BMJ Open

Effectiveness of shared medical appointments delivered in primary care for improving health outcomes in patients with long-term conditions: a systematic review of randomised controlled trials

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To cite: Tang MY, Graham F, O'Donnell A, *et al*. Effectiveness of shared medical appointments delivered in primary care for improving health outcomes in patients with long-term conditions: a systematic review of randomised controlled trials. *BMJ Open* 2024;**14**:e067252. doi:10.1136/bmjopen-2022-067252

► Prepublication history and additional supplemental material for this paper are available online. To view these files, please visit the journal online (https://doi.org/10.1136/bmjopen-2022-067252).

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Received 10 August 2022
Accepted 21 February 2024

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ABSTRACT

Objectives To examine the effectiveness of shared medical appointments (SMAs) compared with one-to-one appointments in primary care for improving health outcomes and reducing demand on healthcare services by people with one or more long-term conditions (LTCs).

Design A systematic review of the published literature.

Data sources Six databases, including MEDLINE and Web of Science, were searched 2013–2023. Relevant pre-2013 trials identified by forward and backward citation searches of the included trials were included.

Eligibility criteria Randomised controlled trials of SMAs delivered in a primary care setting involving adults over 18 years with one or more LTCs. Studies were excluded if the SMA did not include one-to-one patient-clinician time. All countries were eligible for inclusion.

Data extraction and synthesis Data were extracted and outcomes narratively synthesised, meta-analysis was undertaken where possible.

Results Twenty-nine unique trials were included. SMA models varied in terms of components, mode of delivery and target population. Most trials recruited patients with a single LTC, most commonly diabetes (n=16). There was substantial heterogeneity in outcome measures. Meta-analysis showed that participants in SMA groups had lower diastolic blood pressure than those in usual care (d=−0.086, 95% CI=−0.16 to −0.02, n=10) (p=0.014). No statistically significant differences were found across other outcomes. Compared with usual care, SMAs had no significant effect on healthcare service use. For example, no difference between SMAs and usual care was found for admissions to emergency departments at follow-up (d=−0.094, 95% CI=−0.27 to 0.08, n=6, p=0.289).

Conclusions There was a little difference in the effectiveness of SMAs compared with usual care in terms of health outcomes or healthcare service use in the short-term (range 12 weeks to 24 months). To strengthen the evidence base, future studies should include a wider array of LTCs, standardised outcome measures and more details on SMA components to help inform economic evaluation.

PROSPERO registration number CRD42020173084.

STRENGTHS AND LIMITATIONS OF THIS STUDY

⇒ Focus on randomised controlled trials, highest quality evidence of the effectiveness of shared medical appointments (SMAs) in primary care for long-term conditions.
⇒ Robust search strategy, based on previous high-quality review, refined by information specialists to focus on primary care.
⇒ Rapidly evolving area of practice and research, and therefore, the most recent evidence may be missing.
⇒ Small number of studies reported resource use and costs limiting conclusions regarding efficacy of SMAs in primary care.

INTRODUCTION

Shared medical appointments (SMAs), also known as group consultations, are a model of care with the potential to address the interlinked challenges of limited capacity in primary care and rising prevalence of patients with multiple long-term conditions (LTCs).[1 2] SMAs are long appointments (typically 60–120 min) whereby groups of patients with the same LTCs meet with their physician together.[3] SMAs are typically co-led and/or facilitated by healthcare professionals, such as nurses, pharmacists, psychologists and physiotherapists. The group typically consists of between 6 and 15 patients and may include family members and caregivers.[1 4] There are various models of SMA but generally they retain some features of a standard one-to-one (1:1) appointment such as physical examinations and personalised review of medical charts.[2] In addition, SMAs provide participants an opportunity to ask questions of clinicians and other patients and receive formal

education and counselling during the group session. SMAs have been used to deliver care for a range of health conditions including diabetes, hypertension and chronic pain; though there is potential for wider application, including multimorbidity.[5]

A recent synthesis of qualitative literature found that most patients and primary care practitioners regarded SMAs positively.[6] Key benefits included improved patient self-confidence and motivation for self-management, while practitioners felt that SMAs had the potential to provide a more efficient and effective way of delivering care.[6] SMAs may be of particular value in primary care where patients report insufficient time to discuss all that they would like to in single 1:1 appointment.[1] SMAs may improve provider efficiency, helping to provide care to more people (ie, in groups) which could potentially help address staff shortage challenges currently experienced by some health systems.[1]

Previous reviews of effectiveness were inconclusive but evidence, largely from the USA and Australia, reported a promising effect of SMAs for some biomedical measures. For example, improvements in glycated haemoglobin A1C (HbA1C) and systolic blood pressure (SBP) were greater in patients attending SMAs compared with usual care for diabetes.[4 7] However, previous reviews include studies that evaluate the use of SMAs in secondary care settings as follow-up appointments to specialist treatment.[4] A mixed-methods review of SMAs in primary care settings for non-specialist treatment concluded that SMAs can yield improvements in patient satisfaction and some biophysical markers of disease.[5] However, this review conducted in 2015 included studies of SMAs for non-LTCs. It remains unclear whether SMAs are effective in supporting improved ongoing management of LTCs in primary care.

This review examined the effects of SMAs delivered in primary care on health outcomes and healthcare service use in patients with LTCs. We sought to answer two overarching research questions:

1. Are SMAs effective in improving health outcomes for patients with one or more long-term conditions?
2. Do SMAs reduce healthcare service use by patients with one or more long-term conditions?

METHOD

This systematic review follows Cochrane Handbook Guidance[8] and the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines.[9]

Protocol and registration

This study was registered on PROSPERO (CRD42020173084). Regarding protocol changes, we proposed the coding of Behaviour Change Techniques [10] used in SMAs and to explore the specific techniques associated with changes in outcomes. However, most included studies did not report the required detail and so instead we narratively described this information.

Inclusion/exclusion criteria

Studies were included if they met the criteria outlined in table 1. The focus of this review was on models of SMAs that include one-to-one time for every patient in attendance as per the description of group consultations reported previously.[1 2]

Table 1 Inclusion and exclusion criteria

PICOS criterion	Description
Population	Adult patients (≥18 years of age) with one or more LTCs who have attended at least one shared medical appointment (SMA) in a primary care setting were eligible for inclusion. Patients in primary care settings who were seen by a secondary care specialist during the SMA were excluded. All countries were eligible for inclusion.
Intervention (model of care)	SMAs/group consultations/group visits conducted in primary care setting, delivered by a primary care healthcare professional (eg, nurse, doctor, pharmacist), were eligible for inclusion. The present review considered SMAs to be clinical encounters in which groups of patients with the same/similar LTC(s) meet with a healthcare professional for routine care. The SMA must have included 1:1 time for every patient in attendance. Therefore, peer support groups were excluded.
Comparison/control	No restrictions—usual care, active control (eg, another SMA model).
Outcomes	Behavioural outcomes—for example, healthcare utilisation (attendances/consultations/presentations primary and secondary care), physical activity, medication adherence. Disease-specific measures—for example, haemoglobin A1C. Biophysical health indicators—for example, cholesterol, weight, BMI. Cost/resource use, for example, staff time setting up and delivering SMAs. Other outcomes—for example, psychological and well-being
Study design	Only randomised controlled trials (RCTs) that were published in peer-reviewed journals were eligible for inclusion.

BMI, body mass index; LTC, long-term condition.

Search strategy

A comprehensive search strategy was developed, based on the approach described in Booth *et al*[4] to search for trials published after their search, namely the period 2013–2020. The search was first conducted in September 2020 and updated in September 2023 to cover the 2020–2023 period. Key changes included the removal of the terms 'group outpatient', 'GMV' (Group medical visit) or 'GMA' (group medical appointment), 'group processes' and 'group care' to improve the sensitivity and specificity of the search (see online supplemental file 1). The search strategy was first used to search MEDLINE (via OVID) and then translated for the following databases: EMBASE (via OVID), Science citation index (via Web of Knowledge) Social Science Citation Index (via Web of Knowledge), Cumulative Index to Nursing and Allied Health Literature (via EBSCOhost), Cochrane Central Register of Controlled Trials (Wiley), DARE, NHS (National Health Service) EED and HTA (Centre for Reviews and Dissemination). Any relevant pre-2013 trials identified by forward and backward citation searches of the included trials, including those in relevant systematic reviews[4 5 11 12] were also included in the review.

Screening

Screening and data extraction were facilitated using the systematic review management tool, Covidence.[13] Two reviewers independently screened all titles and abstracts against the inclusion criteria, and a third reviewer adjudicated any disagreements. This process was also applied to the screening of full-text papers.

Data extraction

Outcomes and results relating to the study design, population and intervention were extracted from all relevant papers using a data extraction form (see online supplemental file 2) which was informed by a framework on form of delivery[14] (eg, experience/training of the providers and facilitators). All information was double-extracted by two researchers, with disagreements resolved through discussion or third-party moderation.

Where data were reported for several time points, the data point closest to the end of the SMA intervention was used to calculate the effect size as this would be when the largest effects attributable to the SMA are expected. If available, intention-to-treat data were used to calculate effect sizes.

Quality assessment

Three researchers independently assessed the quality of all included studies using the Cochrane Risk of Bias Tool.[8] Percentages of judgements (high, low or unclear) for each domain were calculated across the studies.

Data analysis/synthesis

We mapped all reported outcomes into the following categories agreed by the wider research team to best reflect SMA effectiveness and efficiency: health outcomes (biomedical indicators, psychological and well-being measures), healthcare utilisation, and cost and resource use.

Meta-analyses were performed in StataIC V.18. Given the heterogeneity between studies, a random-effects model was used.[15] Meta-analyses were conducted where there were at least two studies reporting a specific outcome.[16] Outcome effect sizes were calculated as Cohen's d (standardised mean difference). Heterogeneity was assessed using Higgins I^2, whereby 50%–90% was considered as representing substantial heterogeneity.[17] Authors were contacted for additional information if data needed to calculate effect sizes were not sufficiently reported in the published paper(s). Where this information could not be obtained from authors, p values and CIs were used to calculate effect sizes.[8] Only studies in which the comparator was usual care were pooled into the meta-analysis.

Using meta-regression, sensitivity analyses were conducted to explore whether results differed according to sources of bias identified from the risk of bias assessment.

Studies were synthesised narratively if they were too heterogeneous to perform meta-analysis, the comparator was not usual care, or there were inadequate data to calculate effect sizes (eg, authors no longer had the data when contacted). Extracted data were tabulated by outcome measure to enable comparisons and relationships across studies to be more easily examined.[18] For each outcome measure, evidence of an effect was determined by the p values reported in the papers. To assess the certainty of the evidence, number of study participants, CIs and the consistency of effects across studies, the risk of bias of the studies, how directly the included studies address the planned question (directness) were taken into consideration.

Patient and public involvement

The NIHR Policy Research Unit in Behavioural Science Public Patient Involvement group provided their patient perspective about outcome measures of interest.

RESULTS

Characteristics of the included studies

Twenty-nine unique trials (reported in 40 papers) were identified, for PRISMA details, see figure 1 and table 2. See online supplemental file 3 for list of included papers.

Twenty trials (69%) were for a single LTC, of these: 16 were for diabetes[19–34], two for hypertension[35 36], one was for chronic obstructive pulmonary disease (COPD)[37] and one was for osteoporosis.[38] Nine trials considered multiple LTCs: four were for diabetes and hypertension/cardiovascular risk[39–43]; one was for diabetes and depression,[44] one was for overweight patients with diabetes[45]; one was for chronic pain and depression[46] and one included multiple LTCs including arthritis, hypertension, cancer, deafness and diabetes.[47] Overall, 25/29 (86%) of trials focused on patients with diabetes.

Twenty-one trials (72%) were conducted in the USA,[19–23 25 28–34 40 42–45 47 48] three in China[27 35 37] and one each in Australia,[24] Canada,[26] Germany,[36] Kenya[41] and the UK.[38] Nine trials measured the effectiveness, impact or efficacy of SMAs compared with usual care.[19 21 25 27 32 34 42 47 48] Eight trials examined feasibility parameters,[20 23 24 30 31 33 35 44] and three trials were non-inferiority/superiority trials.[38 45 49] Feasibility parameters included recruitment rate,[23 24] retention rate,[24] patient satisfaction[23 34 38] and SMA attendance rates.[20 21 43 50]

In nine trials, participants were veterans or military personnel.[22 25 29 39 40 42–45] Participants were from low-income communities in five trials,[19 31 32 41 48] and uninsured communities in four US trials.[20 21 30 33] Two trials were tailored for non-English-speaking participants, where written materials were available in Spanish.[30 32] The majority of participants were over 50 years, the mean age of participants ranged between 50.5[46] and 74 years.[38] Two trials were specifically for older patients over 55 or 60 years, respectively,[36 47] and two trials excluded patients over 75[45] and 80 years.[27] Sixteen trials (55%) had a majority of female participants.[19–21 26–28 30–35 38 41 46 47] Twelve trials had a majority of male participants.[22–25 28 29 37 39 40 42–45] One trial did not report the gender balance of participants.[36]

Six studies had a majority white population,[22 25 34 42 44 46] six trials had a majority black population,[19 20 23 43 45 51] three trials had a majority Hispanic population,[31–33] three trials had a majority Asian population[24 27 37] and one trial had a majority white-Latino population[30] and one a majority non-white (black, Hispanic or Latina).[28] Nine studies did not report the ethnicity of participants.[26 29 35 36 38–41 47]

Most trials (n=18, 63%) had a two-arm design that compared SMAs with usual care, typically a 1:1 appointment with primary care physician.[19–21 24 26 27 33–39 42–44 46 47] In four other two-arm trials, the comparator was individual counselling[22] a 1:1 appointment plus two diabetes group education sessions,[29] an SMA without an integrated weight management programme[45] or an SMA with a personal health planning component (PHP).[23] One trial compared in-person SMAs with SMAs delivered in a 'virtual world'.[28] Two trials had a delayed 6-month waitlist control design.[31 32] Three trials had a three-arm design: one examined the effectiveness of a cardiovascular risk reduction clinic compared with group medical visits and usual care[40]; and a second compared an automated telephone self-management service with SMAs and usual care[30] a third compared a peer-to-peer support programme with SMAs and usual care.[25] There was one 4-arm trial that compared usual clinical care, usual clinical care plus microfinance, SMAs only and SMAs integrated into microfinance group.[41] Where descriptions of usual care were available, usual care was delivered by a primary care provider, typically a physician/general practitioner or nurse practitioner[19–21 24 26 32 33 41 46] and, in some cases, a pharmacist[29 32 38] or dietician.[29] A review of medication and chronic disease monitoring (eg, measures of blood pressure and HbA1c) commonly took place in these sessions.[19 20 27 38 41 50] In some of the SMAs for diabetes, the usual care sessions included some form of individualised diabetes self-management education[19 29 32] or referrals were made available to see a diabetes educator dietician.[20 40]

SMA components and mode of delivery

Program components

There was much variation in the SMAs models reported by studies (see online supplemental file 4 for detailed description). Key features of SMA models were facilitated group discussion or group question and answer session (23 trials),[19–23 25–27 29–38 41–43 46 47] 'group education' (19 trials)[19 20 24–29 31–33 35 37 40 42–45 47] and the opportunity to socialise (13 trials).[21 22 27 30–33 35 37 43 46 47 52] SMAs were delivered face to face in all trials, although three SMA models included digital technologies, namely website and telephone support[46] and phone calls or text message support and/or reminders.[31 32] One trial compared SMAs delivered in person with SMAs delivered in a 'virtual world' in which patients participated in activities and communicated to each other and the community health workers via their customised avatars.[28]

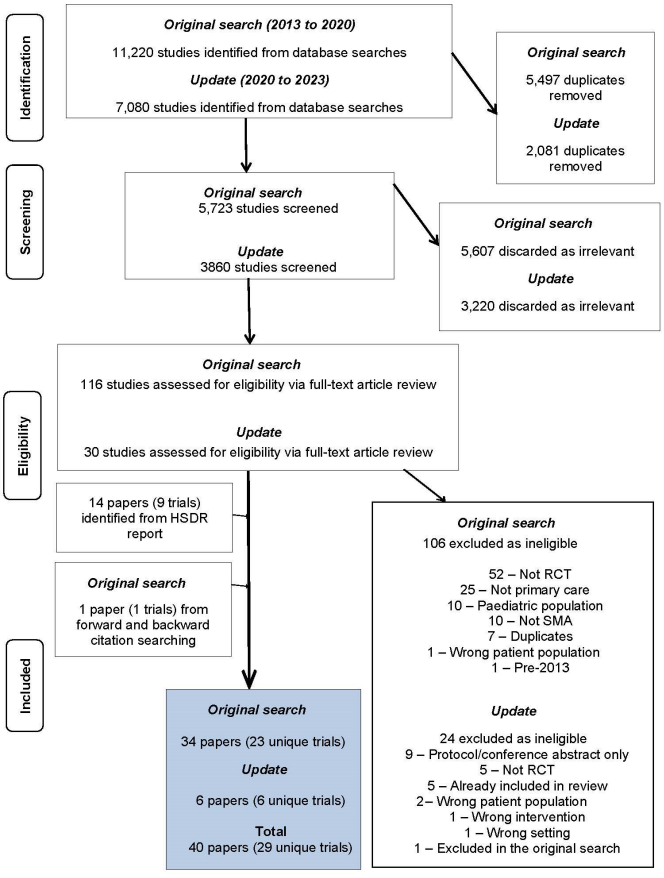

Figure 1 PRISMA diagram of study selection process. PRISMA, Preferred Reporting Items for Systematic Reviews and Meta-Analyses; RCT, randomised controlled trial; SMA, shared medical appointment; HSDR, Health Services and Delivery Research

Table 2 Characteristics of included studies grouped by health condition(s)

Study	Condition(s)	Country	Trial type	Setting	Sample size (N)	Model /description	Comparator	Primary outcome	No. SMAs/ visits	Time points reported	Age of participants mean (SD)
Scott (2004)[47] Coleman (2001)[53]	LTCs*	USA	RCT	Large health maintenance organisation	295 I=145 C=149	CHCC model-'group visits'	Usual care	Patient health survey	24	12 months before and 12 months after enrolment	I: 74.2 (7.6) C:74.1 (7.4)
Zhang 2022[37]	Chronic obstructive pulmonary disease (COPD)	China	'Prospective randomised study'	Community Health Centre	116 I=59 C=57	Group visit	Usual care (follow-up by a community general practitioner team. The follow-up included basic lung function tests, a record of drugs used and tests of related parameters)	Health-Promoting Lifestyle Profile II, Seattle Obstructive Lung Disease Questionnaire, and the COPD Self-Efficacy Scale (CSES)	6	Baseline, 6 and 12 weeks post intervention	63.1 (7.0)
Gardiner (2017)[46] Gardiner (2019)[48]	Chronic pain and depression	USA	RCT (efficacy)	Community Health Centres serving low-income, racially and ethnically diverse populations	159 I=80 C=79	Integrated medical group visit	Usual care	Pain and depressive symptoms	10	Baseline, 9, 21 weeks	50.5 (12.3)
Berry (2016)[19]	Diabetes (type 2)	USA	RCT	Community-based health centre serving low-income population who are working	80 I=40 C=40	Group visits	Usual care	HbA1c	5	Baseline, 3, 6, 9, 15 months	51.4 (8.5)
Clancy 2003a[20] Clancy 2003b[52]	Diabetes (type 2)	USA	RCT	University primary care centre serving uninsured or inadequately insured patients	120 I=59 C=61	CHCC model-'group visits'	Usual care	American Diabetes Association (ADA) standards of care	6	Baseline, 3 and 6 months	54.0 (10.4)
Clancy (2007a)[21] Clancy (2007b)[51] Clancy 2008[60]	Diabetes (type 2)	USA	RCT	University primary care centre serving mainly minority, inadequately insured patients	186 I=96 C=90	CHCC model-'group visits'	Usual care	Primary Care Assessment Tool	12	Baeline, 6 and 12 months	56.1 (NR)
Cole (2013)[22]	Diabetes (pre-diabetes)	USA	RCT	Military health system	65 I=34 C=31	SMA	Individual counselling	Fasting Blood Glucose (FBG) (mg/dL)	3	Baseline, 3 and 12 months	58.3 (9.6)
Drake (2018)[23]	Diabetes (type 2)	USA	Feasibility RCT	Family medicine centre	33 I=17 C=16	SMA+ personalised health planning	SMA	Patient retention and satisfaction	8	Baseline (session 1) Postintervention (session 7/8)	I: 59.4,(10.5) C: 55.1 (14.5)

Continued

Table 2 Continued

Study	Condition(s)	Country	Trial type	Setting	Sample size (N)	Model /description	Comparator	Primary outcome	No. SMAs/ visits	Time points reported	Age of participants mean (SD)
Ee (2020)[24]	Diabetes (type 2)	Australia	Feasibility RCT	University primary care centre	18 I=9 C=8	SMA	Usual care	recruitment, retention and adherence rates as well as acceptability of trial procedures	6	Baseline, 12 weeks	I: 55.9 (11.6), C: 60.1 (7.7),
Heisler (2021)[25]	Diabetes	USA	Multisite cluster randomised pragmatic trial	Veterans affairs health system	1537 I=809 I=304 C=727	SMA	SMA reciprocal peer support programme (P2P) Usual care	Change in HbA1C	Varied across sites	Baseline, 6 months, 12 months†	I: 67.1 (9.2) C: 67.8 (12.7)
Karaivanov, 2021[26]	Diabetes	Canada English, with an Innu Aimun translator present	Mixed methods including RCT	Community health centre	23 I=13 C=10	SMA	Usual care	HbA1C levels	6	Baseline, 6 and 12 months	I: 51.2 (9.1) C:48.0 (15.0)
Liu (2012)[27]	Diabetes (type 2)	China	RCT	General practices	208 I=119 C=89	CHCC model-'group visits'	Usual care	Self management behaviours, self efficacy score, health status	12	Baseline, 12 months	I: 62.0 (9.8) C: 62.5 (10.0)
Mitchell 2023[28]	Diabetes	USA (Spanish/ English)	Non-inferiority RCT	Community health centre	309 I=158 C=151	Virtual world diabetes medical group visit	In-person diabetes medical group visit	mean changes in HbA1c and physical activity from baseline to 6 months	8	Baseline, 9 weeks and 6 months	55.4 (10.6)
Naik (2011)[29]	Diabetes (type 2)	USA	RCT of effectiveness	Veterans Affairs Medical Centres	87 I=45 C=42	Group clinic	Enhanced usual care‡	HbA1c	4	Baseline, 3 and 12 months	I: 63.8 (7.9) C: 63.5 (7.8)
Schillinger (2008)[30] Schillinger (2009)[61] Wallace (2013)[62]	Diabetes (type 2)	USA	3-arm practical clinical trial	University affiliated-Safety net settings-community health network	339 GMV=113 C=114 AT SM=112	Group medical visit	Automated telephone self-management Usual care	Self-management behaviours	9	Baseline, 12 months	56.1 (12.0)
Vaughan (2017)[31]	Diabetes (pre-diabetes/ type 2)	USA	Feasibility RCT	Community health clinic serving low-income Hispanic adults	62 I=31 C=31	Group visit	After 6 months, the control group received the intervention	Blood pressure and weight	6	Baseline, 6 months	I: 51.3 (NR) C: 48.0 (NR)
Vaughan (2020)[32]	Diabetes (type 2)	USA	Randomised clinical trial	Community health clinic serving low-income Hispanic adults	89 I=44 C=45	Group visits	Usual care	HbA1c (%)	6	Baseline, 6 months	I: 56.0 (7.1) C: 53.9 (9.1)
Vaughan 2021[33]	Diabetes	USA (Spanish)	Pilot RCT	Community health centre	37 I=22 C=15	Telehealth-supported, integrated community health workers, medication-access, group visit education	Usual care	Change in HbA1C	6	Baseline, 6 months	I: 52.5 (7.8) C: 57.7 (9.2)

Continued

Table 2 Continued

Study	Condition(s)	Country	Trial type	Setting	Sample size (N)	Model /description	Comparator	Primary outcome	No. SMAs/ visits	Time points reported	Age of participants mean (SD)
Wagner (2001)[34]	Diabetes (types 1 and 2)	USA	A system-wide randomised trial	Primary care practices in health maintenance organisation	708 I=278 C=429	Chronic care clinic	Usual care	Patient reported care satisfaction and health status	NR	Baseline, 12 and 24 months	I: 61.2 (NR) C: 60.4 (NR)
Cohen (2011)[39]	Diabetes (type 2) and cardiovascular risk	USA	RCT	Veterans Association Medical Centre	99 I=50 C=49	SMA programme (2 phases)	Usual care	Change in proportion of participants achieving target glycaemic and cardiac risk factor goals	4	Baseline, 6 months	I: 69.8 (10.7) C: 67.2 (9.4)
Taveira (2014)[40]	Diabetes and cardiovascular risk	USA	3 armed RCT	Veterans Association Medical Centre	200 CCRC=64 I=61 C=53	Group medical visit	CRRC Individual clinic Usual care	Time to failure for guideline recommended goals of HbA1c and blood pressure	Variable	Baseline, 12 months	CCRC: 64.6 (10.0) I: 64.5 (10.0) C: 64.5 (10.2)
Vedanthan 2021[41]	CVD with diabetes or increased risk of diabetes	Kenya	Cluster Randomised Trial	Health facility	2890 I (GMV)=740 C=708 GMV+MF=733 Usual care+MF=709	Group medical visits Group medical visits plus micro finance Usual clinical care plus micro finance	Usual clinic care	Mean change in systolic blood pressure	12	Baseline, 3 and 12 months	60.7 (12.1)
Wu (2018)[42]	Diabetes (type 2) and cardiovascular risk	USA	RCT	Veterans Health Administration Hospital primary care services	250 I=117 C=133	Group medical visit	Usual care	Change in HbA1c, systolic blood pressure and LDL-cholesterol between baseline and 13 months	8	Baseline, 6 and 13 months	I: 65.8 (8.7) C: 65.0 (9.8)
Edelman (2010)[43] Crowley (2013)[50] Crowley (2014)[63] Eisenberg (2019)[64]	Diabetes (type 2) and hypertension	USA	RCT	Veterans Association Medical Centre	239 I=133 C=106	Group clinic	Usual care	HbA1C level and systolic blood pressure	7	Baseline, 6 and 12 months	62.0 (NR)
Taveira (2011)[44]	Diabetes (type 2) and depression	USA	RCT	Veterans Affairs Medical Centres	88 I=44 C=44	SMA/group medical appointment	Usual care	Change in the proportion of participants who attained a goal HbA1C of <7% at 6 months.	4	Baseline, 6 months	I: 60.2 (9.3) C: 61.4 (9.9)
Yancy (2020)[45] Crowley (2017)[49]	Diabetes (type 2) and overweight	USA	Non-inferiority Randomised Clinical Trial	Veterans Association Medical Centre	263 I=127 C=136	Group medical visit with IWM	Group medical visit	Change in HbA1c level at 48 weeks	16	Baseline, every 4 weeks till week 48	60.7 (8.2)

Continued

Table 2 Continued

Study	Condition(s)	Country	Trial type	Setting	Sample size (N)	Model /description	Comparator	Primary outcome	No. SMAs/ visits	Time points reported	Age of participants mean (SD)
Junling (2015)[35]	Hypertension	China	RCT	Community Healthcare Centre	1346 I=692 C=654	CHCC model+ 'group visits'	Usual care	Blood pressure, body mass index and adherence to medication, physical activities and diet.	6	Baseline, 6 months	66.5 (9.8)
Simon (2015)[36]	Hypertension	Germany	Pilot study	Physician practices	48 I=24 C=24	CHCC model 'group medical visit'	Usual care	Patient willingness to attend GMV and attendence	6	Baseline, each session	NR
Baqir (2020)[38]	Osteoporosis	UK	Non-inferiority RCT	General practices	158 I=84 C=94	Group consultation	Usual care	MPR (mean possession ratio) with bisphosphonates	1	Baseline, 12 months	I: 74 (11) C: 74 (10)

Multiple papers for the same trial were found, therefore, we bolded the one used as the index paper throughout the rest of the paper.
*Long Term Conditions (including asthma, COPD, heart failure, diabetes, arthritis, deafness, blindness).
†6 months (3 to <9 months post-enrolment) and 12 months (9 to <15 months post-enrolment).
‡Enhanced usual care—patients required to attend two diabetes group education sessions.
CHCC, Cooperative Health Care Clinics; CRRC, Cardiovascular Risk Reduction Clinic; GMV, Group Medical Visit; HbA1c, glycated haemoglobin A1C; IWM, intensive weight management; LDL, Low Density Lipoprotein; RCTs, randomised controlled trials; SM, self-management; SMA, shared medical appointment.

Delivery teams

In three trials,[29 38 40] SMAs were delivered by a single healthcare professional though mostly they were delivered by multidisciplinary teams. Professionals most commonly involved were family physicians,[19 20 23–25 27–30 34–37 43 45 47] nurse practitioners[19 21 22 27 45] or nurses.[34 35 39 42 43 47 53] It was not always possible to tell what role each member of staff had in the delivery of the SMA. Provider characteristics other than profession or role were rarely reported, though four trials involving a majority of Hispanic/Latino participants reported that the community health worker and or physician were bilingual.[30–33] Four trials reported that the same interventionists attended all visits for a particular group.[36 39 43 45] One trial of diabetes SMAs reported that group assignments were maintained for all SMAs to facilitate peer interactions and relationships within groups.[29] The consistency in group composition in terms of patient and interventionists attending each session was not reported by most studies.

Risk of bias

Risk of bias items across the studies were generally low, except for 'blinding of participants and personnel' (68.97% of trials high, 27.59% unclear) (see online supplemental file 5).

Sensitivity analyses

There were no differences for any of the outcomes according to the risk of bias assessment criteria relating to random sequence generation, allocation concealment, blinding, incomplete outcome data and selected reporting (see online supplemental file 5).

Effectiveness of SMAs

Outcome measures varied across trials though most included biomedical indicators, psychological and well-being measures, healthcare service use and cost and resource use. Full details of all outcome measures reported by the studies are presented in online supplemental file 6.

Biomedical indicators

Glycated haemoglobin A1C (%)

Of the 16 trials measuring HbA1c (%) which compared SMA to usual care, 12 trials[19 21 22 24–26 30 32 33 40 42 44] were included in a meta-analysis. No statistically significant difference between SMAs and usual care was found for HbA1c (%) at follow-up (d=−0.091, 95%CI=−0.27 to 0.09, n=12) (p=0.321) (see figure 2A). Substantial heterogeneity was observed (I^2=65.8%). Of four other SMA trials reporting HbA1c (%) but not in the meta-analysis,[20 34 39 43] only one reported significant between-group differences, whereby the SMA group had significantly higher odds of attaining HbA1c goals (<7%) compared with usual care.[19] However, this was a high risk of bias study, scoring 'unclear' across the six domains.

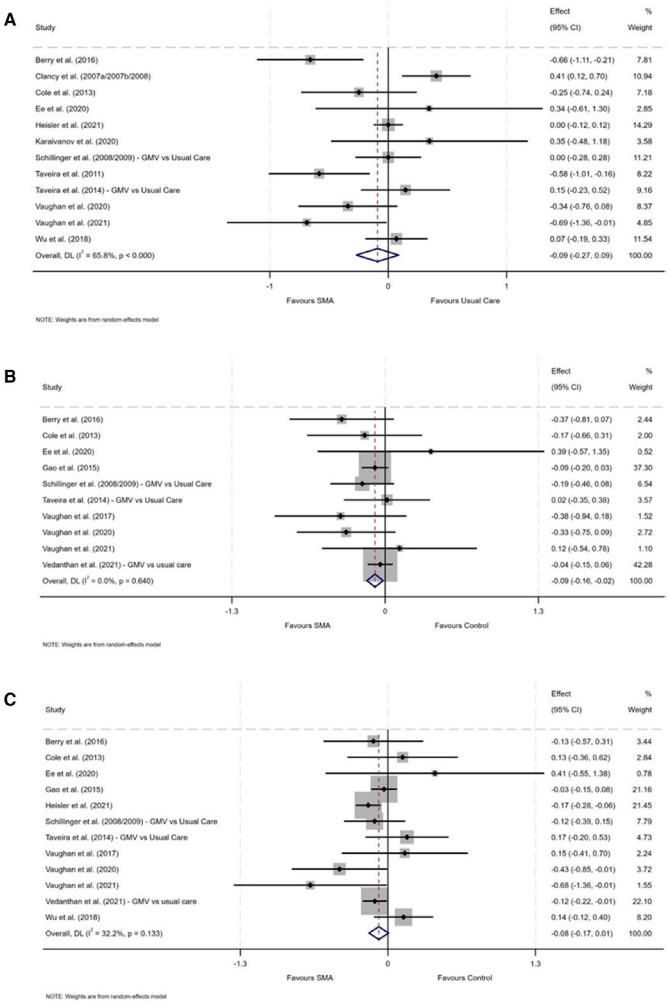

Figure 2 Forest plot for (A) HbA1C(%), (B) diastolic blood pressure, (C) systolic blood pressure. HbA1C, glycated haemoglobin A1C; SMA, shared medical appointment.

Diastolic blood pressure

Of 13 studies that compared SMA to usual care which reported diastolic blood pressure (DBP),[19 21 22 24 27 30–33 35 40 41 43] 10 were included in meta-analysis.[19 22 24 30–33 35 40 41] A very small statistically significant pooled effect was found at follow-up (d=−0.086, 95% CI=−0.16 to −0.02, n=10) (p=0.014), whereby participants in the SMA group had lower DBP than those in usual care (see figure 2B).

Of the three studies not included in the meta-analysis,[21 27 43] one trial of SMAs for diabetes and hypertension reported that mean DBP was lower in the SMA group (78.3 mm Hg) than in the usual care group (82.1 mm Hg) at 12 months.[43]

Systolic blood pressure

Of 16 trials that compared SMA to usual care reporting SBP,[19 21 22 24 25 27 30 31 33 35 39–43] 12 could be meta-analysed.[19 22 24 25 30–33 35 40–42] No statistically significant difference between SMAs and usual care was found for SBP at follow-up (d=−0.081, 95% CI=−0.17 to 0.01, n=12) (p=0.066), with moderate level of heterogeneity observed (I^2=32.2%) (see figure 2C). Of the four trials not in the meta-analysis,[21 27 39 43] two moderately robust studies reported statistically significant between-group differences in SBP at follow-up,[27 43] whereby the SMA group showed greater decreases in SBP compared with usual care.

No statistically significant effect of SMAs compared with usual care was found for other biomedical health outcomes, including total cholesterol, high density lipoprotein cholesterol, low-density lipoprotein cholesterol, triglycerides, weight and body mass index (see online supplemental file 7).

Trials with non-usual care comparators

Three trials had enhanced SMAs as their comparator, all of which found greater reductions in the enhanced SMA group compared with the standard SMA group.[23 29 45] Drake *et al*[23] reported significant improvements in HbA1c (%) at follow-up in the PHP SMA group but it is unclear how this compared with the standard SMA group.[23] Naik *et al*[29] found that HbA1c (%) was significantly lower in the SMA group than the traditional diabetes group education group immediately following the active interventions at 3 months, and the between-group differences remained clinically and statistically significant at 1-year follow-up.[29] Yancy *et al*[45] found that the mean reduction in HbA1c (%) was significantly greater in the enhanced SMA group compared with the standard GMV group at 16 and 32 weeks. However, at 48 weeks, no between-group differences in HbA1c (%) were observed.[45] A fourth trial that compared in-person GMVs with a digital group medical visit confirmed non-inferiority with a mean difference of 0.2 (97.5% CI −∞ to 0.3; p<0.001) in HbA1c across study arms. Improvements of ≥0.4% were achieved by 56% (56/99) of in-person and 52% (56/108) of virtual world participants from baseline to 6 months, while nearly one-third (75/207, 36.02%) achieved a 1% improvement[28]

Further, Drake *et al*[23] reported that participants in the PHP SMA group had lower DBP (M=86 mm Hg) at 8 months follow-up compared with participants in the standard SMA group (M=79.8 mm Hg).[23] Yancy *et al*[45] reported no between-group differences in DBP and SBP at 48 weeks. Further, patient weight loss in the SMAs with intensive weight management was comparable to weight loss among patients attending SMAs but statistical significance was unclear.[45] It is possible that other studies could not detect statistically significant differences between arms due to small sample sizes.

Psychological and well-being measures

Quality of life

Seven trials reported quality of life (QoL) outcomes[24 30 37 42 46 47] of which three trials reported significant between-group differences.[30 37 47] One trial of SMAs for chronically ill patients with multiple LTCs found that participants in the SMA group (M=7.2, SD=1.8) reported significantly better QoL than the usual care group (M=6.3, SD=2.0) (p=0.002) at 24 months.[47] Schillinger *et*

al[30] measured QoL using the Short Form (SF)-12 instrument which composed of mental health and physical health subscales. Improvements in SF-12 mental health were observed for SMA group compared with automated telephone self-management (effect size=0.31, p=0.03) and usual care (effect size=0.18, p=0.2).[30] However, this was considered as a high risk of bias study, with high/unclear judgements across four out of six domains.

Patient satisfaction

Four trials measured patient satisfaction.[23 34 38 47] Scott *et al*[47] reported significant differences at follow-up, with SMA patients reporting higher satisfaction with practitioner discussions compared with usual care.[47] The other three studies found no between-group differences.

Patient self-efficacy

Self-efficacy, including for disease-specific measures (eg, diabetes and COPD) and self-efficacy for managing disease in general, was measured in 10 trials,[19 27 30 35 37 39 43 44 47] of which six studies were included in meta-analysis.[19 30 35 37 46 47] A small statistically significant effect was found (d=0.288, 95% CI=0.02 to 0.56, n=6) (p=0.038). Considerable levels of heterogeneity were observed (I^2=84.4%). Of the four other studies not included in meta-analysis,[27 39 43 44] two reported that SMA patients had significant improvements in self-efficacy to manage diabetes compared with usual care.[27 43]

No statistically significant effect of SMAs compared with usual care was found for depression, the only other psychological and well-being measure identified (see online supplemental file 8).

Trials with non-usual care comparator

Drake *et al*[23] reported significant improvements in self-efficacy, as measured using the Diabetes Empowerment Scale, for the PHP SMA group; there was no change found in the standard SMA group.[23] Naik *et al*[29] did not find any differences in diabetes self-efficacy scores between the SMA group and the traditional diabetes group education group.[29]

Healthcare service utilisation

Hospital admissions

Eight trials reported hospital admissions within 6–24 months[19 20 25 34 40 43 44 47] and four were included in a meta-analysis.[19 25 40 47] There was no difference between SMAs and usual care in terms of hospital admissions at follow-up (d=−0.041, 95% CI=−0.24 to 0.15, n=4) (p=0.674) (see figure 3A). Moderate heterogeneity was observed (I^2=58.6%).

None of the other four trials[20 34 43 44] reported significant between-group differences for hospital admissions at follow-up.

Emergency department use

Of 10 relevant trials,[19 20 25 34 37 40 43 44 46 47] six were included in a meta-analysis.[19 25 34 37 40 47] No difference between SMAs and usual care was found for admissions to emergency departments at follow-up (d=−0.094, 95% CI=−0.27 to 0.08, n=6, p=0.289) (figure 3B). Considerable heterogeneity was observed (I^2=71.6%).

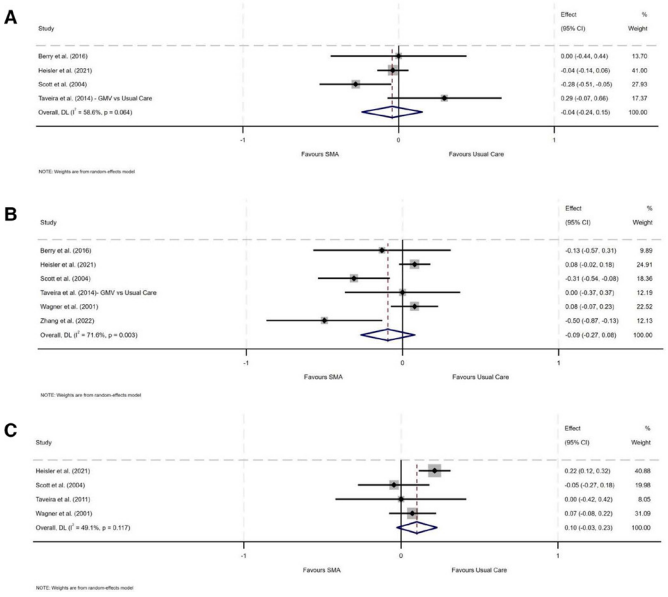

Figure 3 Forest plot for (A) hospital admissions, (B) emergency department use, (C) primary care visits. SMA, shared medical appointment.

Of the four trials not in the meta-analysis,[20 43 44 46] only Edelman *et al*[43] reported significant between-group differences in emergency department use favouring SMAs with 0.4 (95% CI=0.20 to 0.70) fewer emergency care visits than the usual care group over the 12-month study period.[43]

Primary care visits

Five trials reported the number of primary care visits participants made during the study period.[25 34 43 44 47] Four were pooled in a meta-analysis[34 44 47] showing no statistically significant difference (d=0.102, 95% CI=−0.03 to 0.23, n=4, p=0.119) (see figure 3C).

Edelman *et al*[43] which could not be included in the meta-analysis, reported that SMA participants had significantly fewer primary care visits than controls (5.3 vs 6.2 per patient-year) at 12 months.[43]

No statistically significant effect of SMAs compared with usual care was found for other behavioural outcomes including medication adherence and physical activity (see online supplemental file 9).

Cost and resource use

Few studies reported the costs involved in the delivery of the SMA and those that did were unclear about cost parameters (ie, whether scheduling and preparation time were included or not) or how the costs were attributed. One trial of diabetes SMAs reported that overall costs per patient were higher in SMAs than those in usual care group for the study period of 6 months.[20] However, another trial found no significant difference between SMA and usual care in terms of total costs incurred during the 24 months study period but showed a positive effect

of the SMA at 13 months poststudy where cost decreased by 6% for the SMA but increased by 13% for usual care p<0.01.[34] The SMA trial for osteoporosis reported that the costs incurred during the study period were lower for the SMA group compared with control groups.[38] A trial of chronic condition SMAs reported that total costs incurred by the SMA group were lower than the usual care group.[47] Similarly, in patients with COPD, Zhang *et al*[37] reported that medical costs were significantly lower in the SMA group than the control group at 12 weeks postintervention (p=0.005).[37]

DISCUSSION

Our systematic review identified 29 unique RCTs comparing SMAs for one or more LTCs to usual care or an enhanced SMA or SMA delivered via an alternative mode. We found a statistically significant improvement in DBP for patients in SMAs compared with usual care, albeit a small effect size. In line with the findings of previous reviews,[11] no harm was observed for the use of SMAs across these outcomes and there was not enough evidence to determine a clear effect on healthcare service use compared with usual care. This indicates that, while SMAs may not be superior to usual care in terms of most health outcomes or reducing demand on services, they do not appear to increase demand at least in the short term. Evidence reporting costs is too heterogeneous to draw firm conclusions.

Comparison with previous literature

Like previous reviews of SMAs for LTCs,[4 11 54] more than half of the included RCTs included patients with diabetes, and as such the most commonly reported outcome measure was HbA1C. However, unlike previous reviews,[7 55] we did not observe any significant improvements in HbA1c. This may be because HbA1c may not have been the focus of the SMA. Cole *et al*[22] for example, enrolled patients with pre-diabetes so, if their HbA1c levels were in the lower range, the magnitude to lower HbA1c would therefore be more limited.[22] The time of measurement also needs to be considered given that HbA1c changes approximately every 3 months. Further, previous reviews included trials in secondary care. Our meta-analysis showed that SMA participants had lower DBP compared with patients who received usual care.

Previous systematic reviews have been inconclusive with regard to the impact of SMAs on healthcare utilisation. Edelman *et al*'s review of SMAs for patients with chronic medical conditions in older adults found a lower pattern of subsequent hospital admissions and emergency department visits,[54] while Booth *et al*[4] reported a mixed pattern of changes.[4] Our meta-analyses show that SMAs do not differ from usual care in terms of healthcare utilisation. There is no evidence in the present data to suggest that patients compensate for a lack of privacy by returning to primary care or that they risk hospitalisation because issues are not adequately addressed during the SMA session(s). However, it should be noted that the key source of bias across the included studies was the lack of blinding of participants and personnel. Therefore, possible selection bias may result in recruitment of SMA participants with less concern about sharing their personal/medical information.

In comparison to biomedical outcomes and psychological outcomes, healthcare service use and costs and resource use and other behavioural outcomes were less frequently reported in studies. This echoes the findings of Edelman *et al*[7] which found there to be limited data on key patient-centred outcomes such as patient satisfaction.[7] However, our recent qualitative work in which we explored the views of patients and practitioners about SMAs in primary care found much positivity.[56] Behavioural outcomes such as medication adherence are important across many LTCs and are key to understanding how patients are self-managing their conditions. In line with Kelly *et al*'s[11] recommendation, future studies should report outcome effectiveness measures that are common or comparable across different LTCs such as physical activity, self-efficacy, medication adherence and QoL. It would be advantageous to agree a core outcome set (COS), consisting of a standardised group of outcomes, to be reported by all SMA trials. This can help with future evaluations of SMAs through reducing heterogeneity and facilitating meta-analysis and ensuring that outcome measures are relevant to key stakeholders.[57]

Strengths and limitations

Although previous reviews have explored the effectiveness of SMAs in improving health outcomes, this review provides a focus on primary care which is key to managing LTCs. We found 16 additional trials with 6072 participants since the comprehensive work by Booth *et al*[4] indicating a rapidly growing field. We used robust methods whereby our search strategy was developed with input from information specialists through an iterative process and key stages of the review (including screening, data extraction and quality appraisal) were undertaken independently by three reviewers. We included studies regardless of type of LTC so that we were able to summarise all the available evidence on effectiveness of SMAs for LTCs in primary care in one analysis. However, evidence of an effect was determined by p≤0.0.5 in the papers. This assumes that studies were adequately powered, which may not be the case, particularly for some of the secondary outcomes of the included studies.

Limitations of evidence base and implications for future research

Despite using a form of delivery framework to extract relevant study information,[14] some important contextual factors, such characteristics of the healthcare professionals delivering the SMA, may not have been captured as this information was missing from the authors' descriptions of the SMAs. Similar components may be described differently by different authors or, conversely, similar

descriptions are used to describe different components. Using standardised taxonomies for describing the form of delivery and intervention content when designing the intervention/SMA content could help to identify important behavioural components and key implementation processes that contribute to intervention effectiveness, allowing for replication. However, for this to be possible, it is also important that those delivering the SMAs clearly specify which target health behaviours (eg, to increase medication adherence) the SMAs aim to change. None of the included studies included measures of fidelity to SMA protocols which is also important for determining whether the session(s) are delivered as intended to achieve optimum effects.[58] Further, theoretical underpinnings were lacking in the included SMA interventions, making it difficult to identify 'mechanisms of action' through which interventions bring about change.[59] Future SMAs interventions should be theory based and be explicit in reporting its theoretical underpinnings.

Where multiple healthcare professionals are involved in the SMA, their key role and purpose in the SMA were rarely clearly defined. There was also limited reporting on the composition of the SMA groups across some of the included studies (ie, how patients were selected for recruitment and size of SMA group). Therefore, it is unclear which groups of patients might benefit from attending the same SMAs together and what implications SMAs may have for intervention-generated health inequalities. One-third of the included studies were conducted on US veterans and one-third of studies have involved participants from low-income/uninsured population groups. Generalisability of these groups to other healthcare settings in other countries is unclear. There needs to be further examination into how SMAs have been implemented into typical NHS practice. It was envisaged that 'they are not an addition to one-to-one appointments—they replace them' (Clay and Stern[1], p65). However, there is anecdotal evidence that SMAs are being used in addition to usual care models of chronic disease management rather than as replacements. Further investigations into SMAs for patients with one or more LTCs are required, including a wider variety of LTCs (such as asthma and COPD) and with more diverse population groups, for example, including low-income and disadvantaged groups in other countries, including the UK.

Implications for policy and clinical practice

The findings of this review indicate that SMAs do not provide an added benefit beyond usual care for improving outcomes or reducing healthcare utilisation for LTCs in primary care. However, nor did they lead to worse outcomes including on resource utilisation and qualitative work has reported that patients and practitioners can see merit in bringing patients with similar conditions such as regarding peer support and learning. Our recommendations to policy-makers would be to consider new and emerging evidence of effectiveness before widespread roll-out. If SMAs are being delivered in health systems, then outcome evaluations should be planned. Recommendations to healthcare organisations would be to develop standardised measures of SMA effectiveness and efficiency and then embed in patient records systems to enable more rigorous and agile evaluations.

CONCLUSIONS

This review is the first to examine the effects of SMAs delivered in primary care on health outcomes and healthcare service use in patients with one or more LTCs. Our review suggests that SMAs do not provide an added benefit beyond usual care for improving outcomes or reducing healthcare utilisation for LTCs in primary care. However, given the variable nature of the interventions delivered in this review, the short follow-up periods of these studies, and the length of time self-management behaviour change may occur, it is possible that such changes may occur over a longer period. To identify key intervention components that contribute to effectiveness, future studies will benefit from using standardised taxonomies to report intervention content. The use of an evaluation framework, with a COS, is recommended to improve evidence in this field.

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Acknowledgements We would like to thank the PRU BehSci Public Patient Involvement group for providing their patient perspective about outcome measures of interests. EFSK is supported via an NIHR Senior Investigator award. Thanks to Helen Banks for helping to screen the papers found in the 2023 search update.

Contributors EFSK, FFS and AO'D designed the study. MYT, FG, CR and FB developed the search strategy and undertook the searches. FG, MYT and RD carried out the screening, data extraction and analysis. All authors contributed to the interpretation. MYT and FG wrote the manuscript that all authors contributed to and approved. MYT and FG contributed equally to this paper and are the guarantors.

Funding This paper is independent research commissioned and funded by the NIHR PRU in Behavioural Science (Award: PR-PRU-1217-20501).

Disclaimer The views expressed in this publication are those of the authors and not necessarily those of the NHS, the National Institute for Health Research, the Department of Health and Social Care or its arm's length bodies, and other Government Departments. The funders had no role in the design of the study, collection, analysis or interpretation of data or in the writing of the manuscript.

Competing interests None declared.

Patient and public involvement Patients and/or the public were involved in the design, or conduct, or reporting, or dissemination plans of this research. Refer to the Methods section for further details.

Patient consent for publication Not applicable.

Provenance and peer review Not commissioned; externally peer reviewed.

Data availability statement All data relevant to the study are included in the article or uploaded as online supplemental information.

Supplemental material This content has been supplied by the author(s). It has not been vetted by BMJ Publishing Group Limited (BMJ) and may not have been

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