co-design' OR 'Co-Creation' OR 'Co-Production' OR 'Participatory Design' OR 'Human Factors' OR 'user-centered design' OR 'Participatory Approach' OR 'Human-Centered Design' OR 'patient participation'):ab,ti)	42,464
#2	('aged'/exp OR ('older adult' OR 'older adults' OR 'older people' OR elderly OR geriatric OR geriatrics OR 'aged over 60' OR 'aged 60' OR 'over 60' OR 'aged over 65' OR 'aged 65' OR 'over 65' OR senior OR seniors):ab,ti)	3,460,578
#3	('electronic health record'/exp OR ('electronic health record' OR 'electronic health records' OR 'electronic healthcare' OR 'ehealth' OR 'mhealth' OR 'electronic decision aid' OR 'electronic decision aids' OR 'electronic healthcare aid' OR 'electronic healthcare aids' OR 'healthcare applications' OR 'Decision Aid' OR 'decision aids' OR 'digital health' OR 'health information technology' OR 'health information technologies' OR 'health technology' OR 'health technologies'):ab,ti)	59,924
#4	#1 AND #2 AND #3	246

Scopus – 3.17.2021		
Search #	Query	Results
#1	TITLE-ABS("co-design" OR "Co-Creation" OR "Co-Production" OR "Participatory Design" OR "Human Factors" OR "user-centered design" OR "Participatory Approach" OR "Human-Centered Design" OR "patient participation")	78,052
#2	TITLE-ABS("older adult" OR "older adults" OR "older people" OR elderly OR geriatric OR geriatrics OR "aged over 60" OR "aged 60" OR "over 60" OR "aged over 65" OR "aged 65" OR "over 65" OR senior OR seniors)	657,056

#3	TITLE-ABS("electronic health record" OR "electronic health records" OR "electronic healthcare" OR "ehealth" OR "mhealth" OR "electronic decision aid" OR "electronic decision aids" OR "electronic healthcare aid" OR "electronic healthcare aids" OR "healthcare applications" OR "Decision Aid" OR "decision aids" OR "digital health" OR "health information technology" OR "health information technologies" OR "health technology" OR "health technologies")	54,356
#4	#1 AND #2 AND #3	94

- records before duplicates removed: 835
- records after duplicates removed: 625

Supplementary Appendix B - Study Classification Methods

Category	Variable	Classification method
Summary characteristics	Year of publication	Metadata
	First author's geolocation	Metadata
	Study setting	Metadata
	Number of stakeholders	Metadata, mean
	Number of older adults	Metadata, mean
	Study population	Metadata
Co-design approaches	Terminology or definitions	Manual, binary
	Theoretical framework/design principles	Manual, binary
	Iterative development	Metadata, mean
Stakeholder involvement	Participant types	Metadata
	Types of Involvement Processes	Leinonen et.al [24]
	Learning Levels	Bateson [25], Argyris [26]
	Levels of participation	Vaughn et.al [3]
Electronic healthcare tools	Types of healthcare tools	WHO classification of digital health interventions [17]
	User testing	Metadata

Supplementary Appendix C

Author	Theoretical Framework/Co-Design Principle	Level of Involvement	Involvement Processes																	User Testing Measures and Validation						
			A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	Endpoint	Other	Objective Measure	Subjective Measure	Physiological	Validated	
Abujarad [52]	User Centered Design Approach	Empower																		confidence and computer efficacy			CES		X	
			X	X	X	X	X			X					X	X					emotional reactions			I-PANAS-SF		X
																					usability			SUS		X
Ahmed [34]	Participatory Design Approach Developed recommendations for framework	Empower																		health literacy			NVS		X	
			X	X					X			X	X			X				patient engagement - self report on health behaviors			ACE (Altarum Consumer Engagement)		X	
																					quality of decision aid			Ottawa Acceptability Scale		X
Bogza [29]	Center for eHealth and Wellbeing Research guidelines Inductive thematic qualitative analysis approach IPDAS	Empower																		satisfaction			Likart - unspecified			
					X	X	X								X	X					usability			SUS		X
																					Comprehension	teach back method		Decisional Conflict Scale		X
Cornet [12]	User Centered Design Developed recommendations for framework	Involve																		cognitive workload			NASA-TLX		X	
				X	X	X	X			X	X			X		X	X				health literacy			NVS		X
																					usability			SUS		X
																					user acceptance			Likart - unspecified		
Gonzalez [33]	none	Involve																		errors		Not stated				
																					appearance			Likart - unspecified		
																					comfort			Likart - unspecified		
					X																functionality			Likart - unspecified		
																					reliability			Likart - unspecified		
Grimaldi [11]	Human computer design approach ISO 13407:1999 [1] revised by ISO 9241-210:2010	Collaborate																		usability			Likart - unspecified			
				X	X	X	X			X			X		X					quality of interaction			Us.E 2.0			
																					satisfaction			Likart - unspecified		
Gustafson [14]	NIATx model as a framework Developed recommendations for framework	Empower																		errors		Not stated				
			X		X	X			X			X			X	X					usability	Spending time teaching older adults how to use technology in a classroom		Likart - unspecified		

																		setting						
Harrington [9]	Experience-based co-design Developed recommendations for framework	Empower																usability					Likart - unspecified	
																		usefulness	Likart - unspecified					
Harte [7]	HCD methodology ISO 9241-210 standards	Empower																cognitive workload					NASA-TLX	X
																		efficiency					ASQ	X
																		satisfaction					Likart - unspecified	
																		usability					SUS	X
																		errors		Mistakes Counted				
																		Performance		Time to Complete				
Hoffman [39]	IPDAS Ottawa Decision Support	Empower																quality of decision aid					Ottawa Acceptability Scale	X
																		values clarity					SURE	X
																		errors		Observed errors				
Holden [53]	Age-Related Research-Based Usability Guidelines Principles and Creative Human Factors Approaches	Empower																usability					SUS	X
																		errors		Mistakes Counted				
																		need for assistance		Times Request Assistance				
																		Performance		Time to Complete				
Kim [38]	Grounded theory approach	Involve																						
Mansson [35]	Karagianni's Optimized Honeycomb model	Empower																findable, accessible, usable, desirable, credible, useful, and valuable		LUX Honeycomb Model ALL QUALITATIVE				
Martin-Hammond [36]	Nielsen's Heuristics	Involve																usability	qualitative					
Nguyen [42]	Medical Research Council framework Developed recommendations for framework	Empower																satisfaction					Likart - unspecified	
																		errors		Observed errors				
																		Navigation	Google Analytics					
Nielsen [44]	HCD International Organization for Standardization (ISO) standards for human-centered design for	Empower																usability					Likart - unspecified	

Supplementary Appendix D

Co-Design Approach	Inform		Consult		Involve		Collaborate		Empower	
	n	ref	n	ref	n	ref	n	ref	n	ref
Co-creation (n=2)	2	[35,41]	2	[35,41]	2	[35,41]	2	[35,41]	2	[35,41]
Co-design (n=5)	5	[8,9,39,42,44]	5	[8,9,39,42,44]	5	[8,9,39,42,44]	5	[8,9,39,42,44]	5	[8,9,39,42,44]
Human centered computing (n=1)	1	[9]	1	[9]	1	[9]	1	[9]	1	[9]
Human Centered Design (HCD) (n=3)	3	[7,11,40]	3	[7,11,40]	3	[7,11,40]	2	[7,11]	1	[7]
Human Factors (n=1)	1	[33]	1	[33]	1	[33]	0		0	
Interaction Design Process (n=1)	1	[9]	1	[9]	1	[9]	1	[9]	1	[9]
Participatory Design (n=7)	7	[8,9,34,37,38,44,55]	7	[8,9,34,37,38,44,55]	7	[8,9,34,37,38,44,55]	5	[8,9,34,37,44]	5	[8,9,34,37,44]
Usability Evaluation Approach (n=1)	1	[43]	1	[43]	1	[43]	1	[43]	0	
User Centered Design/Approach (n=9)	9	[12,14,29,36,39,41,52-54]	9	[12,14,29,36,39,41,52-54]	9	[12,14,29,36,39,41,52-54]	5	[14,29,39,41,53]	6	[14,29,39,41,52,53]
Other (Did not Specify) (n=2)	2	[28,45]	2	[28,45]	1	[45]	1	[45]	1	[45]

