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Identification of Active Ingredients of Social Prescribing Interventions Targeting Mental Health: A Systematic Review.

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KEYWORDS: Mental Health, Public Health, Primary Care

ABSTRACT

Objectives

To establish the effectiveness, and active ingredients of UK-based social prescribing interventions targeting mental health and well-being outcomes.

Study appraisal and synthesis methods

Nine databases were systematically searched and assessed independently for eligibility by two reviewers. Methodological quality was assessed using NIHR and CASP checklists. Data were extracted on study characteristics, study outcomes, referral pathways, treatment fidelity strategies, person-centredness (personal needs assessment, choice of social prescribing activity, eliciting their personal preferences; and receipt of social prescribing consistent with their preferences), intervention development processes, and theory-linked Behaviour Change Techniques (BCTs). Data were narratively synthesised.

Results

Twelve studies were included in the review (N=5,479 participants). There were 10 uncontrolled before and after designs, one randomised controlled trial and one cohort study. The most reported referral pathways were initial referrals to link workers from primary care (n=4) or direct referral from primary care (n=4). Participants were working age adults (mean age range 42 to 56 years). Reasons for referral included anxiety, depression, social isolation, and loneliness. Eleven out of twelve studies reported statistically significant improvement in outcomes (mental wellbeing was the modal outcome measure). Two studies explicitly described all core components of person-centred care. Strategies to enhance treatment fidelity were sub-optimal across studies. None of the studies reported comprehensive intervention development processes. Two studies engaged service users in intervention design or conducted usability/ feasibility testing. Nine different BCTs were identified across the 12 studies. The most frequently coded BCTs were credible source (n=6), social support-practical (n=3), social support-unspecified (n=2), and goal setting-outcome (n=2).

Conclusions and implications

Robust conclusions on the effectiveness of social prescribing for mental health- related outcomes cannot be made. Future research would benefit from comprehensive developmental processes, with reference to appropriate theory, alongside utilisation of treatment fidelity strategies, and a focus on person-centred care.

PROSPERO registration number

CRD42020167887

STRENGTHS AND LIMITATIONS OF THIS STUDY

- In addition to effectiveness, this review identified active ingredients of social prescribing interventions in the context of mental health.
- A novel approach to elucidating the theoretical basis of social prescribing interventions has been applied.
- Establishing the effectiveness of social prescribing interventions is hindered by lack of fidelity assessment.

INTRODUCTION

Social prescribing is a complex intervention that aims to provide holistic support and care to people living with a range of long-term health problems.[1] It is defined by the Social Prescribing Network as 'a means of enabling general practitioners and other frontline healthcare professionals to refer patients to a link worker' from which a link worker will co-produce an action plan to address what matters to the individual.[2]

NHS England included social prescribing as one of the six pillars of a Universal Personalised Care Strategy,[3] and have a target to recruit an additional link workers to help reach 900,000 individuals by 2023.[3] This is despite several systematic reviews reporting that the evidence for the (cost-)effectiveness of social prescribing is mixed, with most studies having important methodological limitations, including absence of comparison groups,[4] disparity in follow-up periods,[4] absence of clear and focused objectives[5] and no statement of underpinning model or theory informing intervention content or components.[6]

To determine what works (or does not work) within social prescribing interventions, there is a pressing need to identify 'active ingredients' of social prescribing interventions such as mode of delivery, duration, intensity, underpinning theory/ model of behavioural change and theory-linked behaviour change techniques. Identification of these active ingredients will help to inform the design and evaluation of future social prescribing interventions, including optimisation of existing interventions. Kimberlee et al,[7] and Husk et al,[8] describe four models of social prescribing (referral pathways): signposting service users to appropriate services or groups; direct referral from primary care to an activity or service; a link worker (based within or externally to primary care) who receives referrals and in turn conducts a needs assessment and refers the service user onto an activity or service; and the latter model with the addition of feedback and a support loop between the link worker and the service user. This has been supported by purposive action, particularly influenced by the language of

prescribing in primary care, to enhance the implementation of social prescribing in primary care. [9]

Approximately one in six adults in the UK are living with mental health conditions and social prescribing has the potential to improve outcomes for this population. Previous systematic reviews have evaluated the impact of social prescribing on people living with a range of health needs and long-term conditions, but without specific focus on elucidating the evidence of social prescribing interventions for people living with mental health conditions.[4,8,10] We conducted a systematic review to establish the effectiveness, and active ingredients of UK-based social prescribing interventions targeting mental health.

METHODS

Study design

This systematic review followed a published protocol (CRD42020167887)[11] and adhered to the Preferred Reporting Items for Systematic Review and Meta-Analysis (PRISMA) guidelines.[12] A PRISMA Checklist for this review is presented in supplementary materials 1.

Review Criteria

Included studies were social prescribing interventions (any referral pathway, with or without a link worker based in any setting) involving adults aged >18 years that reported on mental health or well-being outcomes. Studies involving adults with physical health comorbidities were included if the study reported on mental health-related or wellbeing outcomes primarily. Only studies with a primary quantitative study design, published in English and conducted in the United Kingdom (UK) were eligible for inclusion in the review. The decision to restrict the review to UK-based studies was made to ensure relevance and transferability of the findings to the health and social care setting in the UK. Studies were excluded if there was no referral or signposting to either a link worker or group/service and/or did not report any empirical data.

Search Strategy

The following nine databases were searched to February 2020: Cochrane Databases of Systematic Reviews (CDSR), The Cochrane Central Register of Controlled Trials (CENTRAL), CINAHL (Cumulative Index of Nursing and Allied Health Literature), Cochrane Protocols, Embase, Medline, PsycInfo, Scopus and Web of Science. Prior to searching, reviewers carried out an extensive exercise to identify and group together potentially relevant terms to cover the concepts of social prescribing and mental health. The search strategy was then developed by an expert information scientist (LE) and adapted as necessary to take into account differing indexing terms and other search functionality available in each of the additional databases.

The search strategy developed for Ovid Medline is provided in supplementary file 2. All modified searches can be supplied on request. Reference lists of included papers were searched to identify any further studies to be considered for eligibility of inclusion.

Study Selection

All results from electronic searches were uploaded to EndNote X9 and underwent a process of de-duplication. One reviewer (MC) screened all titles and abstracts and a second reviewer (CJ) independently screened 20% of the results generated by the search. Studies retained following screening of titles and abstracts were reassessed in full text by the same two reviewers (MC and CJ) working independently using a study selection form. At stage 1 and 2 of study selection, any disagreements between the two reviewers that could not be resolved via discussion were referred to a third reviewer for adjudication (KA). Subsequently, hand searches of reference lists and citation searching (using Google Scholar) of included studies was conducted to identify any potentially relevant literature not captured by the electronic search.

Data Extraction

A structured data extraction form was used to capture information on study characteristics (country of origin, aims, design, outcomes targeted, inclusion/exclusion criteria, sampling method, sample size, follow up period, loss to follow up), components of social prescribing interventions, methodological quality, extent that interventions were person-centred, treatment fidelity strategies, comprehensiveness of intervention development processes, and outcome measures. Data were extracted on three stages of social prescribing (where applicable): initial assessment, use of a facilitator or link worker, and delivery of socially prescribed activity at a specific service. Components of the Template for Intervention Description and Replication (TIDieR)[13] checklist was applied to describe key features of social prescribing interventions. One reviewer (MC) extracted data on all included studies and a second reviewer (KA) checked

data extracted from 50% of included studies. Any discrepancies between the two reviewers were resolved by discussion and checking the primary study data.

Each included study was assessed for methodological quality by the same two reviewers (MC and KA), working independently using a checklist appropriate for the study design: The National Institute for Health Research Quality Assessment Tool for Before-After (Pre/Post) Studies[14], Critical Appraisal Skills Programme Cohort Study Design Checklist,[15] and Critical Appraisal Skills Programme Randomised Control Trial Checklist.[16]

Two reviewers (MC and KA) independently coded the presence of theory-linked BCTs within included studies using the BCT Taxonomy v1.[17]

Methodological strategies utilised by included studies to monitor and enhance the reliability and validity of behavioural interventions (i.e. treatment fidelity strategies) were assessed independently by MC and KA using a framework published by Bellg et al.[18] This framework describes treatment fidelity across five domains: design of the study; monitoring and improving provider training; monitoring and improving delivery of interventions; monitoring and improving receipt of interventions; and monitoring and improving enactment of intervention skills.

The extent that includes studies adhered to core principles of person-centred care was independently assessed by two reviewers (MC and KA). A 4-item checklist was designed specifically for this review, with reference to relevant literature[19-21] in order to record the explicit reference to; a needs assessment was conducted with the service user (i.e., a tailored conversation to discuss their needs and goals); offering a choice of social prescribing activity; actively involving the service user in discussion to elicit their preferences for type of social prescribing activity; and the service user received a social prescription consistent with their preferred choice of social prescribing activity.

The comprehensiveness of developmental processes for social prescribing interventions were assessed using a checklist developed in a previous systematic review[22] to record: use of a framework, theory or model to guide design and evaluation; use of best available evidence from research (e.g. systematic review); conducting a needs assessment with service users; evidence of co-production or design with service users; and evidence of piloting or feasibility testing in the target population.

Data Synthesis

Data were synthesised narratively due to the expected heterogeneity of study designs and outcome measures. The 'promise' of active ingredients and other intervention features for positively changing outcomes was assessed by calculating promise ratio.[23]

Patient and Public Involvement

There was no patient or public involvement in this research.

RESULTS

In total 41,243 (database searching n=41,134, reference lists and citation searching n=109) potentially relevant studies were identified from the electronic search (Figure 1). A total of 256 full text articles were assessed for inclusion, with 12 papers fulfilling all the review criteria.[24-35]

[Insert Figure 1 around here, Title: PRISMA Diagram

Study Characteristics

A summary of included studies is presented in Table 1. The 12 included studies had a combined sample size of 5, 479 participants. Eleven studies were conducted in England[24-30,32-35] and one in Scotland.[31] Ten studies were uncontrolled before and after designs,[26-35] one a randomised controlled trial,[24] and one a cohort study.[25]

The referral pathways were mapped against those described by Husk et al[8]. The most common referral pathway was via link worker (n=4)[2,7,9,10] and a direct referral from primary care (n=4).[26,27,33,35] Two studies reported a direct referral from community care,[28,34] one study used a direct referral from multiple sectors (e.g. referrals from either General Practitioner (GP), Health Care Practitioner (HCP), community, self-referral, secondary care or social care).[24] One study used a community sector referral to a link work pathway.[30]

The initial assessment upon entry to a intervention was mainly reported to have been conducted by a General Practitioner[24-27,29,32,33,35] or other primary care professionals.[24,26,27,29,31,33,35] Initial assessments were also conducted by community-based professionals;[24,28-31,34] self-referral (where the individual contacts a social prescribing service directly);[24,31] secondary care based professionals[24] and social care based professionals.[24,34] Where a link worker model was utilised (n=6),[24,25,29-32] the

link worker was predominantly based within a primary care[25,31,32] or community-based setting.[24,25,30]

The mean age of participants ranged from 42 to 56 years across eight studies. Four studies did not report on the age of participants.[28,30,32,35] Eleven studies reported incomplete data about the sex of participants.[22,23,25-27,29,30-33] A higher proportion of female participants were reported in nine studies.[23-27,30-33]

Employment status was summarised into four categories: participants who were in work (either full time or part time), education (full time or part time education or described as a student), or position of responsibility (such as full time carers) (n=1, 806); those who were not unemployed or incapacitated from work (n=367); participants who were retired (n=792);[27,28,30] and participants described as 'other' (n=476).[24,25,27,28] The employment status for the remaining 2,115 participants was not reported.

The ethnicity of participants was reported in five of the twelve included studies,[25,28,30,34,35]. These studies reported between 55%[25] and 100%[30,34] of participants were from White of White British backgrounds, 45% as non-White,[25] between 6%[28] and 21%[35] as Ethic Minority Groups and 1%[28] as 'Other'. The current Consensus data reports the UK population to be 86% White, 8% Asian, 3% Black and 2% Mixed/Multiple Ethnic Groups.[36]

The most commonly reported reasons for referral to a social prescribing service were anxiety or depression, (or combined anxiety and depression) based on data from eight studies.[24-28,30,31,33] Social isolation and depression was the primary reason for referral in one study.[35] Loneliness was the primary reason for referral in one study[29] with social isolation and loneliness reported as the primary reasons for referral by two studies.[32,34] Six studies reported comorbid physical health conditions including: type 2 diabetes,[32,35] chronic

pain,[26,35] impaired mobility,[35] coronary obstructive pulmonary disease[32] and 'other' health or illness.[28,33]

The mean follow-up period based on data from 10 studies was 4.2 months (SD=2.4)[24-30,33-35], with a range of two months[27] to eight months.[29,35] One study did not report a follow-up period.[31] For one study the follow-up period was stated as dependant on individual need.[32] The mean loss to follow-up (attrition rate) was 51% (SD=22.7, range 11%[30] to 85%[32]) based on data from 10 studies.[24-30,33-35] The attrition rate from referral to initial appointment with a link worker was reported in three studies,[24,25,32] with a mean of 40% (SD= 25), range of 14%[25] to 64%[32]. The attrition rate from initial appointment with a link worker or primary care professional to an organisation for a social prescription was reported in two studies,[26,32] with a range of 36%[26] to 58%[32].

Table 1. Summary of study characteristics

Author(s)	Study Design	Population (Mean Age, Sex%)	Reported Participant Ethnicity^	Employment Status	Reason for Referral	Duration of Follow-up (Loss to Follow-up)	Referral Pathway (Husk et al, [8])
Afuwape, et al. 2010[24]	Randomised Controlled Trial	N=40 (Control Mean age=32.8, Intervention mean age= 42.73), 67% Female***, 33% Male	NR	In⁺= 6 Out⁺⁺= 31 Other =3	Anxiety and Depression	3 Months (20%)	Direct referral from multiple Sectors**
Carnes, et al. 2017[25]	Cohort Study	N=486 (Control Mean age=58, Intervention mean age= 56), 55% Female, 43% Male	White n= 258, Non-White n=213	In⁺ = 155 Other =315	Anxiety and Depression	8 Months (62%)	Link Worker Model
van de Venter et al. 2014 [35]	Uncontrolled Before/After Study	N=44 (Mean age=NR), 82% Female, 16% Male	White-British n= 29 BME n=9 Unknown n=6	NR	Depression and Social Isolation	5 Months (NR)	Direct Referral from Primary Care
Crone, et al. 2013[26]	Uncontrolled Before/After Study	N=255 (Mean age=NR), 76% Female, 22% Male	NR	NR	Anxiety and Depression	2.2 Months* (54%)	Direct Referral from Primary Care
Crone, et al. 2018[27]	Uncontrolled Before/After Study	N=1297 (Mean age=51.9), 76% Female, 24% Male***	NR	In⁺ = 218 Out⁺⁺ = 507 Retired= 289 Other =137	Anxiety and Depression	2 Months (52%)	Direct Referral from Primary Care
Jones, et al. 2013[28]	Uncontrolled Before/After Study	N=715 (Mean age=NR), 78% Female, 26% Male	White n=623 BME n=38 Unknown n=8	In⁺ =259 Out⁺⁺ = 198 Retired= 209 Other=21	Anxiety and Depression	3 Months (NR)	Direct Referral from Community Care
Kellezi, et al. 2019[29]	Uncontrolled Before/After Study	N=630 (Mean age=NR), 54%Female, 45% Male	NR	NR	Loneliness	8 Months (71%)	Link Worker Model

Maund, et al. 2019[30]	Uncontrolled Before/After Study	N=16 (Mean age= NR), 50% Female, 50% Male	White-British n=13, White-Other n=3	In+ =1 Out++ =10 Retired= 5	Anxiety and Depression	6 months (11%)	Link worker model from community referral
Morton, et al. 2015[31]	Uncontrolled Before/After Study	N=136 (Mean age=52), 73% Female***, 27% Male	NR	NR	Anxiety & Depression	NR (48%)	Link Worker Model
Pescheny, et al. 2019[32]	Uncontrolled Before/After Study	N=448 (Mean age=50.3), 65% Female, 32% Male	NR	In+ =22 Out++ =41	Mild moderate mental health issues	Dependant on Needs Assessment (84%)	Link Worker Model
Sumner, et al. 2019[33]	Uncontrolled Before/After Study	N=1297 (Mean age=51.1), 76% Female, 24% Male***	NR	In+ =218 Out++ = 507 Retired =289	Anxiety & Depression	2.1 Months* (48%)	Direct Referral from Primary Care
Thomson, L. J., et al. 2018[34]	Uncontrolled Before/After Study	N=115 (Mean age=NR), 63% Female, 37% Male***	White-British n=95	NR	Social Isolation	2.5 Months* (NR)	Direct Referral from Community Care

^Terminology used by authors.
*Mean calculated by authors based on reported data.
** Multiple Sector – Referral from a combination of the following: General Practitioner, Health Care Professional, Community, Self-referral, Secondary Care or Social Care.
*** Not explicitly reported, calculated from subtracting percentage for the reported sex from 100.
+ In = in work, education, or position of responsibility
++ Out = out of work, education, or position of responsibility
NR- Not reported

Study Outcomes

Outcomes are grouped into between-group and within-group differences (Table 2). Of the 12 included studies, 11 reported statistically significant improvements in mental health, mental well-being, general health or quality of life outcomes from baseline to follow-up[26-35] or between the intervention/ exposed and the comparator/ unexposed group[24,25].

The 7 or 14-item Warwick- Edinburgh Mental Wellbeing Scale (WEMWBS)[37] was the most frequently used outcome measure.[26-28,30-33,35] Six studies used the 14-item[24,25,28,29,31] and three used the 7-item short-form version.[24,26,30] All eight studies reported a statistically significant improvement in mental well-being assessed with the WEMWBS.

Two further studies[26,32] utilised measures of mental wellbeing: South West Wellbeing Questionnaire (SWWBQ)[26]; and Museum Wellbeing Measure for Older Adults (MWM-OA).[32] Both of these studies reported a statistically significant improvement in mental wellbeing.

One study assessed loneliness[27] using the University College London Loneliness Scale (ULS-8)[38] and reported a positive reduction in loneliness scores. Other outcomes assessed by studies were stress[27] using the Perceived Stress Scale (PSS)[39] and mood[28] using the Positive and Negative Affect Schedule (PANAS),[40] with both reporting an improvement from social prescribing.

Three studies [25,30,31] utilised symptom-based outcome measures such as: Hospital Anxiety and Depression Scale (HADS),[41] Generalised Anxiety Disorder Assessment (GAD-7).[42] Out of these three studies reported a statistically significant improvement in mental health symptoms.[28,29]

Other outcomes reported by two studies[22,23] were general health: General Health Questionnaire-28 (GHQ-28),[43] Global Assessment of Functioning (GAF),[44] and General Health Score (GHS).[43] One of the studies reported improved general health.[24] One study reported[24] improved health related quality of life assessed with the Short-Form-36 (SF-36).[45]

Two studies[23,24] reported on health service utilisation using patient reported data[26] and health records.[25] Both studies reported a statistically significant reductions in primary care usage when the number of group memberships increased.

Table 2: Between and Within Group Changes in Outcomes

Paper	Outcome Measure	Statistically significant improvement (p-value)	Effect Size	95% Confidence Intervals
Between Group Changes				
Afuwape et al., 2010[24]	GHQ-28	Yes (p=0.03)	7.76*	0.86 to 14.65
	GAF	No (p=0.87)	-0.78*	-10.40 to 8.84
	SF-36 Mental Health Score	Yes (p=0.02)	-11.93*	-21.99 to -1.88
Carnes et al., 2017[25]	General Health Score	No	-0.03*	−0.312 to 0.253
	HADS Score	No	0.23*	−2.113 to 2.577
	Wellbeing	No	-0.09*	−0.569 to 0.391
Within Group Changes				
van de Venter et al., 2014[35]	WEMWBS-14	Yes (p<0.0001)	8.00	4.8 to 11.2
Crone et al., 2013[26]	WEMWBS-7	Yes (p<0.001)	3.00*	Not Reported
	WEMWBS -14	Yes (p<0.001)	6.00*	Not Reported
Crone et al., 2018[27]	WEMWBS-14	Yes (p<0.001)	6.50*	Not Reported
Jones et al., 2013**[28]	General Health Scale	Yes (p<0.001)	0.51	Not Reported
	Social Wellbeing: SWB-6	Yes (p<0.001)	0.17	Not Reported

	WEMWBS-7	Yes (p<0.001)	2.28	Not Reported
	CES-D-7	Yes (p<0.001)	-1.99	Not Reported
Kellezi et al., 2019[29]	ULS-8	Not Reported	Not Reported	Not Reported
Maund et al.,2019[30]	WEMWBS-14	Yes (p=0.009)	4.00*	Not Reported
	GAD-7	Yes (p=0.002)	-2.99*	Not Reported
	PSS	Yes (p=0.041)	-1.96*	Not Reported
	PANAS (Positive)	Yes (p=0.012)	4.57*	Not Reported
	PANAS (Negative)	Yes (p=0.025)	-0.92*	Not Reported
Morton et al.,2015[31]	HADS – Anxiety	Yes (p<0.001)	Not Reported	2.2 to 3.3
	HADS - Depression	Yes (p<0.001)	Not Reported	1.9 to 3.2
	WEMWBS-14	Yes (p<0.001)	Not Reported	-8.1 to -5.1
Pescheny et al.,2019[32]	WEMWBS-7	Yes (p<0.0001)	2.78	1.68 to 3.88
Sumner et al.,2019[33]	WEMWBS-14	Yes (p<0.001)	Not Reported	0.925 to 0.984
Thomson et al.,2018[34]	MWM-OA Main Effect	Yes (p<0.001)	Not Reported	Not Reported

*Calculated by author.

**Components of the South West Well Being Questionnaire

Generalised Anxiety Disorder (GAD-7), Global Assessment of Functioning (GAF), General Health Questionnaire-28 (GHQ-28), General Health Score (GHS), Hospital Anxiety and Depression Scale (HADS), Museum Wellbeing Measure for Older Adults (MWM-OA), Perceived Stress Scale (PSS) Positive and Negative Affect Schedule (PANAS), University College London Loneliness Scale (ULS-8), Short Form-36 (SF-36), South West Well-being Questionnaire (SWWBQ), Warwick- Edinburgh Mental Wellbeing Scale (WEMWBS).

Methodological Quality Assessment

The methodological quality assessment of each included study can be found in Supplementary material 3.

For the ten uncontrolled before and after studies, the scores (out of 24) ranged from 16,[33] to 10.[27,29] All before/after studies clearly stated the study question or objective and included participants that were representative of those who would be eligible in the clinical population of interest. Only six studies clearly described the eligibility criteria[26,28,31-33] or described the intervention in enough detail to ensure the consistent delivery across the included

population.[25-28,30,33] Only one study detailed sufficient information to conclude that all eligible participants were enrolled.[24] Only one study used a sample size sufficiently large enough to provide confidence in the findings (evidence that the sample size achieved was consistent with a statistical power analysis.[27] None of the before/after studies used blind outcome assessors. None of the studies measured outcomes at specified intervals across the study. However, eight studies used outcome measures that had been assessed for reliability and validity.[25,26,28-33] Eight studies utilised inferential statistical methods to examine changes in outcomes.[26-33] There were substantial losses to follow up across the 10 before and after studies ranging from 11% to 85% (mean=53%) based on data from eight studies.[24-31]

The randomised controlled study[22] scored 20 out of a maximum of 22 points. A potential source for bias was performance and ascertainment as the allocation to groups was not concealed from the interventionists.

The cohort study[23] scored 23 out of a maximum of 24 points. A potential source of bias was a large loss to follow up (62%) suggesting a potential for attrition bias, however there was no evidence provided to attain if this was accounted for when designing the study to ensure sufficient power.

Fidelity Assessment

A summary table presenting the treatment fidelity assessment can be found in supplementary material 4.

Design of the study

Ten studies provided sufficient information to establish use of treatment fidelity strategies for study design to ensure the same dose of the intervention had been delivered within conditions.[24-28,30-33,35] None of the studies reported any explicit evidence they had

planned for implementation setbacks (e.g. sufficient numbers of link workers being recruited to meet future demand).

Monitoring and improving provider training

Five studies provided sufficient evidence that they provided standardised training for providers[24,25,28,30,31] (i.e. training was developed specifically for the purpose of intervention delivery); five studies accommodated and tailored training to address provider differences (i.e. rotations or specific role placement);[24-27,33] three studies targeted consolidation of skills of providers (e.g., follow up sessions with service/ research leads);[24,25,28] and one study minimised variation among providers by monitoring and reviewing delivery on a monthly basis.[28]

Monitoring and improving delivery of interventions

Five studies[24,25,31,32,35] provided sufficient information to suggest they controlled for provider differences by using strategies including rotating sessions attended or offering a range of activities. Two studies[31,35] reduced differences within the intervention using strategies including standardised training or monitoring adherence to a protocol.

Monitoring and improving receipt of interventions and enactment of intervention skills

Three studies[24,25,31] reported information regarding service users comprehension of the intervention, and three studies[24,25,28] reported sufficient information to establish service users ability to receive the intervention using needs assessments prior to delivery of training. None of the studies included in this review provide sufficient information to suggest the use of cognitive or behavioural skills in the enactment of the intervention in service users or staff.

Person-Centredness

A summary table of the person- centredness of the study interventions is presented in supplementary material 5.

Five of the 12 included studies reported evidence that they had conducted a needs assessment with individual service users to discuss their needs and goals.[24,25,29,31,32] Six studies explicitly stated that service users were offered a choice of social prescribing interventions.[25,27,29,31,32,35] Five studies provided sufficient evidence that service users were actively involved in discussions to elicit their preferences/values on the available social prescribing options.[24,25,29,31,32] Two studies provided explicit evidence that service users received a social prescription that was consistent with their preferences.[25,29] Overall, five studies did not report any explicit evidence that any core components of person-centred care were adopted.[26,28,30,33,34] Two of the twelve studies explicitly described all four components of person-centred care.[25,29]

Intervention Development Processes

A summary table of the intervention development processes reported across studies is presented in supplementary material 6.

One study explicitly reported the application of the Medical Research Council Framework for the Development and Evaluation of Complex Interventions.[35] The remaining eleven studies made no explicit reference to the application of a framework, theory or model to underpin the development and evaluation of social prescribing interventions. Five studies reported using 'best available evidence'.[27-29,31,32] Two studies involved service users in co-design or co-production processes to design the intervention.[23,29] Two studies[29,30] conducted a needs assessment of the target population using qualitative research methods (e.g., consultations with service users). Evidence of usability testing and feasibility testing of the social prescribing intervention was reported by two studies.[29,30]

Behaviour Change Techniques

A total of nine different BCTs (Figure 2) were reported across nine studies.[24-28,30-32,34] The most frequently coded BCT was credible source (e.g. health care professional)(n=6), followed by social support-unspecified (e.g. social support from friends or relatives)(n=3), social support-practical (e.g. advise on, arrange, or provide practical help)(n=2) and goal setting-outcome (e.g. set a goal defined in terms of a positive outcome)(n=2). No BCTs were coded for three studies.[25,29,33]

[Insert Figure 2 around here. Title: Frequency of Individual BCT's Across Included Studies]

Individual BCTs were categorised into six groupings (Figure 3) in accordance to a publish taxonomy.[17] The most common groupings were comparison of outcomes (n=6), social support (n=5), and goals and planning (n=4).

[Insert Figure 3 around here. Title: Frequency of BCT Groupings Across the Included Studies]

A promise ratio analysis was planned for the coded BCTs and other intervention features; however, this was not feasible due to the preponderance of positive outcomes (i.e., different target behaviours and applications).

DISCUSSION

Summary of findings

This systematic review identified 12 UK-based studies of social prescribing interventions, which predominately utilised a link worker pathway or direct referral from a primary care model of social prescribing for working-age adults with common mental health conditions (anxiety and depression). All but one study reported a statistically significant improvement in mental wellbeing, mental health, loneliness, or general health/ quality of life outcomes. Consistent with previous research,[46-48] two studies[23,24] in the current review reported reductions in the number of primary care appointments. However, these findings should be interpreted with caution. Consistent with previous reviews of social prescribing interventions,[4,8,9,45] the majority (10 out of 12) of the included studies were uncontrolled before and after studies (with a range of methodological shortcomings). Attrition rates were high (mean of 51%) and there was substantial variability in outcome measures.

Person centredness is one of the key pillars of social prescribing for empowering the person to improve their own health.[49] However, only two studies included in this review reported evidence of adhering to the core principles of person-centred care.

Only one study[35] reported using a specific framework for the systematic development of the social prescribing intervention being evaluated; the Medical Research Council framework for developing and evaluating complex interventions.[50] No other study reported utilising a comprehensive systematic intervention development process, which limits the replicability of interventions identified in this review. There was a lack of service users' involvement across the studies and usability or feasibility testing of the social prescribing interventions. This lack of involvement could lead to issues with acceptability and appropriateness of the intervention, with regular involvement and testing ensuring that resources are not wasted.

Treatment fidelity strategies are critically important for external validity of interventions. Evidence from this review indicated several shortcomings in this regard. For example, there was a lack of reported training of staff who were responsible for the delivery of the interventions, which would serve to promote consistent delivery

This systematic review coded for the presence of theory linked BCTs to elucidate the theoretical underpinning of social prescribing interventions. The most common BCT groupings were comparisons of outcomes (BCT-credible source; e.g. information provided by a general practitioner), social support (BCT-social support-practical; e.g. a friend providing transport to the venue and BCT-social support -unspecified; e.g. a friend who they can call when they feel anxious), and goals and planning (BCT-goal setting- behaviour; e.g. setting a goal defined in terms of the behaviour such as attending a social event, BCT-goal setting-outcome e.g. setting a goal defined in terms of the outcome of the target behaviour such as attending a regular social group, and BCT-action planning; e.g. planning the performic of the behaviour such as attending an art class at a particular time on a certain day of the week). Previous systematic reviews of social prescribing literature and individual articles have not coded for BCT and therefore no comparison can be made with other findings at this point. The importance of referring to which BCTs have been used is important both from an understanding and replicability point of view. [51-53]

Limitations

Active ingredients such as BCTs, person-centredness and other intervention features identified in this review were limited by the available body of evidence consisting of 12 studies. Whilst this is a limitation of the evidence base rather than this review specifically. Their identification was reliant upon descriptions provided by study authors. Indeed, none of the studies included provided an adequate description or a description of intervention content with reference to the published BCT taxonomy.

Future Research

It is critical that complex interventions are underpinned by a structured development process involving service users and providers in a co-design activity with reference to appropriate evidence and theory. Future research should prioritise the application of theory and indeed more work is needed to identify which theory or combinations of theories is most appropriate to social prescribing interventions.

Future research on social prescribing interventions for mental health (and more broadly) would benefit from systematic evaluation of single and clustered BCTs. This would optimise the design and delivery of social prescribing interventions across the entire pathway (e.g., from initial contract with a primary care link worker to first appointment with the service providing socially prescribed activities). Interventions could then be tailored for individuals living with mental health conditions to improve person-centred outcomes. Cross-disciplinary reviews have identified the use of BCT clusters including goal planning,[51,52] feedback and monitoring,[51,52] social support,[51,52] and comparison of outcomes,[52] is associated with effectiveness for improving physical activity,[51] mental health seeking behaviour[52] and employee mental health.[53] In addition these reviews have highlighted interventions using clusters of BCTs focused on shaping knowledge and comparison of behaviour have also improved mental health seeking behaviour.[52]

Despite high rates of attrition across the studies included in this review, none of the included studies reported reasons for service users' disengaging from social prescribing. This warrants attention and further investigation in future research, as well as a more detailed understanding of why a high proportion of those referred to social prescribing interventions fail to engage. Both emphasise the need to engage service users in the design and evaluation of social prescribing interventions with a focus on principles of person-centred care.

The narrative synthesis presented in the review is based on data aggregated across the referral pathways adopted by studies. Therefore, future research should conceptualise social prescribing interventions as complex multi-facetted interventions. There are different referral pathways for social prescribing, including outside of primary care settings,[54] and the specific contact points (e.g., initial assessment, interaction with a facilitator or link worker and receipt/ delivery or socially prescribing activity) need to be considered as sperate, but linked facets of a complex multi-faceted intervention involving interactions between healthcare professionals and service users.

Conclusions

The predominance of before and after studies and associated methodological concerns, sub-optimal development processes, and limited utilisation of treatment fidelity strategies prevents any robust conclusions being made on the effectiveness of social prescribing for mental health-related outcomes. Future research would benefit from comprehensive development processes with reference to appropriate frameworks, theories or models, including adherence to principles of person-centred care, addressing treatment fidelity and exploring the impact of clusters of BCTs.

Contributors

MC and DF conceived the review. DF, LA, and JS supervised the review. KA and CJ assisted MC with study selection and data extraction. LE designed the search strategy and collated the search results. MC drafted the initial manuscript. All authors revised the manuscript for important intellectual content and approve the final manuscript.

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Competing Interests

None declared

Patient Consent

Not applicable

Data Sharing Statement

No original data were generated for this study.

Ethics Statement

Not applicable

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LEGEND

Figure 1 – PRISMA Diagram

Table 1- Summary of Characteristics

Footnotes:

^Terminology used by authors.

*Mean calculated by authors based on reported data.

** Multiple Sector – Referral from a combination of the following: General Practitioner, Health Care Professional, Community, Self-referral, Secondary Care or Social Care.

*** Not explicitly reported, calculated from subtracting percentage for the reported sex from 100.

+ In = in work, education, or position of responsibility

++ Out = out of work, education, or position of responsibility

NR- Not reported

Table 2- Between and Within Group Changes in Outcomes

Footnotes:

*Calculated by author.

**Components of the South West Well Being Questionnaire

Generalised Anxiety Disorder (GAD-7), Global Assessment of Functioning (GAF), General Health Questionnaire-28 (GHQ-28), General Health Score (GHS), Hospital Anxiety and Depression Scale (HADS), Museum Wellbeing Measure for Older Adults (MWM-OA), Perceived Stress Scale (PSS) Positive and Negative Affect Schedule (PANAS), University College London Loneliness Scale (ULS-8), Short Form-36 (SF-36), South West Well-being Questionnaire (SWWBQ), Warwick- Edinburgh Mental Wellbeing Scale (WEMWBS).

Figure 2 – Frequency of Individual Behaviour Change Techniques Across Individual Studies

Figure 3 - Frequency of Behaviour Change Groupings Across the Included Studies

Figure 1: PRISMA Diagram

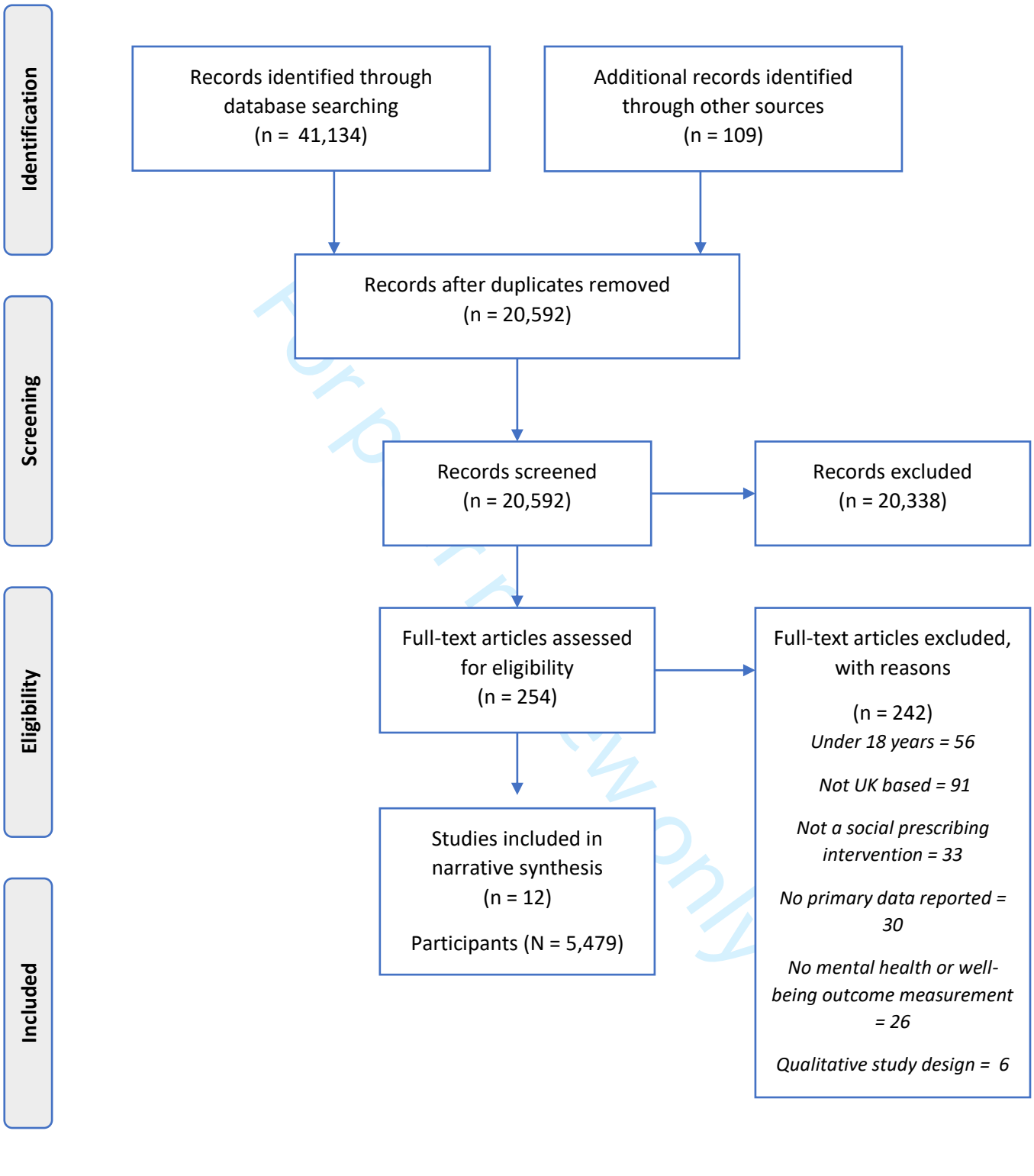


Figure 2: **Frequency of Individual BCT's Across Included Studies**

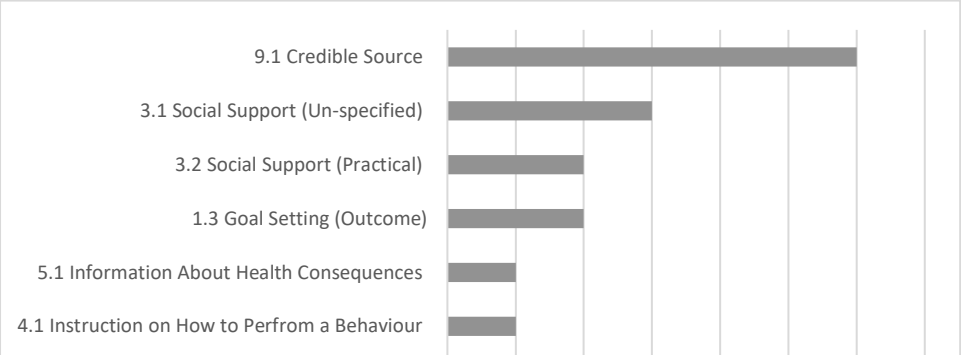
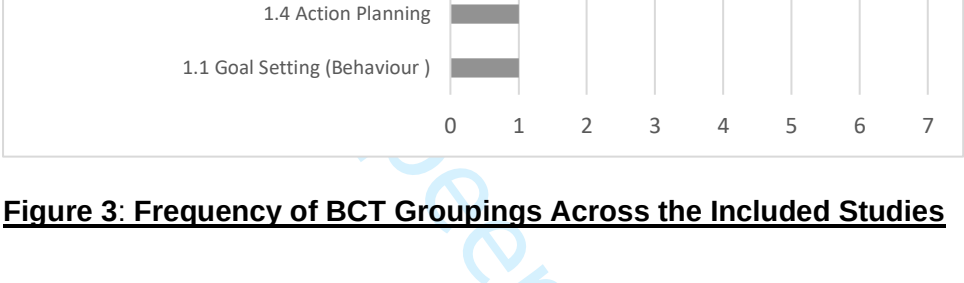


Figure 3: **Frequency of BCT Groupings Across the Included Studies**



Supplementary Materials 1

Prisma Checklist

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.	3
Objectives	4	Provide an explicit statement of the objective(s) or question(s) the review addresses.	3
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.	7
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.	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.	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.	8
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.	8
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
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)).	9
	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

Section and Topic	Item #	Checklist item	Location where item is reported
	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
	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).	9
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.	10
	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.	12
Risk of bias in studies	18	Present assessments of risk of bias for each included study.	18
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.	16
Results of syntheses	20a	For each synthesis, briefly summarise the characteristics and risk of bias among contributing studies.	N/A
	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.	N/A
	20d	Present results of all sensitivity analyses conducted to assess the robustness of the synthesized results.	N/A
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.	24
	23b	Discuss any limitations of the evidence included in the review.	26
	23c	Discuss any limitations of the review processes used.	26

Section and Topic	Item #	Checklist item	Location where item is reported
	23d	Discuss implications of the results for practice, policy, and future research.	27
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.	7
	24c	Describe and explain any amendments to information provided at registration or in the protocol.	N/A
Support	25	Describe sources of financial or non-financial support for the review, and the role of the funders or sponsors in the review.	30
Competing interests	26	Declare any competing interests of review authors.	30
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.	Supplementary Files

Supplementary Materials 2

Ovid Medline Search Strategy Example

1 (Social adj4 (prescri* or referral or intervention)).mp.

2 (community adj4 (prescri* or referral or intervention)).mp.

3 linking scheme*.mp.

4 u3a.mp.

5 university of the third age.mp.

6 buddy scheme*.mp.

7 men's shed.mp.

8 (prescri* adj4 (exercis* or education or learning or arts)).mp.

9 information referral.mp.

10 social referral.mp.

11 green gym.mp.

12 time bank.mp.

13 supported referral.mp.

14 (well-being adj2 referral).mp.

15 (wellbeing adj2 referral).mp.

16 ecotherapy.mp.

17 Individual Placement.mp.

18 supported employment.mp.

19 non-medical referral.mp.

20 non-clinical referral.mp.

21 or/1-20

22 Mental Health/

23 mental disorders/ or anxiety disorders/ or "bipolar and related disorders"/ or "disruptive, impulse control, and conduct disorders"/ or dissociative disorders/ or "feeding and eating disorders"/ or mood disorders/ or personality disorders/ or somatoform disorders/ or "trauma and stressor related disorders"/

24 mental* ill*.mp.

25 Depression/

26 exp Anxiety/

27 wellbeing.mp.

28 well-being.mp.

29 psychiatric disorder*.mp.

30 psychiatric problem.mp.

31 non-medical symptoms.mp.
32 psycho-social problem*.mp.
33 psychosocial problem*.mp.
34 mups.mp.
35 medically unexplained physical symptoms.mp.
36 non-medical problem.mp.
37 mental difficult*.mp.
38 recovery.mp.
39 Mental Health Recovery/
40 social function*.mp.
41 or/22-40
42 21 and 41

Supplementary Materials 3

Additional tables

Methodological Quality Assessment

CASP Randomised Control Trial Checklist	**Study**
Max 22	Afuwape et al. 2010[22]
Did the trial address a clearly focused issue?	Yes
Was the assignment of patients to treatments randomised?	Yes
Were all of the patients who entered the trial properly accounted for at conclusion?	Yes
Were patients, health workers and study personnel 'blind' to treatment?	Yes
Were the groups similar at the start of the trial?	Yes
Aside from the experimental intervention, were the groups treated equally?	Yes
How large was the treatment effect?	Unclear
How precise was the estimate of the treatment?	Unclear
Can the results be applied to the local population or in your context?	Yes
Were all clinically important outcomes considered?	Yes
Are the benefits worth the harms and costs?	Yes
Total CASP Checklist score ***(Yes=2, Unclear = 1, No =0)***	20

CASP Cohort Checklist	Study
Max 24	Carnes et al. 2017[23]
Did the study address a clearly focussed issue?	Yes
Was the cohort recruited in an acceptable way?	Yes
Was the exposure accurately measured to minimise bias?	Yes
Was the outcome accurately measures to minimise bias?	Yes
(A) Have the authors identified all important confounding factor's?	Yes
(B) Have they taken account of the confounding factors in the design and/ or analysis?	Yes
(A) Was the follow up of subjects complete enough?	Yes
(B) Was the follow up of subjects long enough?	Yes
What were the results of this study?	Yes
How precise are the results?	Unclear
Do you believe the results?	Yes
Can the results be applied to the local population?	Yes
Total CASP Checklist score ***(Yes=2, Unclear = 1, No =0)***	23

NIHR Pre/Post Checklist	Study									
Max 24	van de Venter et al. 2014[33]	Crone et al. 2013[24]	Crone et al. 2018[25]	Jones et al. 2013[26]	Kellezi et al. 2019[27]	Maund et al.2019[28]	Morton et al.2018[29]	Peschen y et al. 2019[30]	Sumner et al. 2019[31]	Thomson et al. 2018[32]
Was the study question or objective clearly stated?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Were eligibility/ selection criteria for the study population prespecified and clearly described?	Yes	No	No	Yes	No	Yes	Yes	Yes	Yes	Yes
Were the participants in the study representative of those who would be eligible for the test/service/intervention in the general or clinical population of interest?	Yes	Yes	Yes	Yes	Unclear	Yes	Yes	Yes	Yes	Yes
Were all eligible participants that met the prespecified entry criteria enrolled?	No	Yes	Unclear	No	Unclear	No	Not Reported	Unclear	Unclear	Unclear
Was the sample size sufficiently large to provide confidence in the findings?	Not Reported	Not Reported	Unclear	Not Reported	Yes	NR	Not Reported	Unclear	Unclear	Unclear
Was the test/service/intervention clearly described and delivered consistently across the study population?	Yes	Unclear	Yes	Yes	Yes	Yes	No	Yes	No	Unclear
Were the outcome measures prespecified, clearly defined, valid, reliable, and assessed consistently across all study participants?	Yes	No	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes
Were the people assessing the outcomes blinded to the participants' exposures/interventions?	No	No	No	No	No	No	No	No	No	No
Was the loss to follow-up after baseline 20% or less? Were those lost to follow-up accounted for in the analysis?	NR	No	No	No	No	NR	No	No	No	NR
Did the statistical methods examine changes in outcome measures from before to after the	Yes	Unclear	Unclear	Yes	Yes	Yes	Yes	Yes	Yes	Yes

intervention? Were statistical tests done that provided p values for the pre-to-post changes?										
Were outcome measures of interest taken multiple times before the intervention and multiple times after the intervention (i.e., did they use an interrupted time-series design)?	No	No	No	No	No	No	No	No	No	No
Total CASP Checklist score ***(Yes=2, Unclear = 1, No =0)***	16	11	13	15	10	15	14	14	15	

Supplementary Materials 4

Fidelity Assessment

Study	Afuwape et al., 2010[22]	Carnes et al., 2017[23]	van de Venter et al., 2014[33]	Crone et al., 2013[24]	Crone et al., 2018[25]	Jones et al., 2013[26]	Kellezi et al., 2019[27]	Maund et al.,2019[28]	Morton et al.,2019[29]	Pescheny et al.,2019[30]	Sumner et al.,2019[31]	Thomson et al.,2018[32]
1) Treatment fidelity strategies for design of study												
Ensure same treatment dose within conditions	Yes	Yes	Yes	Yes	Yes	Yes	UC	No	Yes	Yes	Yes	Yes
Ensure equivalent dose across conditions	UC	UC	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Plan for implementation setbacks	Yes	Yes	Yes	Yes	Yes	Yes	UC	Yes	Yes	Yes	Yes	No
2) Treatment fidelity strategies for monitoring and improving provider training												
Standardize training	Yes	Yes	UC	UC	UC	Yes	UC	Yes	Yes	UC	UC	No
Ensure provider skill acquisition	Yes	Yes	UC	UC	UC	Yes	UC	UC	NR	UC	UC	No
Minimize “drift” in provider skills	NR	NR	UC	UC	UC	Yes	UC	UC	NR	UC	UC	No
Accommodate provider differences	Yes	Yes	UC	Yes	Yes	UC	UC	UC	NR	UC	Yes	No
3) Treatment fidelity strategies for monitoring and improving delivery of treatment												
Control for provider differences	Yes	Yes	Yes	No	No	UC	UC	UC	Yes	Yes	No	UC
Reduce differences within treatment	No	No	Yes	No	No	No	UC	No	Yes	UC	No	No
Ensure adherence to treatment protocol	NR	NR	Yes	UC	UC	UC	UC	Yes	N/A	UC	UC	UC
Minimize contamination between conditions	Yes	Yes	N/A	UC	UC	Yes	UC	No	N/A	N/A	UC	Yes
4) Treatment fidelity strategies for monitoring and improving receipt of treatment												
Ensure participant comprehension	Yes	Yes	UC	No	No	No	UC	UC	Yes	UC	No	UC

Ensure participant ability to use cognitive skills	Yes	Yes	UC	No	No	No	UC	UC	NR	UC	No	UC
Ensure participant ability to perform behavioral skills	UC	UC	UC	UC	UC	Yes	UC	UC	NR	UC	UC	UC
5) Treatment fidelity strategies for monitoring and improving enactment of treatment skills												
Ensure participant use of cognitive skills	UC	UC	No	UC	UC	No	UC	UC	NR	No	UC	UC
Ensure participant use of behavioral skills	UC	UC	No	UC	UC	UC	UC	UC	NR	No	UC	UC

UC- unclear
NR-not reported
N/A – not applicable

Supplementary Materials 5

Person Centredness

Study	Afuwape et al., 2010[22]	Carnes et al., 2017[23]	van de Venter et al., 2014[33]	Crone et al., 2013[24]	Crone et al., 2018[25]	Jones et al., 2013[26]	Kellezi et al., 2019[27]	Maund et al.,2019[28]	Morton et al.,2015[29]	Peschenyet al.,2019[30]	Sumner et al.,2019[31]	Thomson et al.,2018[32]
Personal needs assessment conducted (social, emotional or practical needs)	Yes	Yes	NR	UC	No	UC	Yes	UC	Yes	Yes	NR	No
Choice of SP activities offered?	No	Yes	Yes	UC	Yes	UC	Yes	UC	Yes	Yes	NR	No
Person actively involved in discussions to establish their preferences/ values on the available SP options to improve their health and/ or wellbeing	Yes	Yes	NR	UC	No	UC	Yes	UC	Yes	Yes	NR	No
Person received a SP consistent with their choice	No	Yes	NR	UC	No	UC	Yes	UC	UC	No	NR	No

Supplementary Materials 6

Intervention Development Processes

Study		Afuwape et al., 2010[22]	Carnes et al., 2017[23]	van de Venter et al., 2014[33]	Crone et al., 2013[24]	Crone et al., 2018[25]	Jones et al., 2013[26]	Kellezi et al., 2019[27]	Maund et al.,2019[28]	Morton et al.,2020[29]	Pescheny et al.,2019[30]	Sumner et al.,2019[31]	Thomson et al.,2018[32]
Evidence of Systematic Development	Yes/No	UC	No	Yes	No	No	No	No	No	Yes	Yes	Yes	Yes
	Framework used			MRC						No	No	No	No
	Best available evidence	Yes	No	No	UC	UC	UC	Yes	Yes	Yes	No	Yes	Yes
	Needs assessments	UC	No	No	No	No	No	No	No	Yes	Yes	No	No
	Evidence of testing	No	No	No	No	No	No	No	No	Yes	Yes	No	No
Underpinned by Theory	Yes/No	No	No	No	No	No	No	No	No	No	No	No	No
	Which one	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Co-design/ production	Yes/No	No	Yes	No	No	No	No	No	No	Yes	Yes	UC	No
	who		Service User							Service User	Needs Assessment		

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The Effectiveness and Active Ingredients of Social Prescribing Interventions Targeting Mental Health: A Systematic Review

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The Effectiveness and Active Ingredients of Social Prescribing Interventions Targeting Mental Health: A Systematic Review

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ABSTRACT

Objective To establish the effectiveness and active ingredients of UK-based social prescribing interventions targeting mental health and well-being outcomes.

Design Systematic review adhering to PRISMA guidelines, and a published protocol.

Data Sources Nine databases were systematically searched up to March 2022.

Eligibility Criteria Social prescribing interventions in the UK involving adults aged ≥18 years, which reported on mental health outcomes.

Data extraction and synthesis Two reviewers extracted data on study characteristics; outcomes; referral pathways; treatment fidelity strategies; person-centredness; intervention development processes; and theory-linked Behaviour Change Techniques (BCTs). Data were narratively synthesised.

Results 52,074 records were retrieved by the search, 13 interventions reported across 17 studies were included in this review (N=5,036 participants at post-intervention). Fifteen studies were uncontrolled before and after designs, one a randomised controlled trial and one a matched groups design. The most frequently reported referral pathway was the link worker model (n=12), followed by direct referrals from community services (n=3). Participants were predominantly working age adults, and were referred for anxiety, depression, social isolation, and loneliness. 16 out of 17 studies reported statistically significant improvements in outcomes (mental health, mental wellbeing, general health, or quality of life). Strategies to enhance treatment fidelity were sub-optimal across studies. Only two studies utilised a specific theoretical framework. Few studies reported engaging service users in co-design (n=2) or usability and/or feasibility testing (n=4). Overall, 22 BCTs were coded across 13 interventions. The most frequently coded BCTs were social support-unspecified (n=11), credible source (n=7) and social support-practical (n=6).

Conclusions Robust conclusions on the effectiveness of social prescribing for mental health-related outcomes cannot be made. Future research would benefit from comprehensive intervention developmental processes, with reference to appropriate theory, alongside long-

term follow-up outcome assessment, utilising treatment fidelity strategies, and a focus on principle of person-centred care.

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STRENGTHS AND LIMITATIONS OF THIS STUDY

- The methodological approach undertaken identified active ingredients within effective social prescribing interventions as well as the overall impact of the interventions on mental health and wellbeing outcomes
- This review highlighted that a large proportion of individuals referred to social prescribing interventions fail to engage. This emphasises the importance of involving service users in the design and evaluation of social prescribing interventions
- Heterogeneity of study designs, populations, interventions, and outcome measures prevented the conduct of a meta-analysis
- Robust conclusions on the effectiveness of social prescribing for mental health- related outcomes cannot be established due to issues with methodological quality

INTRODUCTION

Social prescribing is a complex intervention that aims to provide holistic support and care to people living with a range of long-term health problems.[1] It is defined by the Social Prescribing Network as 'a means of enabling general practitioners and other frontline healthcare professionals to refer patients to a link worker' from which a link worker will co-produce an action plan to address what matters to the individual.[2]

NHS England included social prescribing as one of the six pillars of a Universal Personalised Care Strategy,[3] and have a target to recruit additional link workers to help reach 900,000 individuals by 2023.[3] This is despite several systematic reviews reporting that the evidence for the (cost-)effectiveness of social prescribing is mixed, with most studies having important methodological limitations, including absence of comparison groups,[4] disparity in follow-up periods,[4] absence of clear and focused objectives[5] and no statement of underpinning model or theory informing intervention content or components.[6]

To determine what works (or does not work) within social prescribing interventions, there is a pressing need to identify 'active ingredients' of social prescribing interventions such as mode of delivery, duration, intensity, underpinning theory/ model of behavioural change and theory-linked behaviour change techniques. Identification of these active ingredients will help to inform the design and evaluation of future social prescribing interventions, including optimisation of existing interventions. Kimberlee et al,[7] and Husk et al,[8] describe four models of social prescribing (referral pathways): signposting service users to appropriate services or groups; direct referral from primary care to an activity or service; a link worker (based within or externally to primary care) who receives referrals and in turn conducts a needs assessment and refers the service user onto an activity or service; and the latter model with the addition of feedback and a support loop between the link worker and the service user. This has been supported by purposive action, particularly influenced by the language of

prescribing in primary care, to enhance the implementation of social prescribing in primary care.[9]

Approximately one in six adults in the UK are living with mental health conditions[10] and social prescribing has the potential to improve outcomes for this population. Mental health has a devasting impact on individuals, their families and society, with depression and anxiety disorders affecting 16% of the UK population at any one time.[10] A conservative estimate of the total costs of mental health in the UK in 2019 was £117.9 billion (approximately 5% of GDP), with 56% and 27% for people aged 15-49 and 50-69 respectively.[11]

Previous systematic reviews have evaluated the impact of social prescribing on people living with a range of health needs and long-term conditions, but without specific focus on elucidating the evidence of social prescribing interventions for people living with mental health conditions.[4, 8, 12] We conducted a systematic review to establish the effectiveness, and active ingredients of UK-based social prescribing interventions targeting mental health.

METHODS

Study design

This systematic review followed a published protocol (CRD42020167887)[13] and adhered to the Preferred Reporting Items for Systematic Review and Meta-Analysis (PRISMA) guidelines.[14] A PRISMA Checklist for this review is presented in supplementary materials 1.

Review Criteria

Included studies were social prescribing interventions (any referral pathway, with or without a link worker based in any setting) involving adults aged ≥18 years that reported on mental health or well-being outcomes. Studies involving adults with physical health comorbidities were included if the study reported on mental health-related or wellbeing outcomes primarily. Only studies with a primary quantitative study design, published in English and conducted in the United Kingdom (UK) were eligible for inclusion in the review. The decision to restrict the review to UK-based studies was made to ensure relevance and transferability of the findings to the health and social care setting in the UK. Studies were excluded if there was no referral or signposting to either a link worker or group/service and/or did not report any empirical data.

Search Strategy

The following nine databases were searched from inception to 21st March 2022: Cochrane Databases of Systematic Reviews (CDSR), The Cochrane Central Register of Controlled Trials (CENTRAL), CINAHL (Cumulative Index of Nursing and Allied Health Literature), Cochrane Protocols, Embase, Medline, PsycInfo, Scopus and Web of Science. Prior to searching, reviewers carried out an extensive exercise to identify and collate potentially relevant terms to cover the concepts of social prescribing and mental health. The search strategy was then developed by an expert information scientist (LE) and adapted as necessary to consider differing indexing terms and other search functionality available in each of the additional databases.

The search strategy developed for each database is provided in supplementary file 2. Reference lists of included studies were searched to identify any further studies to be considered for eligibility of inclusion.

Study Selection

All results from electronic database searches were uploaded to EndNote X9 and underwent a process of de-duplication. One reviewer (MC) screened all titles and abstracts and a second reviewer (CJ) independently screened 20% of all titles and abstracts. All studies retained following screening of titles and abstracts were reassessed in full text by the same two reviewers who worked independently using a study selection form. At stage 1 and 2 of study selection, any disagreements between the two reviewers that could not be resolved via discussion were referred to a third reviewer for adjudication (KA or DF). Subsequently, hand searches of reference lists and citation searching of included studies (using Google Scholar) were conducted to identify any potentially relevant literature not captured by the electronic search.

Data Extraction

A structured data extraction form was used to capture information on study characteristics (country of origin, aims, design, outcomes targeted, inclusion/exclusion criteria, sampling method, sample size, follow up period, loss to follow up), components of social prescribing interventions, methodological quality, extent that interventions were person-centred, treatment fidelity strategies, comprehensiveness of intervention development processes, and outcome measures. Data were extracted on three stages of social prescribing (where applicable): initial assessment, use of a facilitator or link worker, and delivery of socially prescribed activity at a specific service. Components of the Template for Intervention Description and Replication (TIDieR)[15] checklist were applied to describe key features of social prescribing interventions. One reviewer (MC) extracted data on all included studies and a second reviewer (KA) checked

data extracted from 50% of included studies. Any discrepancies between the two reviewers were resolved by discussion and by checking the primary study data.

Three reviewers (MC, KA, LA) independently coded the presence of theory-linked BCTs within included interventions using the BCT Taxonomy v1.[16] The extent that included interventions adhered to core principles of person-centred care was independently assessed by two reviewers (MC and KA). A 4-item checklist was designed specifically for this review, with reference to relevant literature[17-19] in order to record whether: a needs assessment was conducted with the study participants (i.e., a tailored conversation to discuss their needs and goals); a choice of social prescribing activity was offered to participants; participants were actively involving in discussion to elicit their preferences for type of social prescribing activity; and the participants received a social prescription consistent with their preferred choice of social prescribing activity.

The comprehensiveness of developmental processes for social prescribing interventions were assessed using a checklist developed in a previous systematic review[20] to record: use of a framework, theory or model to guide design and evaluation; use of best available evidence from research (e.g. systematic review); conducting a needs assessment with service users; evidence of co-production or design with service users; and evidence of piloting or feasibility testing in the target population.

Methodological strategies utilised by included studies to monitor and enhance the reliability and validity of behavioural interventions (i.e. treatment fidelity strategies) were assessed independently by three reviewers (MC, KA, DF) using a framework published by Bellg et al.[21] This framework describes treatment fidelity across five domains: design of the study; monitoring and improving provider training; monitoring and improving delivery of interventions; monitoring and improving receipt of interventions; and monitoring and improving enactment of intervention skills.

Any additional articles, grey literature, or media sources that were referenced by included studies were consulted for the purpose of coding intervention development processes, person centeredness, fidelity, and BCTs. Where appropriate, data were coded across multiple studies reporting on the same intervention.

Methodological quality assessment

Methodological quality was assessed independently by two reviewers (MC, KA) using the Critical Appraisal Skills Programme Randomised Control Trial Checklist,[22] National Heart, Lung and Blood Institute Quality Assessment Tool for Before-After Studies,[23] and ROBINS-I: tool for assessing risk of bias in non-randomised studies of interventions.[24]

Data Synthesis

Data were synthesised narratively due to the heterogeneity of study designs, populations, interventions (referral pathways, form, and content) and outcome measures (i.e., assessment methods to assess mental health and well-being). The 'promise' of active ingredients and other intervention features for positively changing outcomes was assessed by calculating promise ratios.[25]

Patient and Public Involvement

There was no patient or public involvement in this study.

RESULTS

In total 52,074 (database searching n=51,965, reference lists and citation/hand searching n=109) potentially relevant studies were identified from the electronic search (Figure 1). A total of 297 full text articles (database search = 288 and citation/hand searching = 9) were assessed for inclusion. Seventeen studies reporting on 13 interventions met the inclusion criteria.[26-42] An additional 15 sources of grey literature were consulted for details on the intervention development, person centredness, fidelity, and BCTs.[43-57]

Findings of the Art Lift intervention were reported across four studies.[26-29] The Art Shine intervention was reported in one study.[30] The Social Cure and social prescribing intervention was reported across two studies.[38, 39] The British Red Cross Connecting Communities,[31] The Cadwun Mon,[32] The Cares of Life Project,[33] The Fife Social Prescribing: Mood Café,[34] GROW: Art, Park, and Wellbeing,[35] Luton Social Prescribing Programme,[36] Museums on Prescription,[37] The Southwest Wellbeing Programme,[40] and Wetlands for Wellbeing[42] all were reported within one study. One included study[41] did not provide a specific name for the intervention.

[Insert Figure 1 around here, Title: PRISMA Diagram

Study Characteristics

A summary of the 13 interventions reported across the 17 included studies is presented in Table 1. Fifteen studies were conducted in England,[26-31, 33, 35-42] one in Wales[32] and one in Scotland.[34] The 17 studies had a combined post-intervention sample size of 5,036 participants. Fifteen studies were uncontrolled before and after designs,[26-32, 34-40, 42] one a randomised controlled trial,[33] and one a matched groups design.[41]

The referral pathways were mapped against those described by Husk et al.[8] The most common referral pathway reported within studies was the link worker model (n=12

studies),[26-29, 31, 32, 34, 36, 38, 39, 41, 42] followed by referrals direct from community services (n=3 studies),[35, 37, 40] primary care,[30] or from multiple services.[33]

The mean age of participants who received social prescribing interventions ranged from 43 to 77 years across 11 studies.[26-34, 38, 39] Six studies did not report on the age of participants.[35-37, 40-42] Two studies did not report data on the sex of participants.[33, 41] Out of 15 studies that reported on participant sex, 12 studies reported a higher proportion of female participants.[26-32, 34, 36-38, 40]

Data on ethnicity of participants was reported in seven studies,[30, 31, 33, 37, 40-42] but most did not report data using census categories; for example, only reporting numbers of participants who were White British or from Black, Asian, and Minority Ethnic (BAME) groups. Only one study specifically targeted people from BAME groups.[33] One study did not report on participant ethnicity at the post-assessment period.[41] Proportions of White or White British participants at post-assessment based on data from five studies was 58%,[31] 66%,[30] 82%,[37, 42] and 91%.[40]

Employment status was reported by five studies[28, 29, 36, 30, 42] and was summarised into four categories: participants who were in work (either full time or part time), education (full time or part time education or described as a student), or position of responsibility (such as full time carers)(ranged from 1 to 259 participants); those who were not unemployed or incapacitated from work (ranged from 10 to 198 participants based on data from five studies); participants who were retired (ranged from 5 to 209 participants based on data from two studies); and participants described as 'other'(ranged from 2 to 21 participants based on data from two studies). Employment status was not reported by the remaining 12 studies.[26, 27, 30-35, 37-39, 41]

The most commonly reported reasons for referral to a social prescribing service were anxiety or depression, (or combined anxiety and depression), n=9 studies.[26-29, 33, 35, 40-42] Depression and social isolation was the primary reason for referral in one study.[30] Loneliness was the primary reason for referral in one study,[31] and social isolation in another.[37] Social isolation and loneliness was reported as the primary reasons for referral by three studies.[32, 38, 39] The two remaining studies reporting mild to moderate mental health issues[36] and mental wellbeing[35] as primary reasons for referral.

The period between baseline assessment and follow up was reported by 15 studies and ranged between 1.5 months[40] to 9 months.[39] One study did not report a follow-up period.[34] One study reported a follow up period that was based on individual need.[36] Fourteen studies reported sample sizes at pre-assessment, which ranged from n=16[42] to n=841.[40] All 17 included studies reported the total number of individuals who took part in a follow up assessment, ranging from 16[42] to 2,250.[31] Based on data from 14 studies,[26-29, 32-35, 36, 38-42] the average loss to follow up (attrition rate) was 38% (SD=27), which ranged from 90%[39] to 0%.[35, 42]

Table 1. Summary of Study Characteristics

Author(s) of Corresponding Study(s)	Intervention / Programme name	Research Design	Population Sample Sizes (pre-post assessment data and mean age and sex)	Participant Ethnicity^ (post-assessment data)	Employment Status (post-assessment data)	Reason for Referral	Duration of Follow-up	Referral Pathway (Husk et al)[8]
Crone, et al. 2013[26]	Art Lift	Uncontrolled Before/After Study	Pre-assessment n=157 Post-assessment n=84 (Mean age=57, SD=15), Male n=22, Female n=62	NR	NR	Anxiety and Depression	2.5 months	Direct Referral from Link Worker in Primary Care
Crone, et al. 2018[27]		Uncontrolled Before/After Study	Pre-assessment n=818 Post-assessment n=651 (Mean age=51.9, SD=15.9), Male n=142**, Female n=509	NR	NR	Anxiety and Depression	2.5 months	Direct Referral from Link Worker in Primary Care
Sumner, et al. 2019[28]		Uncontrolled Before/After Study	Pre-assessment n=547 Post-assessment n=418 (Mean age=49.7, SD=15.5), Male n=83**, Female n=335	NR	In⁺ n=76 Out⁺⁺ n=176 Retired n=163	Anxiety and Depression	2.5 months	Direct Referral from Link Worker in Primary Care
Sumner, et al. 2021[29]		Uncontrolled Before/After Study	Pre-assessment n=245 Post-assessment n=110 (Mean age=51.3, SD=15.9), Male n=16**, Female n=94	NR	In⁺ n=22 Out⁺⁺ n=86 Retired n=NR Unknown n=4	Anxiety and Depression	2 months	Direct Referral from Link Worker in Primary Care
van de Venter et al. 2014[30]	Art Shine	Uncontrolled Before/After Study	Pre-assessment n=NR Post-assessment n=44 (Mean age=43, SD=NR), Male n=7, Female n=36, Other n=1	'*White-British*' n=29 (66%) '*Black and Minority Ethnic*' n=9(21%) Unknown n=6	NR	Depression and Social Isolation	5 months	Direct Referral from Primary Care
Foster, et al. 2021[31]	British Red Cross: Connecting Communities	Uncontrolled Before/After Study	Pre-assessment n=NR Post-assessment n=2,250 (Mean age=65.6, SD=18.8), Male n=702,	'*White British*' n= 1,313 (58%) '*Not White British*' n=499(22%) Unknown n=438	NR	Loneliness	3 months	Link Worker Model

			Female n=1,426, Other n=122					
Roberts, et al. 2020[32]	Cadwyn Mon	Uncontrolled Before/After Study	Pre-assessment n=182 Post-assessment n=120 (Mean age=76.7, SD=NR), Male n=22, Female n=98, Other n=1	NR	NR	Loneliness and Social Isolation	3.75 Months	Link Worker Model
Afuwape, et al. 2010[33]	Cares of Life Project	Randomised Controlled Trial	N=16 *Intervention Group* Pre-assessment n=20 Post-assessment n=16 (Mean age =43.6, SD=7.7) Male n=NR, Female n=NR N=16 *Comparison group* Pre-assessment n=20 Post-assessment n=16 (Mean age=32.6, SD=11.0) Male n=NR, Female n=NR	'All participants were of Black African Origin or Black Caribbean Origin' n=32	NR	Anxiety and Depression	3 Months	Direct referral from multiple Sectors*
Morton, et al. 2015[34]	Fife Social Prescribing (Mood Café)	Uncontrolled Before/After Study	Pre-assessment n=174 Post-assessment n=136 (Mean age=52, SD=11), Male n=37, Female n=99**	NR	NR	Anxiety and Depression	NR	Link Worker Model
Thomson, et al. 2020[35]	GROW: Art, Park and Wellbeing	Uncontrolled Before/After Study	Pre-assessment n=20 Post-assessment n=20 (Mean age=NR), Male n=11, Female n=9**	NR	NR	Mental Wellbeing	2.5 Months	Direct referral from Community and Local Mental Health Services
Pescheny, et al. 2019[36]	Luton Social Prescribing Programme	Uncontrolled Before/After Study	Pre-assessment n=162 Post-assessment n=63 (Mean age=NR), Male n=23, Female n=40	NR	In^{+} n=22 Out^{++} n=41	Mild to moderate mental health issues	Dependant on Needs Assessment	Link Worker Model

Thomson, et al. 2018[37]	Museums on Prescription	Uncontrolled Before/After Study	Pre-assessment n=NR Post-assessment n=115 (Mean age=NR), Male n=42**, Female n=73	'*White-British*' n=94 (82%) Other=NR	NR	Social Isolation	2.5 Months	Direct Referral from Community Care
Kellezi, et al. 2019[38]	Social Cure and Social Prescribing	Uncontrolled Before/After Study	Pre-assessment n=630 Post-assessment n=178 (Mean age=55.8, SD=13.8), Male=86, Female=91, Other n=1	NR	NR	Loneliness	4 Months	Link Worker Model
Wakefield, et al 2022[39]		Uncontrolled Before/After Study	Pre-assessment n=630 Post-assessment n=63 (Mean age=57.1, SD=15.7), Male=32, Female=31	NR	NR	Social Isolation and Loneliness	9 Months	Link Worker Model
Jones, et al. 2013[40]	Southwest Wellbeing Programme	Uncontrolled Before/After Study	Pre-assessment n=841 Post-assessment n=687 (Mean age=NR), Male n=179, Female n=357, Other n=151	'*White*' n=623 (91%) '*Black or Minority Ethnic Group*' n=38 (6%) Unknown n=26	In[+] n=259 Out[++] n=198 Retired n=208 Other n=21	Anxiety and Depression	3 Months	Direct Referral from Community Care
Carnes, et al. 2017[41]	Unnamed Intervention	Matched Groups Design	Survey Study *Intervention Group* Pre-assessment, n=184 Post-assessment, n=65 (Mean age=NR) Male= NR, Female= NR *Comparison Group (matched based on age, GP attendance and diagnosis)* Pre-assessment, n= 302 Post-assessment, n=127 Mean age = NR Male= NR, Female= NR Analysis of Health Care Resource use	Survey Study *Intervention Group* Post-assessment = NR *Comparison Group* Pre-assessment: White n=170 Non-white n=123 Post-assessment = NR Analysis of Health Care Resource use=NR	**NR**	Anxiety and Depression	8 Months	Link Worker Model

			Intervention Group, n=377 (Mean age=NR) Male= NR, Female= NR *Comparison Group (matched based on age, sex, ethnicity and comorbidities)*, n= 7,540 Mean age = NR Male= NR, Female= NR				
Maund, et al. 2019[42]	Wetlands for Wellbeing	Uncontrolled Before/After Study	Pre-assessment n=16 Post-assessment n=16 (Mean age=NR), Male=8, Female=8	'*White-British*' n=13 (82%) '*White-Other*' n=3(19%)	In[+] n=1 Out[++] n=10 Retired n=5	Anxiety and Depression	1.5 Months	Link worker model from community referral

^Terminology used by authors.
* Multiple Sector – Referral from a combination of the following: General Practitioner, Health Care Professional, Community, Self-referral, Secondary Care or Social Care.
** Not explicitly reported, calculated by authors
+ In = in work, education, or position of responsibility
++ Out = out of work, education, or position of responsibility
NR- Not reported

Study Outcomes

Outcomes are grouped into between-group and within-group differences (Table 2). Of the 17 included studies, 16 reported statistically significant improvements in mental health, mental well-being, general health, or quality of life outcomes from baseline to follow-up[26-32, 34-40, 42] or between the intervention group and matched controls.[33] Only one intervention (unnamed intervention)[41] did not report any statistically significant improvement in outcomes.

The 7 or 14-item Warwick- Edinburgh Mental Wellbeing Scale (WEMWBS)[58] was the most frequently used outcome measure.[26-30, 34, 36, 40, 42] Seven studies used the 14-item[26-30, 34, 42] and three used the 7-item short-form version.[26, 36, 40] All studies reported a statistically significant improvement in mental well-being assessed with the WEMWBS.

Three studies utilised other measures of mental wellbeing: Social Wellbeing Questionnaire (SWB-6);[40] Museum Wellbeing Measure for Older Adults (MWM-OA);[37] and University College London Museum Wellbeing Measure.[35] All three studies reported a statistically significant improvement in mental wellbeing.

Three studies[31, 38, 39] assessed loneliness using the University College London Loneliness Scale (ULS-3 or 8)[59] and one[32] used the De Jon Gierveld Loneliness Scale.[60] All three studies reported a statistically significant reduction in loneliness. One study[32] reported a statistically significant reduction in social isolation assessed with the Lubben Social Network Scale (LSNL).[61]

Five studies[29, 34, 40-42] utilised mental health symptom-based outcome measures such as: Hospital Anxiety and Depression Scale (HADS),[62] Generalised Anxiety Disorder Assessment (GAD-7),[63] Patient Health Questionnaire (PHQ-8),[64] or the Centre for

Epidemiological Studies Depression Scale (CES-D-7).[65] Four studies reported a statistically significant improvement in symptom-based outcomes.[29, 34, 40, 42]

General health measures were reported by three studies:[33, 40, 41] General Health Questionnaire-28 (GHQ-28)[66] or Global Assessment of Functioning (GAF).[67] In addition, quality of life measures were used by three studies[32, 33, 39] using the Satisfaction with Life Scale,[68] EuroQol Quality of Life Measure (EQ5D),[69] and the Short-Form-36 (SF-36).[70]

Other outcomes assessed by one study[42] were stress using the Perceived Stress Scale (PSS)[71] and mood using the Positive and Negative Affect Schedule (PANAS),[72] and reported statistically significant improvements in these outcomes following social prescribing.

Two studies[38, 41] reported on health service utilisation using patient reported data on group memberships and primary care health service use[38] and health records to extract data on consultation rates and medication prescribed.[41] Both studies reported a statistically significant reduction in use of primary health care.

Table 2: Between and Within Group Changes in Outcomes

Intervention/ Programme Name	Study	Outcome Measure	Statistically significant improvement (p-value)	95% Confidence Intervals
Between Group Changes (compared with comparison groups)				
Cares Of Life Project	Afuwape, et al. 2010[33]	GHQ-28	Yes (p=0.03)	0.86 to 14.65
		GAF	No (p=0.87)	-10.40 to 8.84
		SF-36 Mental Health Score	Yes (p=0.02)	-21.99 to -1.88
Unnamed Intervention	Carnes, et al. 2017[41]	General Health Score	No	−0.31 to 0.25
		HADS Score	No	−2.11 to 2.58
		Wellbeing	No	−0.57 to 0.39
Within Group Changes				
Art Lift	Crone, et al. 2013[26]	WEMWBS-7	Yes (p<0.001)	Not Reported
		WEMWBS -14	Yes (p<0.001)	Not Reported
	Crone, et al. 2018[27]	WEMWBS-14	Yes (p<0.001)	Not Reported
	Sumner, et al. 2019[28]	WEMWBS-14	Yes (p<0.001)	0.93 to 0.98
	Sumner, et al.	GAD-7	Yes (p<0.001)	Not Reported

	2021[29]	PHQ-8	Yes (p<0.001)	Not Reported
		WEMWEBS-14	Yes (p<0.001)	Not Reported
Art Shine	van de Venter, et al. 2014[30]	WEMWBS-14	Yes (p<0.001)	4.80 to 11.20
BRC Connecting Communities	Foster, et al. 2021[31]	ULS-3	Yes (p<0.001)	-1.91 to -1.77
Cadwyn Mon	Roberts, et al. 2020[32]	De Jong Gierveld Loneliness Scale	Yes (p<0.001)	Not Reported
		Lubben Social Network Scale	Yes (p<0.004)	Not Reported
		Satisfaction with Life Scale	Yes (p<0.001)	Not Reported
Fife Social Prescribing (Mood Café)	Morton, et al. 2015[34]	HADS – Anxiety	Yes (p<0.001)	2.20 to 3.30
		HADS – Depression	Yes (p<0.001)	1.90 to 3.20
		WEMWBS-14	Yes (p<0.001)	-8.10 to -5.10
GROW: Art, Park and Wellbeing	Thomson, et al. 2020[35]	UCL Museum Wellbeing Measure	Yes (p<0.001)	Not Reported
Luton Social Prescribing Programme	Pescheny, et al. 2019[36]	WEMWBS-7	Yes (p<0.0001)	1.68 to 3.88
Museums On Prescription	Thomson, et al. 2018[37]	MWM-OA Main Effect	Yes (p<0.001)	Not Reported
Social Cure and Social Prescribing	Kellezi, et al. 2019[38]	ULS-8	Yes (p<0.0001)	Not Reported
	Wakefield, et al. 2022[39]	ULS-8	Yes (p<0.001)	Not Reported
		EQ5D	Yes (p<0.04)	Not Reported
Southwest Wellbeing Programme	Jones, et al. 2013[40]	General Health Scale*	Yes (p<0.001)	Not Reported
		Social Wellbeing: SWB-6*	Yes (p<0.001)	Not Reported
		WEMWBS-7*	Yes (p<0.001)	Not Reported
		CES-D-7**	Yes (p<0.001)	Not Reported
Wetlands For Wellbeing	Maund, et al. 2019[42]	WEMWBS-14	Yes (p=0.009)	Not Reported
		GAD-7	Yes (p=0.002)	Not Reported
		PSS	Yes (p=0.041)	Not Reported
		PANAS (Positive)	Yes (p=0.012)	Not Reported
		PANAS (Negative)	Yes (p=0.025)	Not Reported

*Components of the Southwest Well Being Questionnaire
Generalised Anxiety Disorder (GAD-7), Global Assessment of Functioning (GAF), General Health Questionnaire-28 (GHQ-28), General Health Score (GHS), Hospital Anxiety and Depression Scale (HADS), Museum Wellbeing Measure for Older Adults (MWM-OA), Perceived Stress Scale (PSS) Positive and Negative Affect Schedule (PANAS), University College London Loneliness Scale (ULS-3 or 8), Short Form-36 (SF-36), Southwest Well-being Questionnaire (SWWBQ), Warwick- Edinburgh Mental Wellbeing Scale (WEMWBS), Patient Health Questionnaire (PHQ-8), EuroQol Quality of Life Measure (EQ5D), Centre for Epidemiology Depression Scale (CES-D-7).

Methodological Quality Assessment

The methodological quality assessment of for each individual study can be found in Supplementary material 3.

With reference to the 15 uncontrolled before and after studies, the scores (out of 22) ranged from 9[26, 39] to 14.[30, 36, 37, 42] All before/after studies clearly stated the study question or objective and included participants that were representative of those who would be eligible

in the clinical population of interest. Seven studies clearly described the eligibility criteria or described the intervention in sufficient enough detail to ensure the consistent delivery across the included population.[28, 30, 32, 36, 37, 40, 42] Only one study detailed sufficient information to conclude that all eligible participants were enrolled[26] and one study used a sample size that was adequate to provide confidence in the findings (evidence that the sample size achieved was consistent with a statistical power analysis.[38] None of the studies measured outcomes at specified intervals across the study. All but two studies[26, 38] used outcome measures that had been assessed for reliability and validity. All but two studies[26, 27] utilised inferential statistical methods to examine changes in outcomes. There were substantial losses to follow up of greater than 20% reported in 11 studies.[26-29, 31, 32, 34, 36, 38-40] For four studies there was insufficient data to calculate a percentage loss to follow-up.[30, 35, 37, 42]

The randomised controlled trial[33] scored 20 out of a maximum of 22 points. A potential source for bias was performance and ascertainment as the allocation to groups was not concealed from the interventionists, although in the context of social prescribing interventions this is difficult to achieve.

The matched groups design study[41] was found overall to have a moderate level of bias. The bias due to confounding pre-intervention and selection of participants into the study was judged as being moderate and low respectively. Bias in classification of interventions was also judged to be low. Bias due to missing, measurement of outcomes and selection of the report results were all judged to be moderate.

Fidelity Assessment

A summary table presenting the treatment fidelity assessment of the included interventions and sources of information used is presented in supplementary material 4.

Design of the study

All 13 intervention's provided sufficient information to establish use of treatment fidelity strategies for intervention design to ensure the same dose of the intervention had been delivered within conditions.[26-42] None of the intervention's reported any explicit evidence that they had planned for implementation setbacks (e.g. sufficient numbers of link workers being recruited to meet future demand).

Monitoring and improving provider training

Seven interventions (Art Shine,[30] Cadwyn Mon,[31] Cares of Life Project,[33] Fife Social Prescribing Mood Café,[34] Southwest Wellbeing Programme,[40] Unnamed Intervention,[41] and Wetlands for Wellbeing[42] provided evidence that they provided standardised training for providers (i.e., training was developed specifically for the purpose of intervention delivery). Two interventions (Art Shine[30] and Southwest Wellbeing Programme)[40] accommodated and tailored training to address provider differences in delivery (i.e., rotations or specific role placement) and targeted acquisition of skills by providers (e.g., follow up sessions with service/ research leads). One intervention (Art Shine)[30] minimised drift in provider skills over time by monitoring and reviewing delivery on a monthly basis.

Monitoring and improving delivery of interventions

Four interventions (Art Lift,[26-29] Art Shine,[30] Cadwyn Mon,[32] GROW: Art. Park and Wellbeing)[35] provided sufficient information to suggest they controlled for provider differences by using strategies such as rotating sessions attended or offering a range of activities. One intervention (GROW: Art. Park and Wellbeing)[35] explicitly reported monitoring adherence to a protocol. One intervention (Art Shine)[30] explicitly reported strategies to reduce differences within interventions.

Monitoring and improving receipt of interventions and enactment of intervention skills

All 13 interventions reported information regarding service users' comprehension of the intervention. Due to the nature of social prescribing interventions being tailored to the individual and their specific needs, the specific skills that would be targeted by the interventions is difficult to assess. Similarly, and further due to the absence of long- term follow-up assessments after the intervention period, this prohibited a robust assessment of enactment of intervention skills after the intervention activity had ended.

Person-Centredness

A summary table of the assessment of person-centredness of the 13 interventions is presented in supplementary material 5.

Eight interventions (BRC Connecting Communities,[31] Cadwyn Mon,[32] Cares of Life Project,[33] GROW: Art, Park and Wellbeing,[35] Luton Social Prescribing Programme,[36] Social Cure and Social Prescribing,[38, 39] Southwest Wellbeing Programme,[40] and unnamed intervention)[41] provided evidence that a personal needs assessment with service users was undertaken to discuss their needs and goals. Six interventions (Art Lift,[26-29] Cadwyn Mon,[32] Cares of Life Project,[33] Fife Social Prescribing: Mood Café,[34] GROW: Art, Park and Wellbeing,[35] Luton Social Prescribing Programme,[36] Southwest Wellbeing Programme)[40] explicitly stated that service users were offered a choice of social prescribing interventions. Three interventions (Luton Social Prescribing Programme,[36] Southwest Wellbeing Programme,[40] and Wetlands for Wellbeing)[42] provided explicit evidence that service users were actively involved in discussions to elicit their preferences/values on the available social prescribing options. None of the included interventions provided any explicit evidence they ensured service users received a social prescription that was consistent with their preferences.

Overall, three interventions (Art Shine,[30] Museums on Prescription,[37] and Wetlands for Wellbeing)[42] did not report any explicit evidence that any core components of person-

centred care were adopted. None of the 13 interventions provided any explicit evidence for all four components of person-centred care.

Intervention Development Processes

A summary table of the intervention development processes is presented in supplementary material 6.

Eight interventions (Art Lift,[26-29] BRC Connecting Communities,[31] Cadwyn Mon,[32] Cares of Life Project,[33] Fife Social Prescribing: Mood Café,[34] GROW: Art, Park and Wellbeing,[35] Museums on Prescription,[37] and Southwest Wellbeing Programme)[40] provided explicit evidence they had used the best available evidence in the development (e.g. systematic reviews, previous research, previous piloting). Eight interventions (Art Lift,[26-29] BRC Connecting Communities,[31] Cadwyn Mon,[32] Cares of Life Project,[33] Fife Social Prescribing: Mood Café,[34] Luton Social Prescribing Programme,[36] Southwest Wellbeing Programme,[40] and Unnamed Intervention)[41] explicitly referred to conducting a population needs assessment to inform intervention development. Four interventions (Art Lift,[26-29] Art Shine,[30] Fife Social Prescribing: Mood Café,[34] and Luton Social Prescribing Programme)[36] provided explicit evidence of usability testing or feasibility testing/piloting of the intervention; however one interventions explicitly reported they were in the pilot stage (Unnamed Intervention).[41]

Two interventions provided explicit evidence for the use of a framework to underpin development and evaluation. Cares of Life[33] used the Medical Research Council Framework for The Development and Evaluation of Complex Interventions.[73] The Social Cure and Social Prescribing[38, 39] used the Social Cure Framework.[74] None of the 13 included interventions provided evidence of the use a theory or model of behaviour change to underpin the development of the intervention. Two interventions (Fife Social Prescribing: Mood Café[34]

and Southwest Wellbeing Programme)[40] provided evidence of the use of a co-design/production process, working with service users in the co-design of interventions.

Behaviour Change Techniques

A total of 22 different BCTs (Figure 2) were reported across the 13 interventions. The most frequently coded BCT was social support-unspecified (e.g. social support from link workers, friends or relatives)(n=11), followed by credible source (e.g. health care professional)(n=7), social support-practical (e.g. advise on, arrange, or provide practical help)(n=6) and social support-emotional (e.g. providing support with feelings and emotions)(n=5).

[Insert Figure 2 around here. Title: Frequency of Individual BCT's Used Across Included Interventions]

Individual BCTs were categorised into 10 groupings (Figure 3) in accordance with the published taxonomy.[16] The most common groupings were social support (n=11); comparison of outcomes (n=7), goals and planning; feedback and monitoring; and natural consequences (all n=6).

[Insert Figure 3 around here. Title: Frequency of BCT Groupings Across the Included Interventions]

A promise ratio analysis was planned for the coded BCTs and other intervention features; however, this was not feasible due to the preponderance of positive outcomes (17 of the 18 studies all reported statistically significant improvements in outcomes).

DISCUSSION

Summary of findings

This systematic review identified 13 UK-based social prescribing interventions reported across 17 studies, which most-commonly utilised a link worker model or direct referral from community services, for predominately working-age adults living with common mental health conditions (anxiety and depression). All but one study reported a statistically significant improvement in outcomes (mental wellbeing, mental health, loneliness, and/or general health/ quality of life outcomes). Consistent with previous research,[75-77] two studies[38, 41] in the current review reported reductions in primary healthcare use (consultation rates and medication prescribed). However, these findings should be interpreted with caution. Consistent with previous reviews of social prescribing interventions,[4, 8, 9, 75] the majority (15 out of 17) of the included studies were uncontrolled before and after studies (with a range of methodological shortcomings). Attrition rates were generally high (mean of 38%) and there was substantial variability in outcome measures. Furthermore, there was a lack of long-term follow-up studies.

Person centredness is one of the key pillars of social prescribing for empowering the person to improve their own health.[78] None of the included interventions in this review reported evidence of adhering to all four core principles of person-centred care.

Ethnicity of participants was under-reported across the studies in the current review. Based on five studies the proportions of White or White British participants ranged from 58%[31] to 91%.[40] The current Consensus data reports the UK population to be 86% White, 8% Asian, 3% Black and 2% Mixed/Multiple Ethnic Groups.[79]

Only two interventions reported using a specific framework for design and evaluation of social prescribing interventions - the Medical Research Council Framework For The Development And Evaluation Of Complex Interventions[73] and the Social Cure Framework.[74] There was

a lack of explicit evidence of service user involvement in co-design activity and usability or feasibility testing of interventions. This could lead to sub-optimal acceptability and engagement with social prescribing interventions.

Treatment fidelity strategies are critically important for external validity of interventions. Evidence from this review indicated several shortcomings in this regard. However, due to the nature of social prescribing interventions (i.e., highly tailored to individuals and their circumstances) the findings of the fidelity assessment should be interpreted with caution. There is no published guidance for assessing fidelity of social prescribing interventions. For example, it is not clear what cognitive and behavioural skills social prescribing interventions are targeting and how these can be assessed in terms of receipt and enactment by participants.

The most common BCT groupings identified were: social support (BCTs – social support-unspecified/ practical/ emotional); comparison of outcomes (BCTs - credible source); goals and planning (BCTs - goal setting (behaviour), problem solving, goal setting (outcome), and action planning); feedback and monitoring (BCTs – feedback on behaviour, self-monitoring of behaviour, monitoring of behaviour by others without feedback, feedback on outcome of behaviour); and natural consequences (BCTs – information about health consequences, information about social and environmental consequences, information about emotional consequences). The importance of identifying and reporting on BCTs used when developing/delivering interventions is important to further understanding and to facilitate replicability.[80-82]

Given the lack of detail provided by the studies of social prescribing interventions in the review, and that 16 out of 17 studies reported statistically significant improvements in outcomes, we were unable to conduct promise calculations (summing promising interventions (reported positive results) that includes a specific active ingredient of interest, for example different

models of social prescribing, and dividing this by the number of non-promising interventions (reporting negative results or no change) featuring the same active ingredient) to explore further the active ingredients of effective social prescribing interventions.

Limitations

Several limitations of this review need to be acknowledged. There continues to be a debate about what constitutes a social prescribing intervention, and this will be reflected in published literature. Therefore, the existence of additional studies that would have met our inclusion criteria cannot be ruled out. Findings of the review are also limited by the descriptions of interventions reported within the included studies (i.e., most social prescribing pathways/interventions were not described in detail), which impacts on conclusions about intervention development processes, person centredness, treatment fidelity and BCTs. Improved quality of reporting on social prescribing models and interventions with reference to a published BCT taxonomy[16] would help address this issue.

Future Research

It is critical that complex interventions are underpinned by a structured development process involving service users and providers in a co-design activity with reference to appropriate evidence and theory. Future research should prioritise the application of theory to the design and evaluation of interventions to help identify the optimal theoretical approach to underpin social prescribing interventions for specific outcomes.

Future research on social prescribing interventions for mental health (and more broadly) would benefit from systematic evaluation of single and clustered BCTs (alongside improvements in the quality of reporting on intervention descriptions). This would optimise the design and delivery of social prescribing interventions across the entire pathway (e.g., from initial contract with a primary care link worker to first appointment with the service providing socially prescribed activities). Interventions could subsequently be tailored for individuals living with

mental health conditions to improve person-centred outcomes. Cross-disciplinary reviews have identified the use of BCT clusters including goal planning, feedback and monitoring, social support, and comparison of outcomes, are associated with effectiveness for improving physical activity, mental health seeking behaviour and employee mental health.[80-82] In addition, these reviews have highlighted interventions using clusters of BCTs focused on shaping knowledge and comparison of behaviour and have shown improvements in mental health seeking behaviour.[81]

Despite variable rates of attrition across the studies included in this review, few studies reported reasons for service users' disengaging from social prescribing. This warrants attention and further investigation in future research, as well as a more detailed understanding of why a high proportion of those referred to social prescribing interventions fail to engage. Both emphasise the need to engage service users in the design and evaluation of social prescribing interventions with a focus on principles of person-centred care. In addition, this review has further highlighted the lack of long-term follow up within social prescribing studies. Future research would benefit from evaluations to establish the long-term impact of social prescribing on service users' mental health, including specific skills targeted by social prescribing interventions to improve fidelity assessment.

The narrative synthesis presented in the review is based on data aggregated across the referral pathways adopted by studies. Therefore, future research should conceptualise social prescribing interventions as complex multi-facetted interventions. There are different referral pathways for social prescribing, including outside of primary care settings,[83] and the specific contact points (e.g., initial assessment, interaction with a facilitator or link worker and receipt/ delivery or socially prescribing activity) need to be considered as sperate, but linked facets of a complex multi-faceted intervention involving interactions between healthcare professionals and service users.

Conclusions

The predominance of before and after studies and associated methodological concerns, sub-optimal development processes, and limited evidence of treatment fidelity assessments, prevents any robust conclusions on the effectiveness of social prescribing for mental health-related outcomes. Development of future social prescribing interventions would benefit from comprehensive development processes with reference to appropriate frameworks, theories or models (alongside detailed reporting of social prescribing referral pathways), including long-term outcome assessment and adherence to principles of person-centred care.

Contributors

MC and DF conceived the review. DF, LA, and JS supervised the review. KA, CJ, and JS assisted MC with study selection, and methodological quality assessment. MC, KA, DF, and LA conducted data extraction. LE designed the search strategy, ran all searches, and collated search results. MC drafted the initial manuscript. All authors revised the manuscript for important intellectual content and approved the final version.

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Competing Interests

None declared

Patient Consent

Not applicable

Data Sharing Statement

No original data were generated for this study.

Ethics Statement

Not applicable

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LEGEND

Figure 1 – PRISMA Diagram

Table 1- Summary of Study Characteristics

Footnotes:

^Terminology used by authors.

* Multiple Sector – Referral from a combination of the following: General Practitioner, Health Care Professional, Community, Self-referral, Secondary Care or Social Care.

** Not explicitly reported, calculated by authors

+ In = in work, education, or position of responsibility

++ Out = out of work, education, or position of responsibility

NR- Not reported

Table 2- Between and Within Group Changes in Outcomes

Footnotes:

*Components of the Southwest Well Being Questionnaire

Generalised Anxiety Disorder (GAD-7), Global Assessment of Functioning (GAF), General Health Questionnaire-28 (GHQ-28), General Health Score (GHS), Hospital Anxiety and Depression Scale (HADS), Museum Wellbeing Measure for Older Adults (MWM-OA), Perceived Stress Scale (PSS) Positive and Negative Affect Schedule (PANAS), University College London Loneliness Scale (ULS-8), Short Form-36 (SF-36), Southwest Well-being Questionnaire (SWWBQ), Warwick- Edinburgh Mental Wellbeing Scale (WEMWBS), Patient Health Questionnaire (PHQ-8), EuroQol Quality of Life Measure (EQ5D), Centre for Epidemiology Depression Scale (CES-D-7).

Figure 2 – Frequency of Individual BCT's Across Included Interventions

Figure 3 - Frequency of BCT Groupings Across the Included Interventions

Figure 1: **PRISMA Diagram**

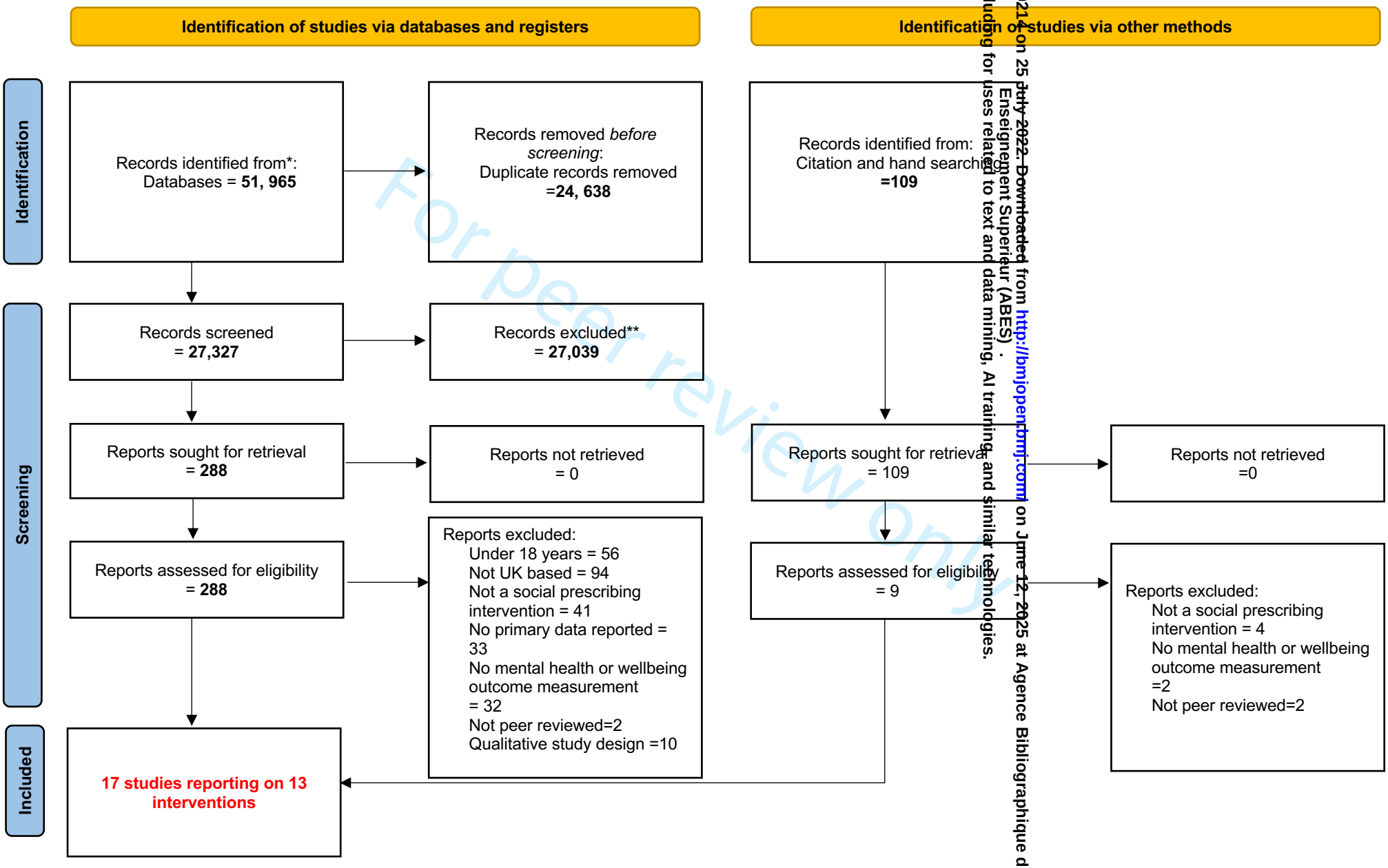


Figure 2: **Frequency of Individual BCT's Across Included Interventions**

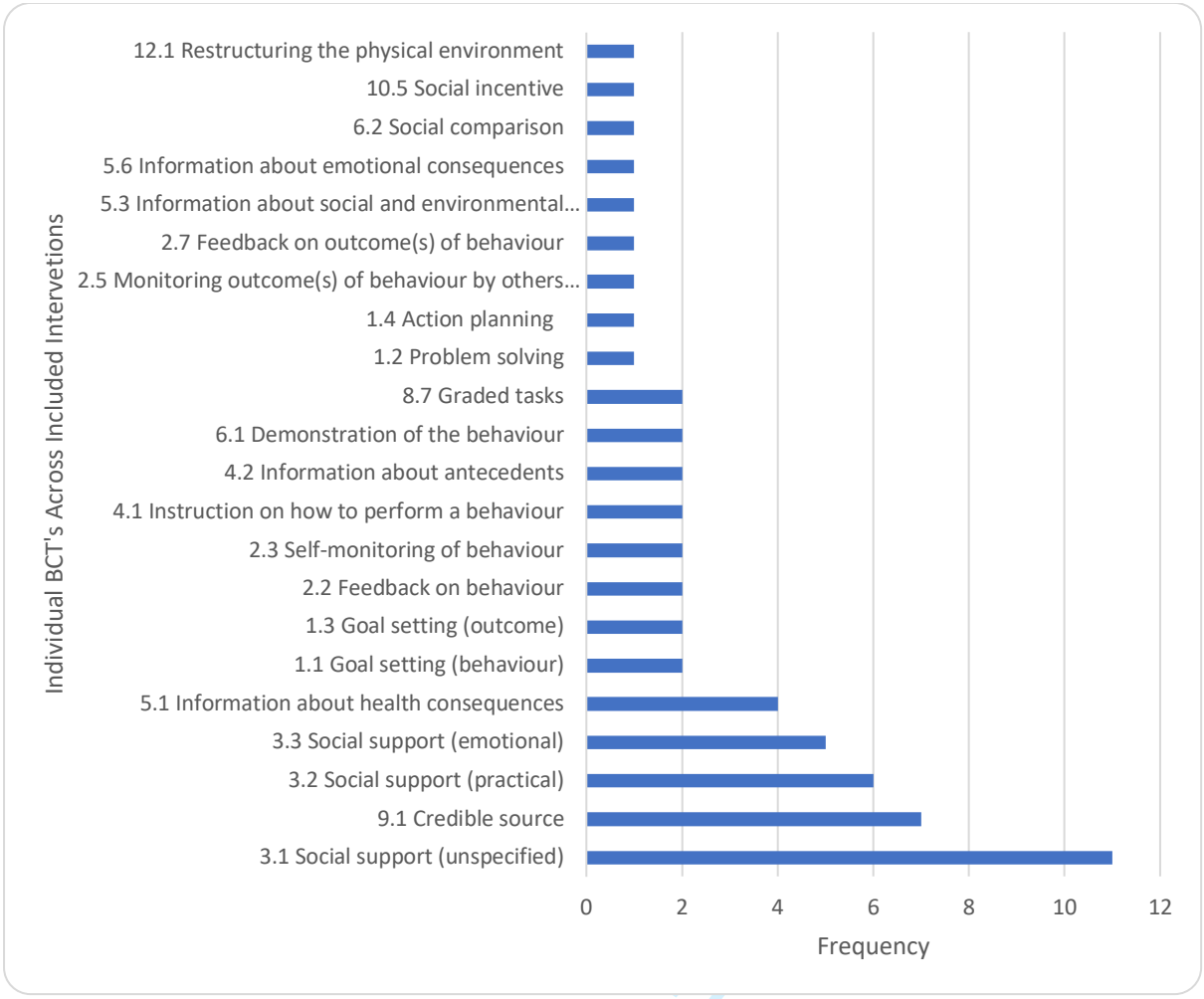
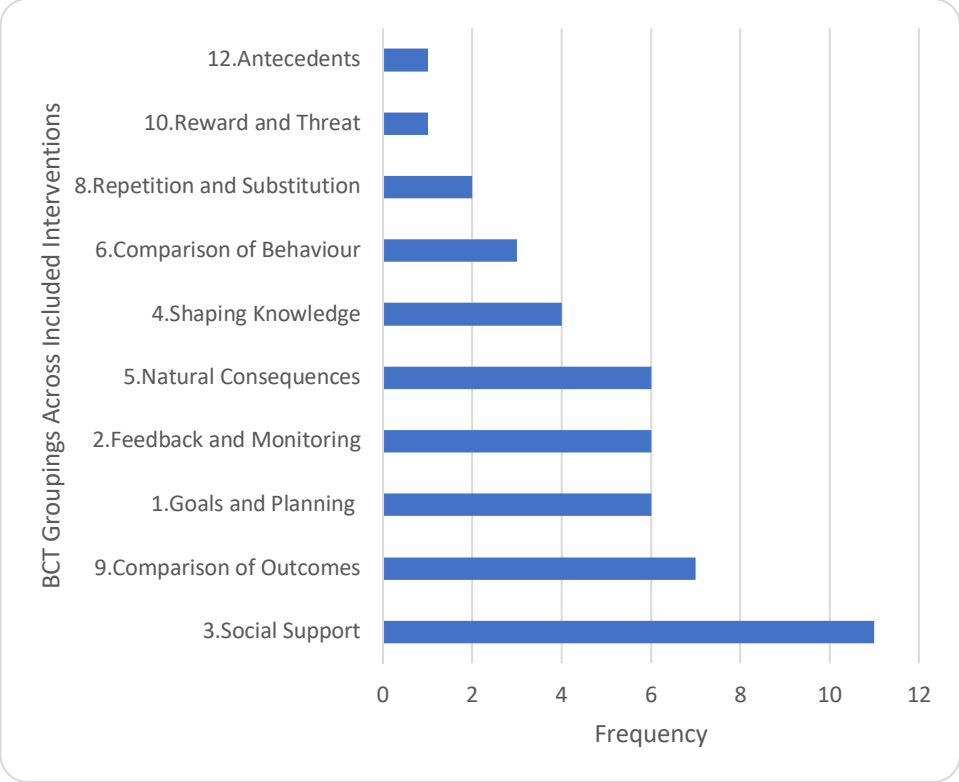


Figure 3: **Frequency of BCT Groupings Across the Included Interventions**



Supplementary Materials 1

Prisma Checklist

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.	5-6
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.	8 (supplementary materials 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.	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.	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.	9
	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.	9
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.	10
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.	10
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)).	10

Section and Topic	Item #	Checklist item	Location where item is reported
	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
	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).	10
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
	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.	14-17
Risk of bias in studies	18	Present assessments of risk of bias for each included study.	21
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.	20
Results of syntheses	20a	For each synthesis, briefly summarise the characteristics and risk of bias among contributing studies.	N/A
	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.	N/A
	20d	Present results of all sensitivity analyses conducted to assess the robustness of the synthesized results.	N/A
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.	26 onwards

Section and Topic	Item #	Checklist item	Location where item is reported
	23b	Discuss any limitations of the evidence included in the review.	28
	23c	Discuss any limitations of the review processes used.	28
	23d	Discuss implications of the results for practice, policy, and future research.	28-29
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.	7
	24c	Describe and explain any amendments to information provided at registration or in the protocol.	N/A
Support	25	Describe sources of financial or non-financial support for the review, and the role of the funders or sponsors in the review.	31
Competing interests	26	Declare any competing interests of review authors.	31
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.	Supplementary Files

Supplementary Material 2

Search strategy used

Cochrane search:

("mental health" OR "mental disease*" OR "mental disorder*" OR anxiety OR bipolar OR "disruptive impulse control" OR "conduct disorder*" OR "dissociative disorder*" OR "eating disorder*" OR "feeding disorder*" OR "mood disorder*" OR "personality disorder*" OR "somatoform disorder*" OR trauma OR "stress* related disorder*" OR depression OR wellbeing OR well-being OR "psychiatric disorder*" OR "psychiatric problem" OR "non-medical symptom*" OR "psychosocial problem" OR "psycho-social problem" OR mups OR "medically unexplained physical symptom*" OR "mental difficult*" OR recovery OR "social function*"):ti,ab,kw

AND

(social near/4 (prescri* OR referral OR intervention)):ti,ab,kw OR (community near/4 (prescri* OR referral OR intervention)):ti,ab,kw OR ("linking scheme*" OR u3a OR "university of the third age" OR "buddy scheme*" OR "men's shed" OR ecotherapy OR "individual placement" OR "supported employment" OR "non-medical referral" OR "non-clinical referral"):ti,ab,kw OR ((wellbeing near/2 referral)):ti,ab,kw OR ((well-being near/2 referral)):ti,ab,kw

Scopus Search:

(((TITLE-ABS-KEY ("mental health" OR "mental disease*" OR "mental disorder*" OR anxiety OR bipolar OR "disruptive impulse control" OR "conduct disorder*" OR "dissociative disorder*" OR "eating disorder*" OR "feeding disorder*" OR "mood disorder*" OR "personality disorder*") OR TITLE-ABS-KEY ("somatoform disorder*" OR trauma OR "stress* related disorder*" OR "mental* ill*" OR depression OR wellbeing OR well-being OR "psychiatric disorder*" OR "psychiatric problem"))) OR (TITLE-ABS-KEY ("non-medical symptoms" OR psychosocial OR psycho-social OR mups OR "medically unexplained physical" OR "mental difficult*" OR recovery OR "social function*"))) AND (((TITLE-ABS-KEY (social W/4 (prescri* OR referral OR intervention))) OR (TITLE-ABS-KEY (community W/4 (prescri* OR referral OR intervention))) OR (TITLE-ABS-KEY ("linking scheme*" OR u3a OR "university of the third age" OR "buddy scheme*" OR "men's shed"))) OR (TITLE-ABS-KEY (ecotherapy OR "individual placement" OR "supported employment" OR "non-medical referral" OR "non-clinical referral")))

Web of Science Search:

((TS=(prescri* near/4 (exercis* OR education OR learning OR arts))) OR (TS=("information referral" OR "social referral" OR "green gym" OR "sign-posting intervention" OR "healthy living" OR "time bank" OR "supported referral" OR "non-clinical intervention" OR ecotherapy OR "employment skills" OR "individual placement")) OR (TS=("supported employment" OR "non-medical referral" OR

"non-clinical referral")) OR (TS=(wellbeing near/2 referral)) OR (TS=(well-being near/2 referral)) OR ((TS=(social near/4 (prescri* OR referral OR intervention))) OR (TS=(community near/4 (prescri* OR referral OR intervention))) OR (TS=("linking scheme*" OR u3a OR "university of the third age" OR "buddy scheme*" OR "men's shed")))) AND (((TS=("mental health" OR "mental disease*" OR "mental disorder*" OR anxiety OR bipolar OR "disruptive impulse control" OR "conduct disorder*" OR "dissociative disorder*" OR "eating disorder*" OR "feeding disorder*" OR "mood disorder*" OR "personality disorder*") OR TS=("somatoform disorder*" OR trauma OR "stress* related disorder*" OR "mental* ill*" OR depression OR wellbeing OR well-being OR "psychiatric disorder*" OR "psychiatric problem"))) OR (TS=("non-medical symptoms" OR "psychosocial problem" OR "psycho-social problem" OR mups OR "medically unexplained physical" OR "mental difficult*" OR "ill health" OR recovery OR "social function*")))
Indexes=SCI-EXPANDED, SSCI, A&HCI, CPCI-S, CPCI-SSH, ESCI Timespan=All years

Medline/ Embase/ PsychINFO search:

1 (Social adj4 (prescri* or referral or intervention)).mp.
2 (community adj4 (prescri* or referral or intervention)).mp.
3 linking scheme*.mp.
4 u3a.mp.
5 university of the third age.mp.
6 buddy scheme*.mp.
7 men's shed.mp.
8 (prescri* adj4 (exercis* or education or learning or arts)).mp.
9 information referral.mp.
10 social referral.mp.
11 green gym.mp.
12 time bank.mp.
13 supported referral.mp.
14 (well-being adj2 referral).mp.
15 (wellbeing adj2 referral).mp.
16 ecotherapy.mp.
17 Individual Placement.mp.
18 supported employment.mp.
19 non-medical referral.mp.
20 non-clinical referral.mp.
21 or/1-20
22 Mental Health/
23 mental disorders/ or anxiety disorders/ or "bipolar and related disorders"/ or "disruptive, impulse control, and conduct disorders"/ or dissociative disorders/ or "feeding and eating

disorders"/ or mood disorders/ or personality disorders/ or somatoform disorders/ or "trauma and stressor related disorders"/

24 mental* ill*.mp.
25 Depression/
26 exp Anxiety/
27 wellbeing.mp.
28 well-being.mp.
29 psychiatric disorder*.mp.
30 psychiatric problem.mp.
31 non-medical symptoms.mp.
32 psycho-social problem*.mp.
33 psychosocial problem*.mp.
34 mups.mp.
35 medically unexplained physical symptoms.mp.
36 non-medical problem.mp.
37 mental difficult*.mp.
38 recovery.mp.
39 Mental Health Recovery/
40 social function*.mp.
41 or/22-40
42 21 and 41

****

Supplementary Materials 3

Methodological Quality Assessments

CASP Randomised Controlled Trial Checklist	Max Score 22
Intervention Name	Cares of Life (Afwape, et al. 2010)(3)
Did the trial address a clearly focused issue?	Yes
Was the assignment of patients who entered the trial properly accounted for at conclusion?	Yes
Were patients, health workers and study personnel 'blind' to treatment?	Yes
Were the groups similar at the start of the trial?	Yes
Aside from the experimental intervention, were the groups treated equally?	Yes
How large was the treatment effect?	Unclear
How precise was the estimate of the treatment?	Unclear
Can the results be applied to the local population or in your context?	Yes
Were all clinically important outcomes considered?	Yes
Are the benefits worth the harms and costs?	Yes
Total CASP Checklist Score	**20**
(Yes=2, Unclear=1, No=0)	

The Risk of Bias in Non-Randomised Studies of Interventions ROBINS-I	
Intervention Name No name provided (Carnes et al 2017)(41)	
Bias due to confounding	
1.1 Is there potential for confounding of the effect of intervention in this study?	Yes
1.2. Was the analysis based on splitting participants' follow up time according to intervention received?	No
1.3. Were intervention discontinuations or switches likely to be related to factors that are prognostic for the outcome?	N/A
Questions relating to baseline confounding only	
1.4. Did the authors use an appropriate analysis method that controlled for all the important confounding domains?	**Yes**
1.5. Were confounding domains that were controlled for measured validly and reliably by the variables available in this study?	Yes
1.6. Did the authors control for any post-intervention variables that could have been affected by the intervention?	No
Questions relating to baseline and time-varying confounding	
1.7. Did the authors use an appropriate analysis method that controlled for all the important confounding domains and for time-varying confounding?	NA
1.8. Were confounding domains that were controlled for measured validly and reliably by the variables available in this study?	NA
Risk of bias judgement	**Moderate**
Bias in selection of participants into the study	
2.1. Was selection of participants into the study (or into the analysis) based on participant characteristics observed after the start of intervention?	No
2.2. Were the post-intervention variables that influenced selection likely to be associated with intervention?	N/A
2.3 Were the post-intervention variables that influenced selection likely to be influenced by the outcome or a cause of the outcome?	N/A
2.4. Do start of follow-up and start of intervention coincide for most participants?	Yes
2.5. Were adjustment techniques used that are likely to correct for the presence of selection biases?	N/A
Risk of bias judgement	Low

Bias in classification of interventions	
3.1 Were intervention groups clearly defined?	Yes
3.2 Was the information used to define intervention groups recorded at the start of the intervention?	Yes
3.3 Could classification of intervention status have been affected by knowledge of the outcome or risk of the outcome?	No
Risk of bias judgement	Low
Bias due to deviations from intended interventions	
4.1. Were there deviations from the intended intervention beyond what would be expected in usual practice?	No information
4.2. Were these deviations from intended intervention unbalanced between groups *and* likely to have affected the outcome?	No information
Risk of bias judgement	No information
Bias due to missing data	
5.1 Were outcome data available for all, or nearly all, participants?	Yes
5.2 Were participants excluded due to missing data on intervention status?	No
5.3 Were participants excluded due to missing data on other variables needed for the analysis?	No
5.4 Are the proportion of participants and reasons for missing data similar across interventions?	N/A
5.5 Is there evidence that results were robust to the presence of missing data?	Yes
Risk of bias judgement	Moderate
Bias in measurement of outcomes	
6.1 Could the outcome measure have been influenced by knowledge of the intervention received?	No
6.2 Were outcome assessors aware of the intervention received by study participants?	No information
6.3 Were the methods of outcome assessment comparable across intervention groups?	Yes
6.4 Were any systematic errors in measurement of the outcome related to intervention received?	No information
Risk of bias judgement	Moderate
Bias in selection of the reported result	
Is the reported effect estimate likely to be selected, on the basis of the results, from...	
7.1. ... multiple outcome *measurements* within the outcome domain?	No
7.2 ... multiple *analyses* of the intervention-outcome relationship?	No
7.3 ... different *subgroups*?	No
Risk of bias judgement	Moderate
Overall bias Risk of bias judgement	**Moderate**

NHLBI Quality Assessment Tool for Before-After (Pre-Post) Studies										
Intervention Name	**Art Lift**				**Art Shine**	**British Red Cross; Connecting Communities**	**Cadwyn Mon**	**Fife SP & Lally (Mood Cafe)**	**GROW: Art, Park and Wellbeing**	**Luton SP Programme**
Author(s) of Corresponding Study(s)	**Crone, et al. 2013 (26)**	**Crone, et al. 2018(27)**	**Sumner, et al. 2019(28)**	**Sumner, et al. 2021(29)**	**van de Venter, et al. 2014(30)**	**Foster, et al. 2020(31)**	**Roberts, et al. 2020(32)**	**Mignon, et al. 2021(34)**	**Thomson, et al. 2020(35)**	**Pescheny, et al. 2019(36)**
Was the study question or objective clearly stated?	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Were eligibility/ selection criteria for the study population prespecified and clearly described?	**No**	**No**	**Yes**	**No**	**Yes**	**No**	**Yes**	**No**	**No**	**Yes**
Were the participants in the study representative of those who would be eligible for the test/service/intervention in the general or clinical population of interest?	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Were all eligible participants that met the prespecified entry criteria enrolled?	**Yes**	**UC**	**UC**	**UC**	**No**	**UC**	**No**	**UC**	**UC**	**UC**
Was the sample size sufficiently large to provide confidence in the findings?	**UC**	**UC**	**UC**	**UC**	**UC**	**UC**	**UC**	**UC**	**UC**	**UC**
Was the test/ service/ intervention clearly described and delivered consistently across the - study population?	**UC**	**Yes**	**No**	**No**	**Yes**	**Yes**	**Yes**	**No**	**No**	**Yes**

Were the outcome measures prespecified, clearly defined, valid, reliable, and assessed consistently across all study participants?	**No**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Were the people assessing the outcomes blinded to the participants' exposures/interventions?	**N/A***	**N/A***	**N/A***	**N/A***	**N/A***	**N/A***	**N/A***	**N/A***	**N/A***	**N/A***
Was the loss to follow-up after baseline 20% or less? Were those lost to follow-up accounted for in the analysis?	**No**	**No**	**No**	**No**	**UC**	**No**	**No**	**UC**	**UC**	**No**
Did the statistical methods examine changes in outcome measures from before to after the intervention? Were statistical tests done that provided *p* values for the pre-to-post changes?	**UC**	**UC**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Were outcome measures of interest taken multiple times before the intervention and multiple times after the intervention (i.e., did they use an interrupted time-series design)?	**No**	**No**	**No**	**No**	**No**	**No**	**No**	**No**	**No**	**No**
Total Checklist Score *(Yes=2, Unclear=1, No=0)* Max=22	**9**	**11**	**12**	**10**	**14**	**12**	**13**	**10**	**11**	**14**

***N/A = not applicable. Due to only one intervention arm and no comparison group**

NHLBI NHLBI Quality Assessment Tool for Before-After (Pre-Post) Studies …continued					
Intervention Name	**Museums on Prescriptions**	**Social Cure and SP**		**Southwest Wellbeing Programme**	**Wetlands for Wellbeing**
Author(s) of Corresponding Article(s)	**Thomson, et al. 2018(37)**	**Kellezi, et al. 2019(38)**	**Wakefield, et al. 2022(39)**	**Jones, et al. 2013(40)**	**Maund, et al. 2019(42)**
Was the study question or objective clearly stated?	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Were eligibility/ selection criteria for the study population prespecified and clearly described?	**Yes**	**No**	**No**	**Yes**	**Yes**
Were the participants in the study representative of those who would be eligible for the test/service/intervention in the general or clinical population of interest?	**Yes**	**UC**	**UC**	**Yes**	**Yes**
Were all eligible participants that met the prespecified entry criteria enrolled?	**UC**	**UC**	**UC**	**No**	**No**
Was the sample size sufficiently large to provide confidence in the findings?	**UC**	**Yes**	**UC**	**UC**	**UC**
Was the test/ service/ intervention clearly described and delivered consistently across the study population?	**UC**	**Yes**	**No**	**Yes**	**Yes**
Were the outcome measures prespecified, clearly defined, valid, reliable, and assessed	**Yes**	**No**	**Yes**	**Yes**	**Yes**

consistently across all study participants?					
Were the people assessing the outcomes blinded to the participants' exposures/interventions?	**N/A***	**N/A***	**N/A***	**N/A***	**N/A***
Was the loss to follow-up after baseline 20% or less? Were those lost to follow-up accounted for in the analysis?	**UC**	**No**	**No**	**No**	**UC**
Did the statistical methods examine changes in outcome measures from before to after the intervention? Were statistical tests done that provided *p* values for the pre-to-post changes?	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Were outcome measures of interest taken multiple times before the intervention and multiple times after the intervention (i.e., did they use an interrupted time-series design)?	**No**	**No**	**No**	**No**	**No**
Total Checklist Score *(Yes=2, Unclear=1, No=0)* Max=22	**14**	**10**	**9**	**13**	**14**

***N/A = not applicable. Due to only one intervention arm and no comparison group**

Intervention/Programme Name	Art Lift (26-29,43-45)	Art Shine (30,46)	BRC Connecting Communities (31,48-50)	Cadwyn Mon (32)	Cares of Life Project (33)	Fife Social Prescribing: Mood Café (34,51)	GROW: Art, Park and Wellbeing (35,52)	Luton Social Prescribing Programme (36,53-55)	Museums on Prescription (37)	Social Cure and Social prescribing (38,39,56)	Southwest Wellbeing Programme (40,57)	No Specific Programme Name (41)	Wetlands for Wellbeing (42)
1) Treatment fidelity strategies for design of study													
The same treatment dose within conditions	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
The same/ equivalent dose across conditions	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Planning for implementation setbacks	No	Yes	No	No	No	No	No	No	No	No	No	No	No
2) Treatment fidelity strategies for monitoring and improving provider training													
Standardize training for those involved	No	Yes	Yes	No	Yes	Yes	No	No	No	No	Yes	Yes	Yes
Ensuring provider skill acquisition of the intervention	No	Yes	No	No	No	No	No	No	No	No	Yes	No	No
Minimize “drift” in provider skills over time	No	Yes	No	No	No	No	No	No	No	No	No	No	No
Accommodate provider differences in delivery	No	Yes	No	No	No	No	No	No	No	No	Yes	No	No
3) Treatment fidelity strategies for monitoring and improving delivery of treatment													
Control for provider differences	Yes	Yes	No	Yes	No	No	Yes	No	No	No	No	No	No
Measures to reduce differences within treatment	No	Yes	No	No	No	No	No	No	No	No	Yes	No	No
Adherence to the treatment protocol	No	No	No	No	No	No	Yes	No	No	No	No	No	No
Measures taken to minimize contamination between conditions	N/A	N/A	N/A	N/A	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

4) Treatment fidelity strategies for monitoring and improving receipt of treatment													
Ensure participant comprehension of the intervention*	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Ensure participant ability to use cognitive skills required**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**
Ensure participant ability to perform behavioral skills required**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**
5) Treatment fidelity strategies for monitoring and improving enactment of treatment skills													
Ensure participant use of cognitive skills***	**No**	**No**	**No**	**No**	**No**	**No**	**No**	**No**	**No**	**No**	**No**	**No**	**No**
Ensure participant use of behavioral skills***	**No**	**No**	**No**	**No**	**No**	**No**	**No**	**No**	**No**	**No**	**No**	**No**	**No**

No = no explicit evidence was reported in the paper(s)
N/A= not applicable
*=Comprehension was assumed if social activities and support was facilitied by group lead/ volunteer/ peers and course was completed by participants
**= Not applicable as it is not clear with social prescribing interventions what skills are being targeted due to variation between interventions and within service users
***= Unclesr what skills are targeted by the interventions and therefore unable to ensure participant use after the intervention or how skill use would be measured

Supplementary Materials 5: Person Centredness

Intervention/ Programme Name	Evidence of a personal needs assessment conducted? (Social. emotional or practical needs)	Evidence of personal choice of Social Prescribing activity offered?	Evidence of the person actively being involved in discussions to establish their preferences/ values on the available SP options to improve their health and/ or wellbeing	Evidence of a person receiving a Social Prescription consistent with their choices?
Art Lift (26-29,43-45)	No	Yes	No	No
Art Shine (30,46)	No	No	No	No
BRC Connecting Communities (31,48-50)	Yes	No	No	No
Cadwyn Mon (32	Yes	Yes	No	No
Cares of Life Project (33)	Yes	No	No	No
Fife Social Prescribing: Mood Café (34,51)	No	Yes	No	No
GROW: Art, Park and Wellbeing (35-52)	Yes	Yes	No	No
Luton Social Prescribing Programme (36,53-55)	Yes	Yes	Yes	No
Museums on Prescription (37)	No	No	No	No
Social Cure and Social prescribing (38,39,56)	Yes	No	No	No

Southwest Wellbeing Programme (40,57)	Yes	Yes	Yes	No
No Specific Programme Name (41)	Yes	No	Yes	No
Wetlands for Wellbeing (42)	No	No	No	No

Supplementary Materials 6
Intervention Development

	Is there evidence of…							
Intervention/Programme Name		**Framework Used?**	**Best Available Evidence?**	**Population Needs Assessment?**	**Evidence of Usability Testing/ Piloting?**	**Use of Theory or model To Underpin Development?**	**Co-Design/ Co-production Process?**	**If Yes, At What Stage?**
Art Lift (26-29,43-45)		No	Yes	Yes	Yes	No	No	N/A
Art Shine (30,46)		No	No	No	Yes	No	No	N/A
BRC Connecting Communities (31,48-50)		No	Yes	Yes	No	No	No	N/A
Cadwyn Mon (32)		No	Yes	Yes	No	No	No	N/A
Cares of Life Project (33)		Yes	Yes	Yes	No	No	No	N/A
Fife Social Prescribing: Mood Café (34,51)		No	Yes	Yes	Yes	No	Yes	Service users in the design of service
GROW: Art, Park and Wellbeing (35-52)		No	Yes	No	No	No	No	N/A
Luton Social Prescribing Programme (36,53-55)		No	No	Yes	Yes	No	No	N/A
Museums on Prescription (37)		No	Yes	No	No	No	No	N/A
Social Cure and Social prescribing (38,39,56)		Yes	No	No	No	No	No	N/A
Southwest Wellbeing Programme (40,57)		No	Yes	Yes	No	No	Yes	Service users in the design of service
No Specific Programme Name (41)		No	No	Yes	No (study was a Pilot)	No	No	N/A
Wetlands for Wellbeing (42)		No	No	No	No	No	No	N/A

Synthesis Without Meta-analysis (SWiM) reporting items

The citation for the Synthesis Without Meta-analysis explanation and elaboration article is: Campbell M, McKenzie JE, Sowden A, Katikireddi SV, Brennan SE, Ellis S, Hartmann-Boyce J, Ryan R, Shepperd S, Thomas J, Welch V, Thomson H. Synthesis without meta-analysis (SWiM) in systematic reviews: reporting guideline BMJ 2020;368:l6890 http://dx.doi.org/10.1136/bmj.l6890

SWiM is intended to complement and be used as an extension to PRISMA			
SWiM reporting item	**Item description**	**Page in manuscript where item is reported**	**Other***
Methods			
1 Grouping studies for synthesis	1a) Provide a description of, and rationale for, the groups used in the synthesis (e.g., grouping by populations, interventions, outcomes, study design)	P8-10	N/A
	1b) Detail and provide rationale for any changes made subsequent to the protocol in the groups used in the synthesis	Protocol ID: P7	N/A
2 Describe the standardised metric and transformation methods used	Describe the standardised metric for each outcome. Explain why the metric(s) was chosen, and describe any methods used to transform the intervention effects, as reported in the study, to the standardised metric, citing any methodological guidance consulted	Table 2 for full list of measures used by studies P19-20	N/A
3 Describe the synthesis methods	Describe and justify the methods used to synthesise the effects for each outcome when it was not possible to undertake a meta-analysis of effect estimates	P10	N/A
4 Criteria used to prioritise results for summary and synthesis	Where applicable, provide the criteria used, with supporting justification, to select the particular studies, or a particular study, for the main synthesis or to draw conclusions from the synthesis (e.g., based on study design, risk of bias assessments, directness in relation to the review question)	P8-10	N/A

Synthesis Without Meta-analysis (SWiM) reporting items

SWiM reporting item	Item description	Page in manuscript where item is reported	Other*
5 Investigation of heterogeneity in reported effects	State the method(s) used to examine heterogeneity in reported effects when it was not possible to undertake a meta-analysis of effect estimates and its extensions to investigate heterogeneity	P27	N/A
6 Certainty of evidence	Describe the methods used to assess certainty of the synthesis findings	P9	N/A
7 Data presentation methods	Describe the graphical and tabular methods used to present the effects (e.g., tables, forest plots, harvest plots). Specify key study characteristics (e.g., study design, risk of bias) used to order the studies, in the text and any tables or graphs, clearly referencing the studies included	Summary of study characteristics P11-17 Methodological Quality Assessment and Fidelity P20-23, tables supplementary materials 3 and 4	N/A
Results			
8 Reporting results	For each comparison and outcome, provide a description of the synthesised findings, and the certainty of the findings. Describe the result in language that is consistent with the question the synthesis addresses, and indicate which studies contribute to the synthesis	P11-25	N/A
Discussion			
9 Limitations of the synthesis	Report the limitations of the synthesis methods used and/or the groupings used in the synthesis, and how these affect the conclusions that can be drawn in relation to the original review question	P28	N/A

PRISMA=Preferred Reporting Items for Systematic Reviews and Meta-Analyses.

Synthesis Without Meta-analysis (SWiM) reporting items

*If the information is not provided in the systematic review, give details of where this information is available (e.g., protocol, other published papers (provide citation details), or website (provide the URL)).