PRISMA 2020 Checklist Supplement 1

Section and Topic	Item #	Checklist item	Location where item is reported
TITLE			
Title	1	Identify the report as a systematic review.	1
ABSTRACT			
Abstract	2	See the PRISMA 2020 for Abstracts checklist.	2
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of existing knowledge.	4-6
Objectives	4	Provide an explicit statement of the objective(s) or question(s) the review addresses.	6
METHODS			
Eligibility criteria	5	Specify the inclusion and exclusion criteria for the review and how studies were grouped for the syntheses.	7
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.	7
Search strategy	7	Present the full search strategies for all databases, registers and websites, including any filters and limits used.	Supplement 2
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.	7-8
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.	7-8
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.	8
	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.	Supplement 3
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.	9
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.	8-9
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)).	n/a
	13b	Describe any methods required to prepare the data for presentation or synthesis, such as handling of missing summary statistics, or data conversions.	n/a
	13c	Describe any methods used to tabulate or visually display results of individual studies and syntheses.	n/a
	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.	n/a

Section and Topic	Item #	Checklist item	Location where item is reported
	13e	Describe any methods used to explore possible causes of heterogeneity among study results (e.g. subgroup analysis, meta-regression).	n/a
	13f	Describe any sensitivity analyses conducted to assess robustness of the synthesized results.	n/a
Reporting bias assessment	14	Describe any methods used to assess risk of bias due to missing results in a synthesis (arising from reporting biases).	n/a
Certainty assessment	15	Describe any methods used to assess certainty (or confidence) in the body of evidence for an outcome.	n/a
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.	11 Figure 1
	16b	Cite studies that might appear to meet the inclusion criteria, but which were excluded, and explain why they were excluded.	11
Study characteristics	17	Cite each included study and present its characteristics.	Table 1
Risk of bias in studies	18	Present assessments of risk of bias for each included study.	Figure 4
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.	Table 1, Figure 2, Figure 5
Results of syntheses	20a	For each synthesis, briefly summarise the characteristics and risk of bias among contributing studies.	14
	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.	n/a
	20c	Present results of all investigations of possible causes of heterogeneity among study results.	14-15
	20d	Present results of all sensitivity analyses conducted to assess the robustness of the synthesized results.	14-15
Reporting biases	21	Present assessments of risk of bias due to missing results (arising from reporting biases) for each synthesis assessed.	n/a
Certainty of evidence	22	Present assessments of certainty (or confidence) in the body of evidence for each outcome assessed.	n/a
DISCUSSION			
Discussion	23a	Provide a general interpretation of the results in the context of other evidence.	16
	23b	Discuss any limitations of the evidence included in the review.	22
	23c	Discuss any limitations of the review processes used.	22
	23d	Discuss implications of the results for practice, policy, and future research.	23
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.	7
	24b	Indicate where the review protocol can be accessed, or state that a protocol was not prepared.	n/a
	24c	Describe and explain any amendments to information provided at registration or in	n/a

Section and Topic	Item #	Checklist item	Location where item is reported
		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.	1
Competing interests	26	Declare any competing interests of review authors.	1
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.	Supplement 4

From: Page MJ, McKenzie JE, Bossuyt PM, Boutron I, Hoffmann TC, Mulrow CD, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. BMJ 2021;372:n71. doi: 10.1136/bmj.n71

Supplement 2

PubMed search strategy

Search	Query	Items found
#18	((((((((((medication[Title/Abstract] OR medicine[Title/Abstract] OR medications[Title/Abstract] OR medicines[Title/Abstract])))) OR ("Drug Therapy/drug therapy"[Mesh] OR "Drug Therapy/pharmacology"[Mesh] OR "Drug Therapy/psychology"[Mesh] OR "Drug Therapy/therapeutic use"[Mesh] OR "Drug Therapy/therapy"[Mesh]))) AND ((("Randomized Controlled Trial" [Publication Type] OR "clinical trial"[publication type])) OR (randomize[Title/Abstract] OR randomise[Title/Abstract] OR control[Title/Abstract] OR randomized[Title/Abstract] OR randomised[Title/Abstract] OR controlled[Title/Abstract])))) AND (((belief[Title/Abstract] OR beliefs[Title/Abstract])) OR (attitude[Title/Abstract] OR attitudes[Title/Abstract])))) NOT ("Medication Errors"[Mesh] OR medication errors[Title]))) NOT ((((("Medication Errors"[Mesh] OR medication errors[Title])) OR ((Cross-Sectional Studies[Mesh] OR cross-sectional[Title] OR systematic review[Title])))) OR ((horse[Title] OR sheep[Title] OR bovine[Title] OR mouse[Title] OR animal[title]))))	3500
#17	((("Medication Errors"[Mesh] OR medication errors[Title])) OR ((Cross-Sectional Studies[Mesh] OR cross-sectional[Title] OR systematic review[Title]))) OR ((horse[Title] OR sheep[Title] OR bovine[Title] OR mouse[Title] OR animal[title]))	763247
#16	(((((((((medication[Title/Abstract] OR medicine[Title/Abstract] OR medications[Title/Abstract] OR medicines[Title/Abstract])))) OR ("Drug Therapy/drug therapy"[Mesh] OR "Drug Therapy/pharmacology"[Mesh] OR "Drug Therapy/psychology"[Mesh] OR "Drug Therapy/therapeutic use"[Mesh] OR "Drug Therapy/therapy"[Mesh]))) AND ((("Randomized Controlled Trial" [Publication Type] OR "clinical trial"[publication type])) OR (randomize[Title/Abstract] OR randomise[Title/Abstract] OR control[Title/Abstract] OR randomized[Title/Abstract] OR randomised[Title/Abstract] OR controlled[Title/Abstract])))) AND (((belief[Title/Abstract] OR beliefs[Title/Abstract])) OR (attitude[Title/Abstract] OR attitudes[Title/Abstract])))) NOT ((horse[Title] OR sheep[Title] OR bovine[Title] OR mouse[Title] OR animal[title]))	3337
#15	(horse[Title] OR sheep[Title] OR bovine[Title] OR mouse[Title] OR animal[title])	389429
#14	(((((((((medication[Title/Abstract] OR medicine[Title/Abstract] OR medications[Title/Abstract] OR medicines[Title/Abstract])))) OR ("Drug Therapy/drug therapy"[Mesh] OR "Drug Therapy/pharmacology"[Mesh] OR "Drug Therapy/psychology"[Mesh] OR "Drug Therapy/therapeutic use"[Mesh] OR "Drug Therapy/therapy"[Mesh]))) AND ((("Randomized Controlled Trial" [Publication Type] OR "clinical trial"[publication type])) OR (randomize[Title/Abstract] OR randomise[Title/Abstract] OR control[Title/Abstract] OR randomized[Title/Abstract] OR randomised[Title/Abstract] OR controlled[Title/Abstract])))) AND (((belief[Title/Abstract] OR beliefs[Title/Abstract])) OR (attitude[Title/Abstract] OR attitudes[Title/Abstract])))) NOT ((Cross-Sectional Studies[Mesh] OR cross-sectional[Title] OR systematic review[Title]))	2977
#13	(Cross-Sectional Studies[Mesh] OR cross-sectional[Title] OR systematic review[Title])	360597
#12	(((((((((medication[Title/Abstract] OR medicine[Title/Abstract] OR medications[Title/Abstract] OR medicines[Title/Abstract])))) OR ("Drug Therapy/drug therapy"[Mesh] OR "Drug Therapy/pharmacology"[Mesh] OR "Drug Therapy/psychology"[Mesh] OR "Drug Therapy/therapeutic use"[Mesh] OR "Drug Therapy/therapy"[Mesh]))) AND ((("Randomized Controlled Trial" [Publication Type] OR "clinical trial"[publication type])) OR (randomize[Title/Abstract] OR randomise[Title/Abstract] OR control[Title/Abstract] OR randomized[Title/Abstract] OR randomised[Title/Abstract] OR controlled[Title/Abstract])))) AND (((belief[Title/Abstract] OR beliefs[Title/Abstract])) OR (attitude[Title/Abstract] OR attitudes[Title/Abstract])))) NOT ("Medication Errors"[Mesh] OR medication errors[Title])	3308
#11	"Medication Errors"[Mesh] OR medication errors[Title]	15034
#10	((((((medication[Title/Abstract] OR medicine[Title/Abstract] OR medications[Title/Abstract] OR medicines[Title/Abstract])))) OR ("Drug Therapy/drug therapy"[Mesh] OR "Drug Therapy/pharmacology"[Mesh] OR "Drug Therapy/psychology"[Mesh] OR "Drug Therapy/therapeutic use"[Mesh] OR "Drug Therapy/therapy"[Mesh]))) AND ((("Randomized Controlled Trial" [Publication Type] OR "clinical trial"[publication type])) OR (randomize[Title/Abstract] OR randomise[Title/Abstract] OR control[Title/Abstract] OR randomized[Title/Abstract] OR randomised[Title/Abstract] OR controlled[Title/Abstract])))) AND (((belief[Title/Abstract] OR beliefs[Title/Abstract])) OR (attitude[Title/Abstract] OR attitudes[Title/Abstract]))	3345
#9	((belief[Title/Abstract] OR beliefs[Title/Abstract])) OR (attitude[Title/Abstract] OR attitudes[Title/Abstract])	188131
#8	attitude[Title/Abstract] OR attitudes[Title/Abstract]	131284
#7	belief[Title/Abstract] OR beliefs[Title/Abstract]	71316

#6	(("Randomized Controlled Trial" [Publication Type] OR "clinical trial"[publication type])) OR (randomize[Title/Abstract] OR randomise[Title/Abstract] OR control[Title/Abstract] OR randomized[Title/Abstract] OR randomised[Title/Abstract] OR controlled[Title/Abstract])	3408287
#5	randomize[Title/Abstract] OR randomise[Title/Abstract] OR control[Title/Abstract] OR randomized[Title/Abstract] OR randomised[Title/Abstract] OR controlled[Title/Abstract]	3013302
#4	"Randomized Controlled Trial" [Publication Type] OR "clinical trial"[publication type]	798718
#3	(((medication[Title/Abstract] OR medicine[Title/Abstract] OR medications[Title/Abstract] OR medicines[Title/Abstract]))) OR ("Drug Therapy/drug therapy"[Mesh] OR "Drug Therapy/pharmacology"[Mesh] OR "Drug Therapy/psychology"[Mesh] OR "Drug Therapy/therapeutic use"[Mesh] OR "Drug Therapy/therapy"[Mesh])	899741
#2	"Drug Therapy/drug therapy"[Mesh] OR "Drug Therapy/pharmacology"[Mesh] OR "Drug Therapy/psychology"[Mesh] OR "Drug Therapy/therapeutic use"[Mesh] OR "Drug Therapy/therapy"[Mesh]	195707
#1	(medication[Title/Abstract] OR medicine[Title/Abstract] OR medications[Title/Abstract] OR medicines[Title/Abstract])	714454

Embase search strategy

Search	Query	Items found
#18	#9 NOT #13 AND ([embase]/lim OR [embase classic]/lim)	4,624
#17	#9 NOT #16	3,837
#16	#10 OR #12 OR #14	2,057,858
#15	#9 NOT #14	4,431
#14	mouse':ti,ab,kw OR 'bovine':ti,ab,kw OR 'sheep':ti,ab,kw OR 'horse':ti,ab,kw OR 'animal':ti,ab,kw	1,596,783
#13	#9 NOT #12	4,451
#12	medication error'/exp OR 'medication error':ti,ab,kw	17,704
#11	#9 NOT #10	3,878
#10	('systematic review (topic)'/exp OR 'cross-sectional study'/exp OR 'cross-sectional':ti,ab,kw OR 'systematic review':ti,ab,kw) AND ([embase]/lim OR [embase classic]/lim)	452,387
#9	#3 AND #7 AND #8	4,468
#8	(randomize:ab,ti OR randomized:ab,ti OR randomise:ab,ti OR randomised:ab,ti OR control:ab,ti OR controlled:ab,ti OR 'clinical trial':ab,ti OR 'randomized controlled trial') AND ([embase]/lim OR [embase classic]/lim)	3,564,734
#7	#4 OR #5 OR #6	167,640
#6	(attitude:ab,ti OR attitudes:ab,ti) AND ([embase]/lim OR [embase classic]/lim)	114,920
#5	health belief'/exp AND ([embase]/lim OR [embase classic]/lim)	9,042
#4	('belief':ab,ti OR 'beliefs':ab,ti) AND ([embase]/lim OR [embase classic]/lim)	61,927
#3	#1 OR #2	992,473
#2	prescription'/exp AND ([embase]/lim OR [embase classic]/lim)	152,539
#1	(medication:ab,ti OR medications:ab,ti OR medicine:ab,ti OR medicines:ab,ti) AND ([embase]/lim OR [embase classic]/lim)	885,616

Cochrane search strategy

No.	Query	Results
#17	#9 not #16	3783
#16	#10 or #12 or #14	70810
#15	#9 not #14	2583
#14	mouse or bovine or sheep or horse or animal:ti,ab,kw (Word variations have been searched)	28670
#13	#9 not #12	2554
#12	medication error' or 'medication errors':ti,ab,kw (Word variations have been searched)	1193
#11	#9 not #10	2450
#10	"cross-sectional" or "systematic review":ti,ab,kw (Word variations have been searched)	41739
#9	#4 and #7 and #8	2608

#8	randomise or randomised or randomize or randomized or control or controlled:ti,ab,kw (Word variations have been searched)	827697
#7	#5 or #6	23147
#6	attitude or attitudes:ti,ab,kw (Word variations have been searched)	19706
#5	belief or beliefs:ti,ab,kw (Word variations have been searched)	5101
#4	#1 or #2 or #3	98311
#3	medication or medications or medicine or medicines:ti,ab,kw (Word variations have been searched)	97655
#2	MeSH descriptor: [Polypharmacy] explode all trees	188
#1	MeSH descriptor: [Drug Prescriptions] explode all trees	910

PsycNET search strategy

No.	Query	Results
#27	info and articles	839
#26	#12 NOT #25	759
#25	#15 OR #19 OR #23	316,920
#24	#12 NOT #23	844
#23	#21 OR #22	222,483
#22	Keywords:mouse OR Keywords:bovine OR Keywords:sheep OR Keywords:horse OR Keywords:animal	176,204
#21	Abstract: mouse OR Abstract: bovine OR Abstract: sheep OR Abstract: horse OR Abstract: animal	90,327
#20	#12 NOT #19	839
#19	#17 OR #18	1,910
#18	Keywords:'medication error' OR Keywords:'medication errors'	396
#17	Abstract: 'medication error' OR Abstract: 'medication errors'	1,861
#16	#12 NOT #15	777
#15	#13 OR #14	93,590
#14	Keywords:cross-sectional OR Keywords:'systematic review'	22,897
#13	Abstract: cross-sectional OR Abstract: 'systematic review'	85,012
#12	#4 AND #8 AND #11	851
#11	#9 OR #10	558,377
#10	Keywords: randomise OR Keywords: randomised OR Keywords: randomize OR Keywords: randomized OR Keywords: control OR Keywords: controlled	155,059
#9	Abstract: randomise OR Abstract: randomised OR Abstract: randomize OR Abstract: randomized OR Abstract: control OR Abstract: controlled	506,151
#8	#5 OR #6 OR #7	155,392
#7	Keywords: belief OR Keywords: beliefs	49,823
#6	Abstract: belief OR Abstract: beliefs	120,496
#5	Index Terms: {Attitudes}	27,563
#4	#1 OR #2 OR #3	150,835
#3	Keywords: medication OR Keywords: medications OR Keywords: medicine OR Keywords: medicines	51,727
#2	Abstract: medication OR Abstract: medications OR Abstract: medicine OR Abstract: medicines	134,796
#1	Index Terms: {Polypharmacy} OR {Prescribing (Drugs)}	4,676

ProQuest search strategy

ti(belief OR beliefs OR attitude OR attitudes) AND ti(medicine OR medication OR medications OR drug therapy) AND ti(randomise OR randomised OR randomize OR randomized OR control OR controlled)

740 results

Supplement 3

BCT Coding

Rules: Check studies on BCT Intervention website

BCT Name	Definition from taxonomy	Additional coding rules	Examples of BCT present in included study
1.2 Problem Solving	Analyze, or prompt the person to analyze, factors influencing the behavior and generate or select strategies that include overcoming barriers and/or increasing facilitators	Coded if authors mention 'medication/target behavior problem solving', 'coping planning', or 'relapse prevention' without any further information	Patients were helped to identify obstacles that might prevent them from taking medication, to identify strategies to overcome obstacles that arise, and to build self-efficacy [92]
1.4 Action Planning	Prompt detailed planning of performance of the behavior (must include at least one of context, frequency, duration and intensity).		Implementation intentions approach to develop an individually tailored coping plan [88]
1.6. Discrepancy between current behavior and goal	Draw attention to discrepancies between a person's current behavior (in terms of the form, frequency, duration, or intensity of that behavior) and the person's previously set outcome goals, behavioral goals or action plans (goes beyond self-monitoring of behavior) (code 13.3 if discomfort is the only outcome)		generating discrepancy and checking beliefs. (example provided in text) [107]
1.9 Commitment	Ask the person to affirm or reaffirm statements indicating commitment to change the behavior		assessed patients' commitment to their relapse prevention plans [78]
2.2 Feedback on behavior	Monitor and provide informative or evaluative feedback on performance of the behavior (e.g. form, frequency, duration, intensity)		review of drop diaries in the initial weeks of therapy (these were continued if found beneficial as a reminder tool) [70]

2.3 Self-monitoring of behaviors	Establish a method for the person to monitor and record their behavior(s) as part of a behavior change strategy		participant to record when they had taken their medications each day [93]
2.4 Self-monitoring of outcome(s) of behavior	Establish a method for the person to monitor and record the outcome(s) of their behavior as part of a behavior change strategy		Patients were also requested to record in their diaries any emergency hospital visits or admissions, together with possible hypoglycemic／hyperglycemic episodes [55]
2.6 Biofeedback	Provide feedback about the body (e.g. physiological or biochemical state) using an external monitoring device as part of a behavior change strategy		graphical representations of the estimated plasma concentrations and a personalized disease state simulation of immune activity .[93]
2.7 Feedback on outcome(s) of behavior	Monitor and provide feedback on the outcome of performance of the behavior		active follow-up included phone calls and written personalized feedback initiated by the DPS. The written feedback included graphs of individual Beck Depression Inventory (BDI) scores over time, and other elements of the relapse prevention plan.[78]
3.1 Social support (unspecified)	Advise on, arrange or provide social support (e.g. from friends, relatives, colleagues,' buddies' or staff) or noncontingent praise or reward for performance of the behavior. It includes encouragement and counselling, but only when it is directed at the behavior	Coded words such as 'counselling, support, encouraged'	Advice and support was offered to assist patients in incorporating a drop regimen into their daily routine [70]
3.2 Social support (practical)	Advise on, arrange, or provide practical help (e.g. from friends, relatives, colleagues, 'buddies' or staff) for performance of the behavior		Involve family members in sharing the cost of medications and tap community sources of financial aid [65]
3.3 Social support (emotional)	Advise on, arrange, or provide emotional social support (e.g. from friends, relatives, colleagues, 'buddies' or staff) for performance of the behavior		to discuss their illness and treatment with significant others to enhance social support [105]

4.1 Instruction on how to perform a behavior	Advise or agree on how to perform the behavior	Drop instillation training and drop aids were provided as required [70]
5.1 Information about health consequences	Provide information (e.g. written, verbal, visual) about health consequences of performing the behavior	The research fellow also provided information on the likelihood of experiencing any side effects mentioned [88]
5.2 Salience of consequences	Use methods specifically designed to emphasize the consequences of performing the behavior with the aim of making them more memorable (goes beyond informing about consequences)	explaining that having a cholesterol level of 4.0 or lower was likely to further reduce their risk of having another TIA or stroke [88]
5.3 Information about social and environmental consequences	Provide information (e.g. written, verbal, visual) about social and environmental consequences of performing the behavior	The social stigma of depressive patients and the false belief that depression is a sign of weakness were challenged [105]
6.2 Social comparison	Draw attention to others' performance to allow comparison with the person's own performance	patients were able to compare their current situation to others with similar risk factors [78]
7.1 Prompts/cues	Introduce or define environmental or social stimulus with the purpose of prompting or cueing the behavior. The prompt or cue would normally occur at the time or place of performance	A reminder system for patients to set up to allow the patient to receive alerts to help track medication [77]
8.1 Behavioral practice/rehearsal	Prompt practice or rehearsal of the performance of the behavior one or more times in a context or at a time when the performance may not be necessary, in order to increase habit and skill	Encouraging the patient to practice and apply the newly acquired coping skills to stressful situations either by means of role playing in a simulated stress situation captured on videotape or by means of a behavioral rehearsal preceding the actual stressful situation, e.g., an encounter with a family member about some aspect of the medical regimen or an encounter with the health practitioner [85]

9.1 Credible Source	Present verbal or visual communication from a credible source in favor of or against the behavior		Learning about RA and medication (use) from a rheumatologist [106]
9.2 Pros and Cons	Advise the person to identify and compare reasons for wanting (pros) and not wanting to (cons) change the behavior	Coded when authors mention benefits/drawbacks, decisional matrix, exploring ambivalence	Exploring patients' ambivalence about taking medication using a decisional matrix (the pros and cons of taking/not taking medication) [99]
9.3 Comparative imagining of future outcomes	Prompt or advise the imagining and comparing of future outcomes of changed versus unchanged behavior		Helping patients to move forward in their lives, to consider 'life goals' and the role medication may play in achieving these [59]
10.4 Social reward	Arrange verbal or non-verbal reward if and only if there has been effort and/or progress in performing the behavior		The phone calls also offered the opportunity to provide recognition and praise for any efforts the patient made to adhere to his/her prevention plan [78]
11.2 Reduce Negative emotion	Advise on ways of reducing negative emotions to facilitate performance of the behavior		The therapist would disseminate information about coping skills for adverse drug react ions, cues on self-medication and problem-shooting practice was shared in the session [101]
13.2 Framing/reframing	Suggest the deliberate adoption of a perspective or new perspective on behavior (e.g. its purpose) in order to change cognitions or emotions about performing the behavior		recognize 'strange' experiences as symptoms and restructure illness knowledge/perceptions in a constructive way[79]
13.3 Incompatible Beliefs	Draw attention to discrepancies between current or past behavior and self-image, in order to create discomfort		amplify the personally relevant benefits of medication by generating discrepancy between what the patients says is important to them (for example, being able to work, not visiting hospital so frequently, not worrying family) and what they actually do that is, not taking medication [107]

Note. Definitions from taxonomy and examples of BCTs present in included studies are all direct quotes.

Supplement 4

Description of included studies (n=56).

Study, year, country, therapeutic area, treatment		Participants			Intervention	Control	How, Where, & Whom	Key measures and reported significance
		n	Age	f				
Adams et al.,[71] RCT Pilot England (Europe) Diabetes Noninsulin med	I C	67 66	69.2 68.3	22 28	Level 2 medication review, level 3 medication review, and level 3 consultation	UC	F2F, medical practice, pharmacy students (and supervising pharmacist)	BMQ-S: Non-significant MAQ: Non-significant
Aho-Mustonen et al.,[72] Exploratory RCT Finland (Europe) Schizophrenia Antipsychotics	I C	19 20	38.6 40.6	2 2	8 group sessions of psychoeducation	UC	F2F, hospital, hospital staff	DAI-10: Non-significant Compliance Rating Scale: Non-significant
Alfian et al.,[99] Cluster RCT Indonesia (Asia) Hypertension Hypertensives	I C	57 56	- -	43 50	Tailored intervention based on their adherence barriers	UC	F2F, pharmacy, pharmacists	BMQ-S: non-significant MARS5: significant
Alhalaiqa et al., Single Blind RCT Jordan (Asia) Hypertension Antihypertensives	I C	68 68	53.4 53.9	43 44	7 weekly 20-min sessions of adherence therapy in addition to UC	UC	F2F, hospital/ home, researcher	BMQ (G&S): Significant improvement in beliefs for intervention group MMAS: sig percentage adherence at 11 weeks
Ali et al.,[73] Prospective RCT UK (Europe) Type 2 diabetes T2 Oral medication	I C	23 23	66.4 66.8	13 10	Pharmaceutical care package with regular monitoring and consultations	UC	F2F, pharmacy, pharmacist	BMQ Specific: Sig reduced concerned and increased necessity Adherence Not measured

Aljumah et al.,[101] RCT Saudi Arabia (Asia) Major depression Antidepressants	I C	110 110	- -	61 59	Two shared decision-making sessions	UC	F2F, pharmacy, pharmacists	BMQ (Specific and General): Significant at 6m for general overuse and specific concern MMAS: Significant increase for IG
Appallasamy et al.,[102] RCT Malaysia (Asia) Stroke Various	I C	108 108	- -	33 39	Two sets of video narratives featuring neurologist and patient	UC	F2F, individual, electronic	BMQ (one score) Significant difference between groups
Bender et al.,[111] RCT United States (North America) Asthma Daily inhaled corticosteroid	I C	25 25	39.6 43.5	15 17	2 or 3 automated interactive voice response telephone calls	No calls	Telephone (automated), n/a, electronic	BMQ N-C differential: IG had significantly more positive med beliefs than control Adherence Electronic tracking device: IG significantly more adherence than CG
von Bormann et al.,[110] Parallel group RCT Thailand (Asia) Schizophrenia Antipsychotics	I C	38 32	38 50	11 7	8 one-to-one sessions of adherence therapy	UC	F2F, hospital, nurse therapist	DAI-30: non-significant Adherence: Not measured
Brook et al.,[74] RCT The Netherlands (Europe) Depression Antidepressants	I C	64 71	43 42	45 50	Three coaching contacts and a 25-min video to take home	UC – oral & written info	F2F, pharmacy, pharmacists	DAI-30: Significant improvement in IG at 3m f/u Adherence Not measured
Cavezza et al.,[120] RCT Australia (Australia) Psychotic Illness Antipsychotics	I C	24 24	36 34	- -	8 sessions of adherence therapy	8 sessions standard health education	F2F, forensic hospital, clinical and forensic psychologist	DAI-30: IG had significantly more positive med beliefs Adherence Rating Scale: significant

Clarkesmith et al.,[75] RCT England (Europe) Atrial Fibrillation Warfarin	I C	46 51	72 73.7	15 19	One group session shown a DVD with information about anti-coagulant therapy, and an info booklet. Ps encouraged to ask qs and complete worksheets following each 10 min DVD section.	UC: 'yellow booklet' with info	F2F, n.r., DVD	BMQ (General and Specific): significant difference in general harm. Perceived general harm at 1m only predictor of TTR at 6m Adherence Not measured: intervention group spent significantly more time in therapeutic range during the first 6m
Clifford et al.,[76] RCT England (Europe) Various Various	I C	255 237	67 67	113 108	Telephone call where pharmacist gave information, advice or reassurance in response to the patients' expressed needs	No phone call	Telephone, n/a, pharmacists	BMQ (General and Specific): Significantly more positive med beliefs for IG Adherence Interview: Significantly lower non-adherence in IG at f/u
Crockett et al.,[121] Parallel group RCT Australia (Australia) Depression Antidepressants	I C	46 60	46 46	35 49	Extra support and advice (brochures, a video, and asking how patients were)		F2F, pharmacy, pharmacists	DAI – 28: Non-significant once baseline differences were accounted for Self-report adherence: Non-significant
Dahan et al.,[103] RCT Israel (Asia) Schizophrenia Antipsychotics	I C	30 30	36.1 39.7	6 6	Integrative one-to-one intervention including psychoeducational strategies, motivational interviewing, and cognitive behavioral strategies	UC	F2F, hospital, psychiatric nurse	DAI-10: Significant differences between IG and CG in degree of change in attitude Adherence Visual Analog Scale: Significant
Daley et al.,[77] RCT England (Europe) Parkinson's Disease Antiparkinsonian Medication	I C	38 38	72.2 71.6	13 14	7 weekly one-to-one adherence therapy	UC	F2F, home, lead author	BMQ (General and Specific): significantly improved BMQ general harm in intervention MMAS – 4: Significant

Elliot et al.,[78] Parallel group RCT England (Europe) Various Various	I C	251 253	59.3 59.5	125 135	One-to-one consultation with a 'follow-up' 14–21 days after that	UC	F2F, pharmacy or telephone, pharmacist	BMQ (General and Specific): Non-significant MMAS – 8: significantly more adherence in IG
Ferguson et al.,[79] Exploratory pilot study England (Europe) Rheumatoid Arthritis DMARDs	I C	10 8	51 46	10 8	6 weekly one-to-one sessions of compliance therapy	UC	n.r., n.r., psychologist	BMQ (General and Specific): non-significant MARS: non-significant
Geurts et al.,[80] RCT The Netherlands (Europe) Cardiovascular Various	I C	178 334	72.5 72.8	96 172	One clinical medication review with a follow-up that developed a pharmaceutical care plan	UC	n.r., n.r., pharmacists	BMQ General: Harm subscale significant, 1 year later for intervention Adherence Not measured
Gray et al.,[81] Exploratory RCT England (Europe) Ocular Hypertension Eye Drops	I C	64 63	65.4 67.2	37 26	Individualised care plan implemented for one year. 5 face-to-face consultations	UC	F2F, hospital, nurse	BMQ (General and Specific): Significantly greater belief in necessity for IG compared to CG Prescription and dispensing information: Significant
Gujral et al.,[122] RCT Australia (Australia) Various Various	I C	100 100	58.4 60.4	23 20	Pharmacist reviewed monthly, at 3 & 6 ms, conversation tailored to med beliefs from the repertory grid interview	UC	F2F/Telephone, pharmacy and n/a, pharmacist	Repertory grid and BMQ-S: separated sample into 4 groups depending on adherence, significant increase in BMQ differential for control group categorised as adherent at 6 months and non-adherent at 12 months Adherence MARS: Non-significant
Higgins et al.,[82] RCT England (Europe) Depression Antidepressants	I C	10 9	- -	- -	3–4 sessions of concordance therapy between 15 and 45 minutes	UC	n.r., n.r., psychiatrist	BMQ (General and Specific): non-significant MARS: non-significant

Kemp et al.,[83] RCT England (Europe) Psychosis Neuroleptics	I C	25 22	35 39	13 11	4-6 sessions of compliance therapy lasting 20-60 minutes roughly twice a week	4-6 supportive therapy 20-60 minutes roughly twice a week	F2F, hospital, psychiatrist with clinical psychologist's support	DAI-30: IG significantly greater improvements Attitudes to treatment questionnaire: IG significant improvement Adherence 7-point rating scale: significant
Kooy et al.,[84] Cluster RCT The Netherlands (Europe) Various Various	I C	56 117	62.8 62.2	30 62	Telephone counselling	UC	Telephone, n/a, pharmacists	BMQ (General and Specific): Significantly more positive necessity-concerns balance for IG Adherence Not measured
Krasnoryadtseva et al.,[123] RCT New Zealand (Australia/Oceania) Gout Urate-lowering medication	1 2 3	20 20 20	64.4 64.7 67.2	0 1 3	Education with embedded personal medical images. 3 groups: 1. Personal 2. Generic 3. Medical	Three intervention groups	Laptop, hospital, investigator	BMQ All groups significantly increased perceived necessity
Van der Laan et al.,[96] Parallel-group RCT Netherlands (Europe) Hypertension Anti-hypertensives	I C	85 85	60.3 61.9	44 42	A structured interview at the pharmacy to identify patients' barriers to adherence and to counsel patients in order to overcome these barriers.	UC	F2F, pharmacy, pharmacist	BMQ: non-significant differences until 9m Adherence: non-significant
Lakshminarayana et al.,[85] RCT England (Europe) Parkinson's Disease Various	I C	94 107	59.9 60.7	34 45	Use the app once a day or alternate days over 16 weeks, and a call from their clinician after 2 weeks	UC	Smartphone app, n/a, electronic	BMQ (General and Specific): non-significant MMAS – 8: Significant improvement for IG

Lin et al.,[112] 2003 RCT United States (North America) Depression Antidepressants	I C	194 192	46.4 45.6	146 138	Two visits with a depression prevention specialist, 3 telephone calls, and four personalized letters	UC	Various, various, psychologist, psychiatric nurse, and social worker	Attitudes toward antidepressant medications: significant Self-report adherence: significant
Lin et al.,[104] 2013 RCT Taiwan (Asia) Schizophrenia Antipsychotics	I C	48 49	35.3 35.2	18 17	Two 90-min sessions of IMR program were conducted per week for 3 weeks	UC	F2F, hospital, clinician	DAI-30: Significant Adherence Not measured
Linn et al.,[86] 2018 Cluster RCT The Netherlands (Europe) Inflammatory Bowel Disease Various	I1 C1 I2 C2	57 18 52 33	44.5 44.1 40.8 45.2	33.5 12 30.9 16	One text message per week	UC	Text messages, n/a, electronic	BMQ Specific: Non-Significant MARS: Non-Significant
Maneesakorn et al.,[105] 2007 RCT Thailand (Asia) Schizophrenia	I C	16 16	38.7 43	3 6	8 weekly sessions of adherence therapy lasting 15-60 minutes per session	UC	F2F, hospital, therapist	DAI-30: IG significantly improved in attitude towards and satisfaction with medication Adherence Not measured
Mazor et al.,[113] 2007 RCT United States (North America) Patient taking anticoagulant Warfarin	N a St C o C	77 82 77 90	- - - -	27 25 33 34	Three intervention groups, the physician used either: narrative evidence (patient anecdotes), statistical evidence, or both to highlight key information.	UC (no video)	Video, home, electronic	Beliefs about Medication and Warfarin (ben = beneficial, wor = worrisome subscale): All three videos had a significant impact on beliefs Self-report adherence: Non-Significant
Montes et al.,[87] 2010 Prospective RCT Spain (Europe) Schizophrenia Antipsychotics	I C	424 441	40.7 39.5	148 153	4-month nurse telephone strategy, each call included brief semi-structured assessment and DAI-10	UC	Telephone, n/a, nurses	DAI:10 Significant Interview – significant

Montes et al.,[88] 2012 Prospective RCT Spain (Europe) Schizophrenia Antipsychotics	I C	100 154	38.6 40.6	35 50	Daily SMS reminders on their cell phones to take their medication for 3 months	UC – No SMS	Text messages, n/a, electronic	DAI-10: Significant improvement in IG MAQ: Significant improvement in IG
Morisky et al.,[114] 1982 RCT United States (North America) Hypertension Antihypertensives	I[3] C	100 100	- -	- -	Three group sessions involving: discussion of health behaviors, teaching and rehearsal of specific coping skills, and encouraging patient to practice new coping skills	Not specified	F2F, n.r., social worker and nurse	Beliefs measure: non-significant BP Control: significantly more ps with controlled BP in intervention group, 62%, than control group, 46%)
Moshkovska et al.,[89] 2011 Exploratory RCT England (Europe) Ulcerative Colitis 5aminosalicylic acid	I C	37 34	- -	21 15	One-on-one education and motivation session lasting 20–30 minutes	UC	F2F/Telephone, hospital, researcher	BMQ (General and Specific): non-significant Adherence: significant
Nguyen et al.,[124] 2016 RCT Australia (Australia) Various	I C	60 60	64.4 62.6	31 35	Tailored adherence support strategy based on a discussion informed by questionnaires	Control group	F2F, pharmacy, investigator	BMQ Specific: Significant differences in necessity at 3m and 6m MAQ: Significant
O'Carroll et al.,[90] 2013 Pilot RCT Scotland (Europe) Stroke Antihypertensives	I C	58 58	68.4 70.7	18 24	Tailored two-session intervention based on a discussion informed by questionnaires	Control equal amount of researcher contact	F2F, home visits/hospital, research fellow	BMQ Specific: significant effect of time for both groups. Significantly greater decrease in concerns for IG compared to CG MEMS: significant
O'Donnell et al.,[91] 2003 RCT Ireland (Europe) Schizophrenia Neuroleptics	I C	28 28	32 32	9 6	5 compliance therapy sessions, each lasting 30-60 minutes	5 non-specific counselling sessions 30-60 m.	F2F, hospital, n.r.	DAI-30: Non-Significant Adherence Interview: no improvement

Östbring et al.,[92] 2014 Pilot RCT Sweden (Europe) Cardiovascular Disease Cardiovascular Medication	I C	11 10	70 62	3 4	Medication review, and a semi structured interview by a clinical pharmacist based on MI-approach, with a f/U phone call 2w later, Patient Information Leaflet	UC	F2F and telephone. Cardiology unit, pharmacist	BMQ Specific: Non-significant MMAS – 8: Non-significant
Pakpour et al.,[106] 2015 Prospective RCT Iran (Asia) Epilepsy Antiepileptic Drugs	I C	138 137	39.9 41.4	49 45	Three weekly MI sessions (each lasting 40 to 60 mins) including family members	one-time session of brief advice	F2F, neurologic clinic, health psychologist	BMQ Specific: Significant Serum Level and MARS: Significant
Pakpour et al.,[107] 2017 Cluster RCT Iran (Asia) Bipolar Mood Stabilizers	I C	134 136	41.8 41.2	74 69	Five sessions MI and psychoeducation with family members	one-time session of brief advice	F2F, outpatient clinic, psychologist and psychiatrist	BMQ Specific: Significant MARS and plasma levels: Significant
Perera et al.,[125] 2014 RCT Australia (Australia) AIDs/HIV Antiretroviral Therapy	I C	17 11	- -	- -	Augmented smartphone application providing personalised visual imagery and real-time feedback	standard smartphone application	Smartphone app, n/a, electronic	2 qs about necessity and concern: Non-Significant MARS: Significant for IG Dispensing data and % of prescribed doses taken at 3m no sig differences
Petrie et al., [126] 2011 RCT New Zealand Asthma Preventer medication	I C	58 66	- -	- -	Tailored text message approx. 27 across 18 weeks	Usual care	Text message, n/a, electronic	2 qs on necessity and control: significant Self-reported adherence: significant

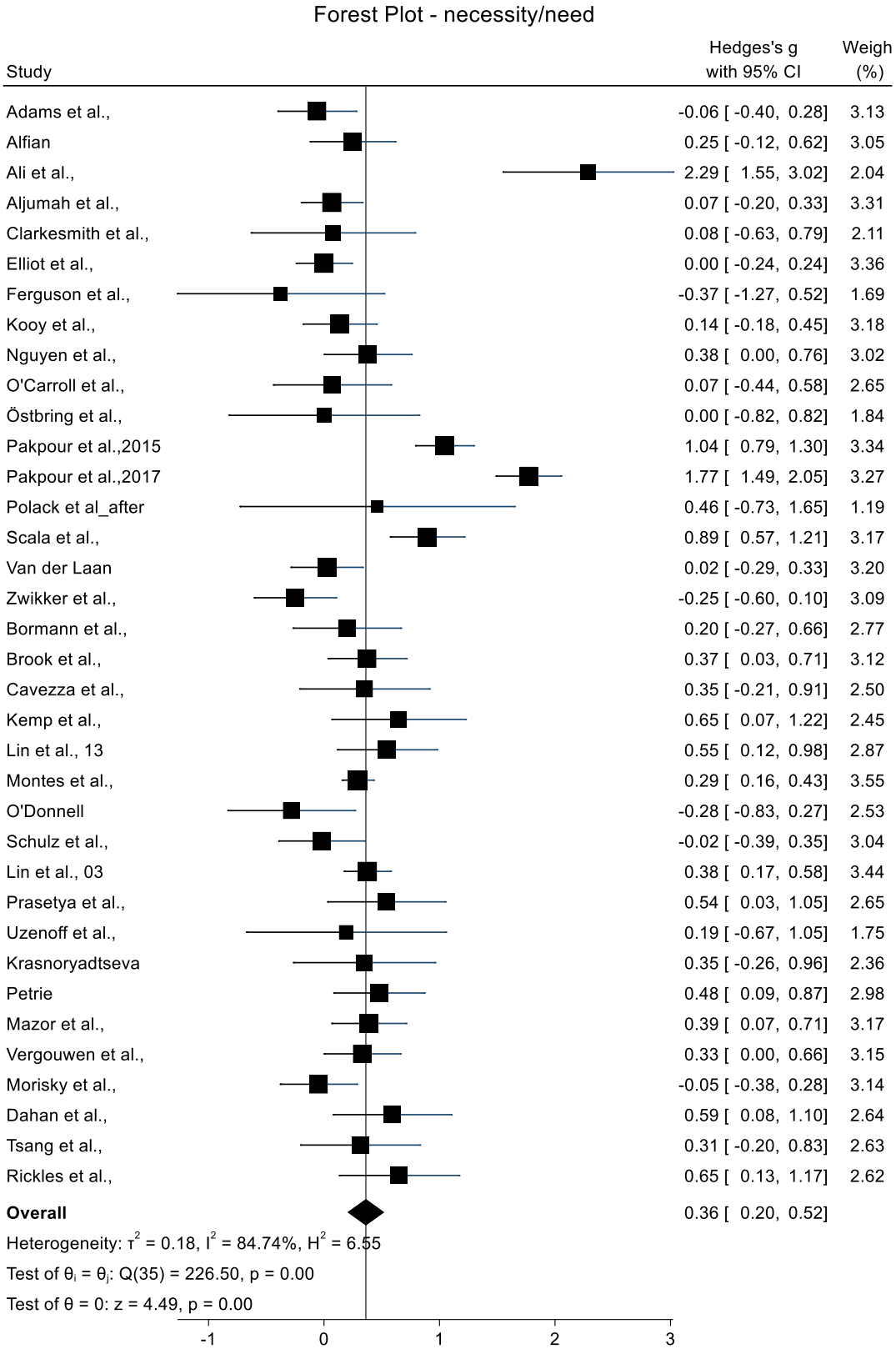
Polack et al.,[115] 2008 RCT Canada (North America) Myocardial Infarction Antiplatelet agent, statin, ACE inhibitor, or betablocker	A B C	5 4 5	59.2 67.8 65.4	0 2 0	Hospital pharmacist pre-discharge medication education (A), or medication education from a pharmacist 1 to 2 weeks after discharge (B)	UC (C)	F2F, hospital primary healthcare clinic, pharmacist	BMQ Specific: Non-Significant MMAS-4: Non-Significant
Prasetya et al.,[108] 2018 RCT Indonesia (Asia) Tuberculosis Antituberculotic treatment	I C	- -	- -	- -	One session of hypnosis followed by self-hypnosis	No information	F2F/mobile, home, hypnotist	Designed a measure: Significantly greater belief in benefit of medication for IG compared to CG Self-report adherence: Significant
Rickles et al.,[116] 2005 RCT United States (North America) Depression Antidepressants	I C	31 32	37.8 37.5	25 28	Three monthly telephone calls from pharmacists providing pharmacist-guided education and monitoring, PIL	UC (variable depending on location)	Telephone, n/a, pharmacist	Beliefs About Antidepressants: Significant impact on beliefs for IG Pharmacy Records: Non-significant (underpowered)
Scala et al.,[93] 2018 Exploratory pilot study Italy (Europe) Hypertension Cardiovascular Medication	I C	84 80	57.5 57.7	44 40	Telephone calls/interviews that occurred approximately every 2 months for 1 year.	UC	Telephone, n/a, pharmacist	BMQ: significant differences between IG and CG for both BMQ's N&C Not measured: n/a
Schulz et al.,[94] 2013 Parallel group RCT Germany (Europe) Schizophrenia Antipsychotics	I C	80 57	35 36	32 25	8 sessions of AT (5 as inpatient, 3 after discharge), mean duration of session 42 min	UC multi-disciplinary team based on individualised plan	F2F, hospital, mental health nurses	DAI-30: Non-Significant MARS: Non-Significant

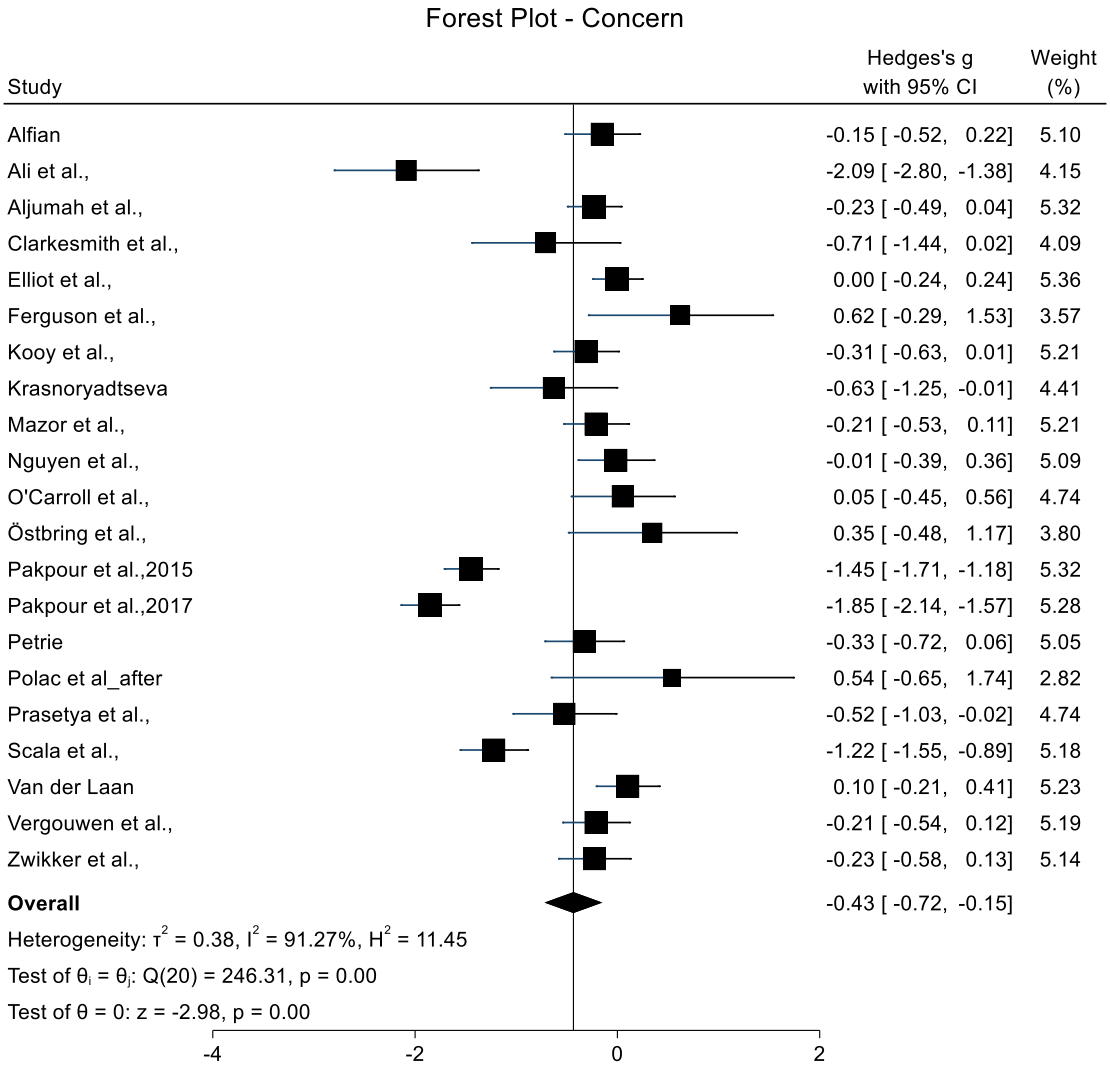
Sethares et al.,[117] 2004 RCT United States (North America) Heart Failure Various	I C	33 37	75.7 76.8	16 21	Tailored message based on questionnaire responses during hospitalization, 1 week, and 1 month after hospital discharge	UC	F2F/Telephone, hospital or n/a, research nurse	Beliefs about Medicine Compliance Scale: Barriers of medication changed significantly, benefits of medication did not change significantly
Tsang et al.,[109] 2005 Single blind RCT China (Asia) Schizophrenia Neuroleptics	I C	28 19	36 39	0 0	5 sessions of compliance therapy programme, 2-3 times a week in groups:	UC	F2F, hospital, therapist	DAI-10: Significant difference at 6 months post intervention Self-report adherence: Significant
Unk et al.,[118] 2014 RCT United States (North America) Rheumatoid Arthritis DMARDs	I C	54 54	50.1 50.5	46 40	Viewed the multimedia in clinic exam room on laptop and given printed copy of slides and a CD copy for home	sent home with published literature about RA	Audio PowerPoint, clinic/home, n/a	BIPQ: non-significant MAQ: non-significant
Uzenoff et al.,[119] 2008 Pilot RCT United States (North America) Psychosis Various	I C	10 9	25.3 19.8	4 3	14 sessions of 'Adherence Coping Education'	Supportive therapy	F2F, n.r., therapists	The Need for Treatment and Benefits of Medication scales: Non-significant between groups. Sig within-group improvements for IG on Benefits of Medication Self-report adherence: Excluded from analysis due to ceiling effect
Uslu et al.,[95] 2020 RCT Turkey (Europe) Schizophrenia Antipsychotics	I C	22 24	36 39.5	13 14	Weekly telephone interviews, for 2 months, led by the "Telephone Intervention Problem Solving" call guide	Routine care	Telephone, n/a, pharmacists	the rate of believing in the necessity of medication after TIPS was significantly higher in the intervention group than that in the control group (P = 0.004).

Vergouwen et al.,[97] 2009 Cluster RCT The Netherlands (Europe) Depression Antidepressants	I C	67 75	44.9 45.7	49 48	Depression care program	Systematic follow-up program	F2F, GP surgery, GP	Beliefs About Antidepressants: Significant Adherence Reported elsewhere: n/a
Zwikker et al.,[98] 2014 RCT The Netherlands (Europe) Rheumatoid Arthritis DMARDs	I C	63 60	60.4 59.3	42 43	Two MI group sessions, a homework assignment, follow-up call	brochures with information about DMARDS	F2F, clinic, pharmacists	BMQ (General and Specific): Non-significant Compliance Questionnaire Rheumatology and MARS: Non-significant

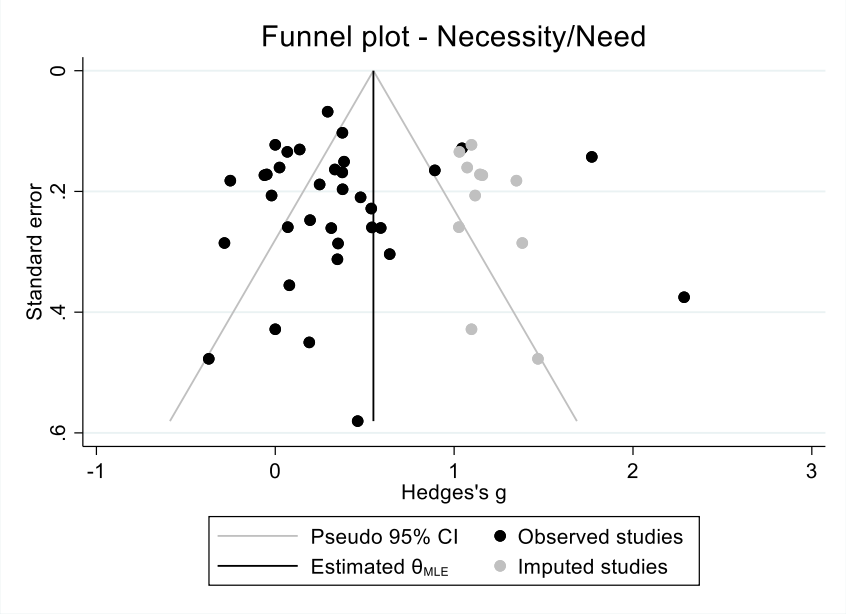
Note. Abbreviations: BMQ S/G = Beliefs About Medication Questionnaire Specific/General (N = necessity, C = concern, O = overuse, H = harm), CG = control group, DAI-10/28/30 = Drug Attitude Inventory 10/28/30, F2F = Face-to-face, IG = Intervention group, MARS – Medicine Adherence Rating Scale, MAQ = Medicine Adherence Questionnaire, MI = Motivational interviewing, MMAS = Morisky Medication Adherence Scale, n.r. = not reported, RCT = Randomised controlled trial, UC = Usual care

Supplement 5

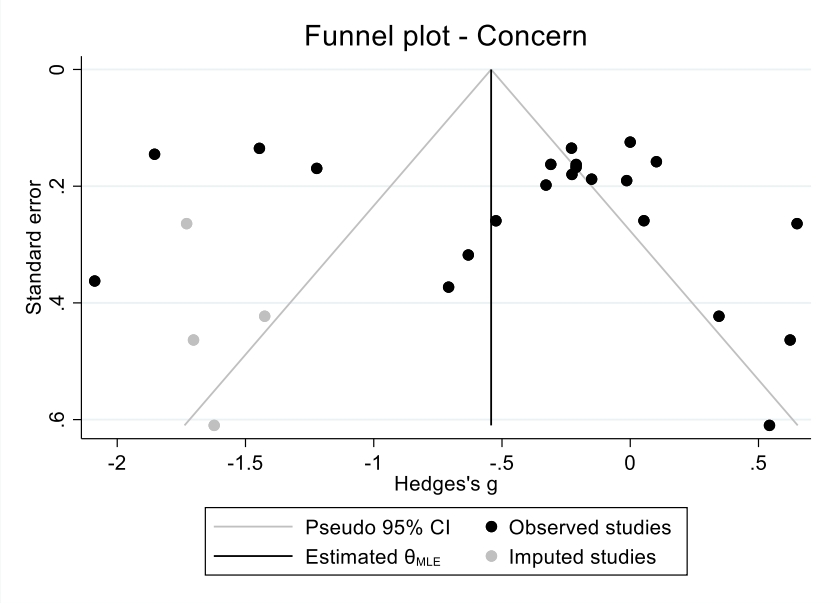



Forest Plot - Concern
Study
Hedges's g with 95% CI
Weight (%)
Alfian -0.15 [-0.52, 0.22] 5.10
Ali et al., -2.09 [-2.80, -1.38] 4.15
Aljumah et al., -0.23 [-0.49, 0.04] 5.32
Clarkesmith et al., -0.71 [-1.44, 0.02] 4.09
Elliot et al., 0.00 [-0.24, 0.24] 5.36
Ferguson et al., 0.62 [-0.29, 1.53] 3.57
Kooy et al., -0.31 [-0.63, 0.01] 5.21
Krasnoryadtseva -0.63 [-1.25, -0.01] 4.41
Mazor et al., -0.21 [-0.53, 0.11] 5.21
Nguyen et al., -0.01 [-0.39, 0.36] 5.09
O'Carroll et al., 0.05 [-0.45, 0.56] 4.74
Östbring et al., 0.35 [-0.48, 1.17] 3.80
Pakpour et al.,2015 -1.45 [-1.71, -1.18] 5.32
Pakpour et al.,2017 -1.85 [-2.14, -1.57] 5.28
Petrie -0.33 [-0.72, 0.06] 5.05
Polac et al_after 0.54 [-0.65, 1.74] 2.82
Prasetya et al., -0.52 [-1.03, -0.02] 4.74
Scala et al., -1.22 [-1.55, -0.89] 5.18
Van der Laan 0.10 [-0.21, 0.41] 5.23
Vergouwen et al., -0.21 [-0.54, 0.12] 5.19
Zwikker et al., -0.23 [-0.58, 0.13] 5.14
Overall -0.43 [-0.72, -0.15]
Heterogeneity: τ² = 0.38, I² = 91.27%, H² = 11.45
Test of θi = θj: Q(20) = 246.31, p = 0.00
Test of θ = 0: z = -2.98, p = 0.00
-4
-2
0
2

Supplement 6



Funnel Plot for necessity/benefit beliefs with imputed studies using Trim-and-Fill method



Funnel Plot for concern beliefs with imputed studies using Trim-and-Fill method