

Supplementary Material

APPENDIX 1. Search strategy for literature search.

DATABASE	QUERY	OUTPUT
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PubMed	<p>("Machine Learning"[Title/Abstract] OR "Artificial Intelligence"[Title/Abstract] OR "Natural Language Processing"[Title/Abstract] OR "Neural Networks (Computer)" [Title/Abstract] OR "Support Vector Machine"[Title/Abstract] OR "Naive Bayes" [Title/Abstract] OR "bayesian learning" [Title/Abstract] OR "random forest" [Title/Abstract] OR "boosting" [Title/Abstract] OR "deep learning" [Title/Abstract] OR "CNN" [Title/Abstract] OR "conventional neural network" [Title/Abstract] OR "machine intelligence" [Title/Abstract] OR "computational intelligence" [Title/Abstract] OR "computer reasoning" [Title/Abstract] OR "evolutionary computing" [Title/Abstract] OR "genetic algorithms" [Title/Abstract] OR "evolutionary algorithms" [Title/Abstract] OR "regression" [Title/Abstract] OR "decision tree" [Title/Abstract] OR "clustering" [Title/Abstract] OR "classification" [Title/Abstract] OR "case-based reasoning" [Title/Abstract] OR "qualitative reasoning" [Title/Abstract] OR "rule-based system" [Title/Abstract] OR "decision-theoretic planning" [Title/Abstract] OR "first-order logic" [Title/Abstract] OR "artificial neural network" [Title/Abstract] OR "intelligent agent" [Title/Abstract] OR "multi-agent system" [Title/Abstract] OR "fuzzy model" [Title/Abstract] OR "cellular automata" [Title/Abstract] OR "swarm intelligence" [Title/Abstract] OR "reinforcement learning" [Title/Abstract] OR "supervised learning" [Title/Abstract] OR "unsupervised learning" [Title/Abstract] OR "Bayesian network" [Title/Abstract] OR "inference" [Title/Abstract] OR "markov models" [Title/Abstract] OR "knowledge representation and reasoning" [Title/Abstract] OR "Machine learning"[MeSH] OR "Artificial Intelligence"[MeSH] OR "Natural Language Processing"[MeSH] OR "Neural Networks (Computer)"[MeSH] OR "Support Vector Machine"[MeSH] OR "Regression Analysis" [MeSH] OR "Decision Trees" [MeSH] OR "Supervised Machine Learning" [MeSH] OR "Unsupervised Machine Learning" [MeSH] OR "Sentiment analysis"[Title/Abstract] OR "fuzzy logic"[Title/Abstract] OR "markov system"[Title/Abstract] OR "finite-state machine"[Title/Abstract] OR "linear Discriminant Analysis"[Title/Abstract] OR "Super vector machine"[Title/Abstract] OR "k-nearest neighbor"[Title/Abstract] OR "data mining"[Title/Abstract] OR "opinion mining"[Title/Abstract] OR "cluster analysis"[Title/Abstract] OR "evolutionary computation"[Title/Abstract] OR "heuristic"[Title/Abstract] OR "k-means"[Title/Abstract] OR "particle swarm"[Title/Abstract] OR "Pattern recognition"[Title/Abstract] OR "self-organizing map"[Title/Abstract]) AND ("participatory health"[Title/Abstract] OR "patient engagement"[Title/Abstract] OR "participatory medicine"[Title/Abstract] OR "patient empowerment"[Title/Abstract] OR "shared decision making"[Title/Abstract] OR "patient-practitioner relationship"[Title/Abstract] OR "consumer health"[Title/Abstract] OR "consumer empowerment"[Title/Abstract] OR "consumer engagement"[Title/Abstract] OR "citizen health"[Title/Abstract] OR "citizen engagement"[Title/Abstract] OR "citizen empowerment"[Title/Abstract]) AND ("social media"[Title/Abstract] OR "facebook"[Title/Abstract] OR "twitter"[Title/Abstract] OR "youtube"[Title/Abstract] OR "instagram"[Title/Abstract] OR "whatsapp"[Title/Abstract] OR "social network site"[Title/Abstract] OR "online social network"[Title/Abstract] OR "social environment"[Title/Abstract] OR "social feedback"[Title/Abstract] OR "social network"[Title/Abstract] OR "discussion group"[Title/Abstract] OR "support group"[Title/Abstract] OR "community network"[Title/Abstract] OR "online community"[Title/Abstract] OR "second life"[Title/Abstract] OR "virtual worlds"[Title/Abstract] OR "virtual reality"[Title/Abstract] OR "web 3.0"[Title/Abstract] OR "medicine 2.0"[Title/Abstract] OR "health 2.0"[Title/Abstract] OR "web 2.0"[Title/Abstract] OR "blog"[Title/Abstract] OR "microblog"[Title/Abstract] OR "media sharing sites"[Title/Abstract] OR "wiki"[Title/Abstract] OR "crowdsourcing"[Title/Abstract] OR "conversational agent"[Title/Abstract])</p>	34
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EMBASE	<p>(Machine Learning or Artificial Intelligence or Natural Language Processing or Neural Networks or Support Vector Machine or Naive Bayes or bayesian learning or random forest or boosting or deep learning or CNN or conventional neural network or machine intelligence or computational intelligence or computer reasoning or evolutionary computing or genetic algorithms or evolutionary algorithms or regression or decision tree or clustering or classification or case-based reasoning or qualitative reasoning or rule-based system or decision-theoretic planning or first-order logic or artificial neural network or intelligent agent or multi-agent system or fuzzy model or cellular automata or swarm intelligence or reinforcement learning or supervised learning or unsupervised learning or Bayesian network or inference or markov models or knowledge representation and reasoning or Sentiment analysis or fuzzy logic or markov system or finite-state machine or linear Discriminant Analysis or Super vector machine or k-nearest neighbor or data mining or opinion mining or cluster analysis or evolutionary computation or heuristic or k-means or particle swarm or Pattern recognition or self-organizing map) and (participatory health or patient engagement or participatory medicine or patient empowerment or shared decision making or patient-practitioner relationship or consumer health or consumer empowerment or consumer engagement or citizen health or citizen engagement or citizen empowerment) and (social media or facebook or twitter or youtube or instagram or whatsapp or social network site or online social network or social environment or social feedback or social network or discussion group or support group or community network or online community or second life or virtual worlds or virtual reality or "web 3 0" or "medicine 2 0" or "health 2 0" or "web 2 0" or blog or microblog or media sharing sites or wiki or crowdsourcing or conversational agent).ab.</p>	12
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CINAHL	<p>(TI ("social media" OR "facebook" OR "twitter" OR "youtube" OR "instagram" OR "whatsapp" OR "social network site" OR "online social network" OR "social environment" OR "social feedback" OR "social network" OR "discussion group" OR "support group" OR "community network" OR "online community" OR "second life" OR "virtual worlds" OR "virtual reality" OR "web 3.0" OR "medicine 2.0" OR "health 2.0" OR "web 2.0" OR "blog" OR "microblog" OR "media sharing sites" OR "wiki" OR "crowdsourcing" OR "conversational agent") OR AB ("social media" OR "facebook" OR "twitter" OR "youtube" OR "instagram" OR "whatsapp" OR "social network site" OR "online social network" OR "social environment" OR "social feedback" OR "social network" OR "discussion group" OR "support group" OR "community network" OR "online community" OR "second life" OR "virtual worlds" OR "virtual reality" OR "web 3.0" OR "medicine 2.0" OR "health 2.0" OR "web 2.0" OR "blog" OR "microblog" OR "media sharing sites" OR "wiki" OR "crowdsourcing" OR "conversational agent")) AND (TI (Machine learning OR artificial intelligence OR natural language processing OR neural networks OR support vector machine OR Naive Bayes OR bayesian learning OR random forest* OR boosting OR deep learning OR CNN OR Convolutional neural network OR Recurrent neural network OR machine intelligence OR computational intelligence OR computer reasoning OR evolutionary computing OR genetic algorithms OR evolutionary algorithms OR regression OR decision tree OR clustering OR classification OR case-based reasoning OR knowledge-based reasoning OR qualitative reasoning OR rule-based system OR decision-theoretic planning OR first-order logic OR artificial neural network OR intelligent agent OR multi-agent system OR fuzzy model OR cellular automata OR swarm intelligence OR reinforcement learning OR supervised learning OR unsupervised learning OR bayesian network inference OR markov models OR knowledge representation reasoning OR Sentiment Analysis OR fuzzy logic OR markov system OR finite-state machine OR linear Discriminant Analysis OR Super vector machine OR k-nearest neighbor OR k-nearest neighbor OR data mining OR opinion mining OR cluster analysis OR evolutionary computation OR heuristic OR k-means OR particle swarm OR Pattern recognition OR self-organizing map) OR AB (Machine learning OR artificial intelligence OR natural language processing OR neural networks OR support vector machine OR Naive Bayes OR bayesian learning OR random forest* OR boosting OR deep learning OR CNN OR Convolutional neural network OR Recurrent neural network OR machine intelligence OR computational intelligence OR computer reasoning OR evolutionary computing OR genetic algorithms OR evolutionary algorithms OR regression OR decision tree OR clustering OR classification OR case-based reasoning OR knowledge-based reasoning OR qualitative reasoning OR rule-based system OR decision-theoretic planning OR first-order logic OR artificial neural network OR intelligent agent OR multi-agent system OR fuzzy model OR cellular automata OR swarm intelligence OR reinforcement learning OR supervised learning OR unsupervised learning OR bayesian network inference OR markov models OR knowledge representation reasoning OR Sentiment Analysis OR fuzzy logic OR markov system OR finite-state machine OR linear Discriminant Analysis OR Super vector machine OR k-nearest neighbor OR k-nearest neighbor OR data mining OR opinion mining OR cluster analysis OR evolutionary computation OR heuristic OR k-means OR particle swarm OR Pattern recognition OR self-organizing map)) AND (TI ("participatory health" OR "patient engagement" OR "participatory medicine" OR "patient empowerment" OR "shared decision making" OR "patient-practitioner relationship" OR "consumer health" OR "consumer empowerment" OR "consumer engagement" OR "citizen health" OR "citizen engagement" OR "citizen empowerment") OR AB ("participatory health" OR "patient engagement" OR "participatory medicine" OR "patient empowerment" OR "shared decision making" OR "patient-practitioner relationship" OR "consumer health" OR "consumer empowerment" OR "consumer engagement" OR "citizen health" OR "citizen engagement" OR</p>	6
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“citizen empowerment”))

PsychInfo	<p>(TI,AB("social media" OR "facebook" OR "twitter" OR "youtube" OR "instagram" OR "whatsapp" OR "social network site" OR "online social network" OR "social environment" OR "social feedback" OR "social network" OR "discussion group" OR "support group" OR "community network" OR "online community" OR "second life" OR "virtual worlds" OR "virtual reality" OR "web 3.0" OR "medicine 2.0" OR "health 2.0" OR "web 2.0" OR "blog" OR "microblog" OR "media sharing sites" OR "wiki" OR "crowdsourcing" OR "conversational agent")) AND (AB,TI("Machine learning" OR "artificial intelligence" OR "natural language processing" OR "neural networks" OR "support vector machine" OR "Naive Bayes" OR "bayesian learning" OR "random forest*" OR "boosting" OR "deep learning" OR "CNN" OR "Convolutional neural network" OR "Recurrent neural network" OR "machine intelligence" OR "computational intelligence" OR "computer reasoning" OR "evolutionary computing" OR "genetic algorithms" OR "evolutionary algorithms" OR "regression" OR "decision tree" OR "clustering" OR "classification" OR "case-based reasoning" OR "knowledge-based reasoning" OR "qualitative reasoning" OR "rule-based system" OR "decision-theoretic planning" OR "first-order logic" OR "artificial neural network" OR "intelligent agent" OR "multi-agent system" OR "fuzzy model" OR "cellular automata" OR "swarm intelligence" OR "reinforcement learning" OR "supervised learning" OR "unsupervised learning" OR "bayesian network inference" OR "markov models" OR "knowledge representation reasoning" OR "Sentiment Analysis" OR "fuzzy logic" OR "markov system" OR "finite-state machine" OR "linear Discriminant Analysis" OR "Super vector machine" OR "k-nearest neighbor" OR "k-nearest neighbour" OR "data mining" OR "opinion mining" OR "cluster analysis" OR "evolutionary computation" OR "heuristic" OR "k-means" OR "particle swarm" OR "Pattern recognition" OR "self-organizing map")) AND (AB,TI("participatory health" OR "patient engagement" OR "participatory medicine" OR "patient empowerment" OR "shared decision making" OR "patient-practitioner relationship" OR "consumer health" OR "consumer empowerment" OR "consumer engagement" OR "citizen health" OR "citizen engagement" OR "citizen empowerment"))</p>	6
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<p>ACM Digital</p>	<p>acmdlTitle:(("social media" "facebook" "twitter" "youtube" "instagram" "whatsapp" "social network site" "online social network" "social environment" "social feedback" "social network" "discussion group" "support group" "community network" "online community" "second life" "virtual worlds" "virtual reality" "web 3.0" "medicine 2.0" "health 2.0" "web 2.0" "blog" "microblog" "media sharing sites" "wiki" "crowdsourcing" "conversational agent") +("Machine learning" "artificial intelligence" "natural language processing" "neural networks" "support vector machine" "Naive Bayes" "bayesian learning" "random forest" "boosting" "deep learning" "CNN" "Convolutional neural network" "Recurrent neural network" "machine intelligence" "computational intelligence" "computer reasoning" "evolutionary computing" "genetic algorithms" "evolutionary algorithms" "regression" "decision tree" "clustering" "classification" "case-based reasoning" "knowledge-based reasoning" "qualitative reasoning" "rule-based system" "decision-theoretic planning" "first-order logic" "artificial neural network" "intelligent agent" "multi-agent system" "fuzzy model" "cellular automata" "swarm intelligence" "reinforcement learning" "supervised learning" "unsupervised learning" "bayesian network inference" "markov models" "knowledge representation reasoning" "Sentiment Analysis" "fuzzy logic" "markov system" "finite-state machine" "linear Discriminant Analysis" "Super vector machine" "k-nearest neighbor" "k-nearest neighbour" "data mining" "opinion mining" "cluster analysis" "evolutionary computation" "heuristic" "k-means" "particle swarm" "Pattern recognition" "self-organizing map") +("participatory health" "patient engagement" "participatory medicine" "patient empowerment" "shared decision making" "patient-practitioner relationship" "consumer health" "consumer empowerment" "consumer engagement" "citizen health" "citizen engagement" "citizen empowerment")) OR record Abstract:(("social media" "facebook" "twitter" "youtube" "instagram" "whatsapp" "social network site" "online social network" "social environment" "social feedback" "social network" "discussion group" "support group" "community network" "online community" "second life" "virtual worlds" "virtual reality" "web 3.0" "medicine 2.0" "health 2.0" "web 2.0" "blog" "microblog" "media sharing sites" "wiki" "crowdsourcing" "conversational agent") +("Machine learning" "artificial intelligence" "natural language processing" "neural networks" "support vector machine" "Naive Bayes" "bayesian learning" "random forest" "boosting" "deep learning" "CNN" "Convolutional neural network" "Recurrent neural network" "machine intelligence" "computational intelligence" "computer reasoning" "evolutionary computing" "genetic algorithms" "evolutionary algorithms" "regression" "decision tree" "clustering" "classification" "case-based reasoning" "knowledge-based reasoning" "qualitative reasoning" "rule-based system" "decision-theoretic planning" "first-order logic" "artificial neural network" "intelligent agent" "multi-agent system" "fuzzy model" "cellular automata" "swarm intelligence" "reinforcement learning" "supervised learning" "unsupervised learning" "bayesian network inference" "markov models" "knowledge representation reasoning" "Sentiment Analysis" "fuzzy logic" "markov system" "finite-state machine" "linear Discriminant Analysis" "Super vector machine" "k-nearest neighbor" "k-nearest neighbour" "data mining" "opinion mining" "cluster analysis" "evolutionary computation" "heuristic" "k-means" "particle swarm" "Pattern recognition" "self-organizing map") +("participatory health" "patient engagement" "participatory medicine" "patient empowerment" "shared decision making" "patient-practitioner relationship" "consumer health" "consumer empowerment" "consumer engagement" "citizen health" "citizen engagement" "citizen empowerment"))</p>	<p>2</p>
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IEEExplore	<p>((("Document Title": "social media" OR "facebook" OR "twitter" OR "youtube" OR "instagram" OR "whatsapp" OR "social network site" OR "online social network" OR "social environment" OR "social feedback" OR "social network" OR "discussion group" OR "support group" OR "community network" OR "online community" OR "second life" OR "virtual worlds" OR "virtual reality" OR "web 3.0" OR "medicine 2.0" OR "health 2.0" OR "web 2.0" OR "blog" OR "microblog" OR "media sharing sites" OR "wiki" OR "crowdsourcing" OR "conversational agent") AND ("Document Title": "Machine learning" OR "artificial intelligence" OR "natural language processing" OR "neural networks" OR "support vector machine" OR "Naive Bayes" OR "bayesian learning" OR "random forest*" OR "boosting" OR "deep learning" OR "CNN" OR "Convolutional neural network" OR "Recurrent neural network" OR "machine intelligence" OR "computational intelligence" OR "computer reasoning" OR "evolutionary computing" OR "genetic algorithms" OR "evolutionary algorithms" OR "regression" OR "decision tree" OR "clustering" OR "classification" OR "case-based reasoning" OR "knowledge-based reasoning" OR "qualitative reasoning" OR "rule-based system" OR "decision-theoretic planning" OR "first-order logic" OR "artificial neural network" OR "intelligent agent" OR "multi-agent system" OR "fuzzy model" OR "cellular automata" OR "swarm intelligence" OR "reinforcement learning" OR "supervised learning" OR "unsupervised learning" OR "bayesian network inference" OR "markov models" OR "knowledge representation reasoning" OR "Sentiment Analysis" OR "fuzzy logic" OR "markov system" OR "finite-state machine" OR "linear Discriminant Analysis" OR "Super vector machine" OR "k-nearest neighbor" OR "k-nearest neighbour" OR "data mining" OR "opinion mining" OR "cluster analysis" OR "evolutionary computation" OR "heuristic" OR "k-means" OR "particle swarm" OR "Pattern recognition" OR "self-organizing map") AND ("Document Title": "participatory health" OR "patient engagement" OR "participatory medicine" OR "patient empowerment" OR "shared decision making" OR "patient-practitioner relationship" OR "consumer health" OR "consumer empowerment" OR "consumer engagement" OR "citizen health" OR "citizen engagement" OR "citizen empowerment")) OR (("Abstract": "social media" OR "facebook" OR "twitter" OR "youtube" OR "instagram" OR "whatsapp" OR "social network site" OR "online social network" OR "social environment" OR "social feedback" OR "social network" OR "discussion group" OR "support group" OR "community network" OR "online community" OR "second life" OR "virtual worlds" OR "virtual reality" OR "web 3.0" OR "medicine 2.0" OR "health 2.0" OR "web 2.0" OR "blog" OR "microblog" OR "media sharing sites" OR "wiki" OR "crowdsourcing" OR "conversational agent") AND ("Abstract": "Machine learning" OR "artificial intelligence" OR "natural language processing" OR "neural networks" OR "support vector machine" OR "Naive Bayes" OR "bayesian learning" OR "random forest*" OR "boosting" OR "deep learning" OR "CNN" OR "Convolutional neural network" OR "Recurrent neural network" OR "machine intelligence" OR "computational intelligence" OR "computer reasoning" OR "evolutionary computing" OR "genetic algorithms" OR "evolutionary algorithms" OR "regression" OR "decision tree" OR "clustering" OR "classification" OR "case-based reasoning" OR "knowledge-based reasoning" OR "qualitative reasoning" OR "rule-based system" OR "decision-theoretic planning" OR "first-order logic" OR "artificial neural network" OR "intelligent agent" OR "multi-agent system" OR "fuzzy model" OR "cellular automata" OR "swarm intelligence" OR "reinforcement learning" OR "supervised learning" OR "unsupervised learning" OR "bayesian network inference" OR "markov models" OR "knowledge representation reasoning" OR "Sentiment Analysis" OR "fuzzy logic" OR "markov system" OR "finite-state machine" OR "linear Discriminant Analysis" OR "Super vector machine" OR "k-nearest neighbor" OR "k-nearest neighbour" OR "data mining" OR "opinion mining" OR "cluster analysis" OR "evolutionary computation" OR "heuristic" OR "k-means" OR "particle swarm" OR "Pattern recognition" OR "self-organizing map") AND ("Abstract": "participatory health"</p>	10
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	<p>OR "patient engagement" OR "participatory medicine" OR "patient empowerment" OR "shared decision making" OR "patient-practitioner relationship" OR "consumer health" OR "consumer empowerment" OR "consumer engagement" OR "citizen health" OR "citizen engagement" OR "citizen empowerment"))</p>	
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Scopus	TITLE-ABS-KEY(("social media" OR "facebook" OR "twitter" OR "youtube" OR "instagram" OR "whatsapp" OR "social network site" OR "online social network" OR "social environment" OR "social feedback" OR "social network" OR "discussion group" OR "support group" OR "community network" OR "online community" OR "second life" OR "virtual worlds" OR "virtual reality" OR "web 3.0" OR "medicine 2.0" OR "health 2.0" OR "web 2.0" OR "blog" OR "microblog" OR "media sharing sites" OR "wiki" OR "crowdsourcing" OR "conversational agent") AND ("Machine learning" OR "artificial intelligence" OR "natural language processing" OR "neural networks" OR "support vector machine" OR "Naive Bayes" OR "bayesian learning" OR "random forest" OR "boosting" OR "deep learning" OR "CNN" OR "Convolutional neural network" OR "Recurrent neural network" OR "machine intelligence" OR "computational intelligence" OR "computer reasoning" OR "evolutionary computing" OR "genetic algorithms" OR "evolutionary algorithms" OR "regression" OR "decision tree" OR "clustering" OR "classification" OR "case-based reasoning" OR "knowledge-based reasoning" OR "qualitative reasoning" OR "rule-based system" OR "decision-theoretic planning" OR "first-order logic" OR "artificial neural network" OR "intelligent agent" OR "multi-agent system" OR "fuzzy model" OR "cellular automata" OR "swarm intelligence" OR "reinforcement learning" OR "supervised learning" OR "unsupervised learning" OR "bayesian network inference" OR "markov models" OR "knowledge representation reasoning" OR "Sentiment Analysis" OR "fuzzy logic" OR "markov system" OR "finite-state machine" OR "linear Discriminant Analysis" OR "Super vector machine" OR "k-nearest neighbor" OR "k-nearest neighbour" OR "data mining" OR "opinion mining" OR "cluster analysis" OR "evolutionary computation" OR "heuristic" OR "k-means" OR "particle swarm" OR "Pattern recognition" OR "self-organizing map") AND ("participatory health" OR "patient engagement" OR "participatory medicine" OR "patient empowerment" OR "shared decision making" OR "patient-practitioner relationship" OR "consumer health" OR "consumer empowerment" OR "consumer engagement" OR "citizen health" OR "citizen engagement" OR "citizen empowerment"))	143
	TOTAL	213

Search date: 10th August 2018

Appendix 2. PRISMA checklist.

Section/topic	#	Checklist item	Reported in chapter #
TITLE			
Title	1	Identify the report as a systematic review, meta-analysis, or both.	Title
ABSTRACT			
Structured summary	2	Provide a structured summary including, as applicable: background; objectives; data sources; study eligibility criteria, participants, and interventions, study appraisal and synthesis methods, results, limitations, conclusions, and implications of key findings, systematic review registration number.	Abstract
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of what is already known.	1
Objectives	4	Provide an explicit statement of questions being addressed with references to participants, interventions, comparisons, outcomes, and study design (PICOS).	1 and 2
METHODS			
Protocol and registration	5	Indicate if a review protocol exists, if and where it can be accessed (e.g., Web address), and, if available, provide registration information including registration number.	N/A
Eligibility criteria	6	Specify study characteristics (e.g., PICOS, length of follow-up) and report characteristics (e.g., years considered, language, publication status) used as criteria for eligibility, giving rationale.	2
Information sources	7	Describe all information sources (e.g., databases with dates of coverage, contact with study authors to identify additional studies) in the search and date last searched.	2 and Appendix 1
Search	8	Present full electronic search strategy for at least one database, including any limits used, such that it could be repeated.	Appendix 1
Study selection	9	State the process for selecting studies (i.e., screening, eligibility, included in systematic review, and, if applicable, included in the meta-analysis).	2 and Figure 1 and 2
Data collection process	10	Describe method of data extraction from reports (e.g., piloted forms, independently, in duplicate) and any processes for obtaining and confirming data from investigators.	2
Data items	11	List and define all variables for which data were sought (e.g., PICOS, funding sources) and any assumptions and simplifications made.	2
Risk of bias in individual studies	12	Describe methods used for assessing risk of bias of individual studies (including specification of whether this was done at the study or outcome level), and how this information is to be used in any data synthesis.	N/A
Summary measures	13	State the principal summary measures (e.g., risk ratio, difference in means).	N/A
Synthesis of results	14	Describe the methods of handling data and combining results of studies, if done, including measures of consistency (e.g., I^2) for each meta-analysis.	N/A
Risk of bias across studies	15	Specify any assessment of risk of bias that may affect the cumulative evidence (e.g., publication bias, selective reporting within studies).	N/A
Additional analyses	16	Describe methods of additional analyses (e.g., sensitivity or subgroup analyses, meta-regression), if done, indicating which were pre-specified.	N/A
RESULTS			
Study selection	17	Give numbers of studies screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally with a flow diagram.	
Study characteristics	18	For each study, present characteristics for which data were extracted (e.g., study size, PICOS, follow-up period) and provide the citations.	3

Risk of bias within studies	19	Present data on risk of bias of each study and, if available, any outcome level assessment (see item 12).	N/A
Results of individual studies	20	For all outcomes considered (benefits or harms), present, for each study: (a) simple summary data for each intervention group (b) effect estimates and confidence intervals, ideally with a forest plot.	Appendix 4 and 5
Synthesis of results	21	Present results of each meta-analysis done, including confidence intervals and measures of consistency.	N/A
Risk of bias across studies	22	Present results of any assessment of risk of bias across studies (see Item 15).	N/A
Additional analysis	23	Give results of additional analyses, if done (e.g., sensitivity or subgroup analyses, meta-regression [see Item 16]).	N/A
DISCUSSION			
Summary of evidence	24	Summarize the main findings including the strength of evidence for each main outcome; consider their relevance to key groups (e.g., healthcare providers, users, and policy makers).	4 and Appendix 4 and 5
Limitations	25	Discuss limitations at study and outcome level (e.g., risk of bias), and at review-level (e.g., incomplete retrieval of identified research, reporting bias).	4
Conclusions	26	Provide a general interpretation of the results in the context of other evidence, and implications for future research.	5
FUNDING			
Funding	27	Describe sources of funding for the systematic review and other support (e.g., supply of data); role of funders for the systematic review.	No funding

Appendix 3: Search strategy for trial search on Clinicaltrials.gov.

Query	Output
"AI" OR "Artificial Intelligence" AND "mobile phone"	4
"AI" OR "Artificial Intelligence" AND "wearable"	1
"AI" OR "Artificial Intelligence" AND "smart phone"	6
"Textmining" OR "Text mining"	1
"Social media" OR "social network"	0
"Conversational agent" OR "conversational UI" OR "conversational user interface"	12
"Machine learning"	1
"Chatbot"	4
TOTAL	29

Search data: 11th October 2018

Appendix 4: Papers reporting artificial intelligence (AI) applications in participatory health.

Author, year	Health domain	Purpose	Platform	AI task	Study type & methods	User type	Evaluation approach
Huh et al., 2013 [22]	Diabetes	Determine whether a thread in an online health forum needs moderators' help	WebMD	Classification (binary)	Secondary use of self-reported data	Healthcare Consumers	Technical performance
Zhang et al., 2014 [23]	Diabetes	Identify use of diabetes-related terms across different categories	Yahoo! Answers (Q&A site)	Clustering & visualization	Secondary use of self-reported data	Healthcare Consumers	Technical performance
Grabar & Hamon, 2014 [24]	Diabetes, backache, hypertension	Automatic paraphrasing of technical medical terms	Online French discussion forums	Natural language processing (NLP)	Secondary use of self-reported data	Healthcare Consumers	Technical performance and manual review
Yin et al., 2015 [25]	Non-specific	Detect personal health status mentions in tweets	Twitter	Classification	Secondary use of self-reported data	Healthcare Consumers	Technical performance
Rastegar-Mojarad et al., 2015 [14]	Non-specific	Create a corpus of patient experience at healthcare facilities (e.g. hospitals, urgent care facilities, and medical centres)	Yelp reviews	NLP Sentiment analysis &	Secondary use of self-reported data	Healthcare Consumers	Co-occurrence analysis

<p>Demner-Fushman & Elhadad, 2016 [33]</p>	<p>Non-specific</p>	<p>Review NLP research in clinical and consumer-generated text</p>	<p>Social media (e.g. RateMD, Twitter, Wikipedia), health-related posts (e.g. MedlinePlus), consumer health question answering, clinical texts</p>	<p>NLP</p>	<p>Narrative review</p>	<p>Clinicians, healthcare consumers</p>	<p>Commentary on progress and trends in NLP of clinical text processing and social media text analysis</p>
<p>Deetjen & Powell, 2016 [26]</p>	<p>14 chronic medical conditions</p>	<p>Identify whether forum posts contain informational and/or emotional elements, and the factors associated with the informational and/or emotional nature of the post</p>	<p>Dailystrength.org</p>	<p>Classification (Bayesian)</p>	<p>Secondary use of self-reported data</p>	<p>Healthcare Consumers</p>	<p>Multilevel logistic regression</p>
<p>Yang et al., 2016 [27]</p>	<p>Breast cancer</p>	<p>Extract medical terms (conditions, symptoms, treatments, effectiveness and side effects) for each question in an online health forum</p>	<p>Medlinehelp.org</p>	<p>Sentiment analysis, clustering, Latent Dirichlet Allocation</p>	<p>Secondary use of self-reported data</p>	<p>Healthcare Consumers</p>	<p>Technical performance</p>

Wang et al., 2017 [28]	Breast cancer	Predict whether a user will churn from the online community based on usage data	Breastcancer.org	Text classification	Secondary use of self-reported data	Cancer survivors	Technical performance
Rocchetti et al., 2017 [29]	Crohn's disease	Investigate patients' perspectives on medication Infliximab	Facebook and Twitter	Sentiment analysis	Secondary use of self-reported data	Patients with Crohn's disease	Interrater reliability
Adams et al., 2017 [30]	Joint & muscle pain relief	Identify safety and efficacy concerns on over-the-counter treatments from online reviews	Amazon's online product reviews	Sentiment analysis	Secondary use of self-reported data	Healthcare Consumers	Interrater reliability
He et al., 2017 [35]	Diabetes, Cancer	Mine consumer health expressions consumers used in social media	Yahoo! Answers (Q&A site)	K-means clustering	Secondary use of self-reported data	Healthcare Consumers	Technical performance and manual review
Nguyen et al., 2017 [31]	Mental health	Identify adverse drug reactions (ADR) of psychiatric medications mentioned in social media	Twitter, Reddit, and LiveJournal	Deep learning	Secondary use of self-reported data	Healthcare Consumers	Rates of ADR in social media corpus, and agreement measured by Pearson correlation coefficient

<p>Eletriby et al., 2017 [32]</p>	<p>Lung and respiratory disorders</p>	<p>Extract important contextual information missing from questions and answers posted in online forums</p>	<p>Medlinehelp.org</p>	<p>NLP and Machine Learning</p>	<p>Secondary use of self-reported data</p>	<p>Healthcare Consumers</p>	<p>Technical performance</p>
<p>Staccini & Frenandez-Luque, 2017 [17]</p>	<p>Non-specific</p>	<p>Review secondary use of patient data, and identify 5 top papers in 2016</p>	<p>Non-specific (but primarily Twitter)</p>	<p>Non-specific (but primarily machine learning)</p>	<p>Narrative review</p>	<p>Healthcare Consumers</p>	<p>Commentary on secondary use of patient data in 2016, focusing on formal requirements of informed consent, and machine learning approaches to elicit patient experience with health care delivery, drug and medication use, barriers to cancer treatment, and acceptance of vaccination</p>

<p>Gonzalez-Hernandez et al., 2017 [12]</p>	<p>Non-specific</p>	<p>Review of NLP techniques in EHR and social media</p>	<p>EHR (ShARe, i2b2, THYME), generic social networks (Facebook, Twitter, and Instagram), and domain-specific social networks (PatientsLikeMe, DailyStrength)</p>	<p>NLP</p>	<p>Narrative review</p>	<p>Clinicians, healthcare consumers</p>	<p>Commentary on challenges, applications and insights in health text processing in EHR and social media</p>
<p>Laranjo et al., 2018 [21]</p>	<p>Non-specific</p>	<p>Review the characteristics, applications, and evaluation measures of conversational agents for patients and clinicians</p>	<p>Unconstrained natural language input</p>	<p>Conversational agent</p>	<p>Systematic review</p>	<p>Clinicians, healthcare consumers</p>	<p>Commentary on the emerging nature of these technologies, calling for rigorous studies to evaluate their efficacy and safety.</p>

Appendix 5: Clinical trials reporting artificial intelligence (AI) applications in participatory health.

Author, year	Health domain	Purpose	Technology / AI task	Study type and methods
Mohr [42]	Major Depressive Disorder, Anxiety Disorders	Treatment	Mobile application, patient tailored treatment material, motivational statements created using machine learning	Single group
Mohr et al. [43]	Depression, anxiety	Treatment	App with recommender system and coaching	Factorial assignment, no masking, randomized allocation
Labovitz et al. [44]	Stroke	Treatment	AI platform on mobile devices has also been used to measure and increase medication adherence	Parallel assignment, no masking, randomized allocation
Wall [45]	Autism spectrum disorder	Treatment	Autism glass / google glass	Crossover assignment, double blind, randomized
Wong [68]	Preterm birth	Observation	Conversational user interface	Cohort study
Kowatsch [46]	Physical activity	Prevention	Ally – mHealth intervention for self-regulation	Factorial assignment, randomized
Paasche-Orlow [38]	Palliative care in cancer patients	Supportive care	Embodied conversational agent	Parallel assignment, no masking, randomized
Fitzpatrick et al. [39]	Mental Health	Supportive care	Use of smartphone app vs. treatment as usual	Parallel assignment, no masking, randomized
Sullivan [40]	Smoking cessation	Treatment	Messaging program intervention	Parallel assignment, double masked, randomized
Magnani [41]	Atrial Fibrillation	Health services research	Embodied conversational agent plus mobile application Kardia	Single group assignment, no masking, randomized
Litwin [64]	Opiate addiction	Device	Artificial intelligence platform to automatically confirm medication ingestion, AI for computer vision	Interventional, single group assignment, no masking
Mitchell [65]	Chronic pain, depression	Device	Relational agent is a human animation program	Single group assignment, no masking