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A SYSTEMATIC REVIEW OF THE EFFECTIVENESS OF LINK WORKERS PROVIDING SOCIAL PRESCRIBING ON HEALTH OUTCOMES AND COSTS FOR ADULTS IN PRIMARY CARE AND COMMUNITY SETTINGS.

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TITLE: A SYSTEMATIC REVIEW OF THE EFFECTIVENESS OF LINK WORKERS PROVIDING SOCIAL PRESCRIBING ON HEALTH OUTCOMES AND COSTS FOR ADULTS IN PRIMARY CARE AND COMMUNITY SETTINGS.

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ABSTRACT

Objectives: To establish the evidence base for the effectiveness and costs of link workers in improving health outcomes for people in primary care and community settings with a particular focus on individuals living in deprived areas and with multimorbidity.

Methods: A systematic review of the literature for randomised and non-randomised trials examining use of link workers, or equivalent, based in primary care or community settings for community dwelling adults compared to usual care. Primary outcomes were health related quality of life (HRQoL) and mental health. Secondary outcomes included patient reported outcomes measures, physical activity, clinical outcomes, healthcare utilisation and costs. Two authors independently screened abstracts, selected studies, extracted data, evaluated study quality and judged certainty of the evidence. Results were synthesised narratively.

Results: Seven studies including 3,341 participants were included. Two studies specifically targeted people with multimorbidity and three targeted people living in areas of deprivation. Four studies reported no impact on HRQoL. Four studies reported mental health outcomes with three reporting no impact. There was no evidence of impact on most secondary outcomes apart from improvement in self-rated health in two studies and two studies in a specific setting found improved ratings of high quality care and reduced hospitalisations. Two studies reported costs, but there were no cost effectiveness analyses. The certainty of the evidence was low or very low.

Conclusion: There is very limited evidence for social prescribing link workers generally and for people with multimorbidity in areas of deprivation. Policy makers should note the limited evidence base and support robust evaluation of current programmes before mainstreaming social prescribing link workers.

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Prospero registration: CRD42019134737 (04/07/2019)

STRENGTHS AND LIMITATIONS

- We conducted a worldwide search for link worker social prescribing interventions, rather than focusing on a specific geographic location and included equivalent roles across all healthcare systems.
- We only included randomized trials and controlled before after studies that met the Cochrane Effectiveness of Practice and Organisation of Care guidance, to avoid potentially biased results from poorer quality studies.
- This is the first systematic review that specifically examined the evidence for social prescribing link workers for people with multimorbidity and in areas of deprivation.
- The limited number of studies and heterogeneity in study design and intervention meant a meta-analysis was not possible. We conducted a robust narrative synthesis including an assessment of the certainty of the evidence.

INTRODUCTION

Social prescribing is a way of linking people with complex needs to non-medical supports in the community. There are different models of social prescribing, ranging from online signposting services to individual support from a link worker to access community resource. The link worker model of social prescribing is most frequently used in the UK.(1) Link workers determine the health and well-being needs of people referred to them (usually by health care professionals), co-produce a health and well-being plan and provide support to connect with community resources to meet these needs. No qualifications are specified for link workers, rather there is a focus on relevant experience and skills, such as listening and empathising, to perform the role.(2) Many health systems are developing social prescribing initiatives and NHS England is funding link workers in primary care and recommends their use for people who have one or more chronic conditions, need support with their mental health, are isolated or who have complex social problems.(3)

People experiencing multimorbidity (defined as two or more chronic health conditions) need support with managing their conditions. They experience fragmented care, poorer health outcomes and more psychological stress and as multimorbidity becomes the norm among an aging population, it poses a significant challenge to health systems.(4) People with complex multimorbidity account for a higher proportion of hospital admissions and therefore costs, and have higher consultation rates than those without.(5) In socially deprived areas, the impact is greater as people experience earlier onset of multimorbidity and are more likely to have mental health comorbidities.(6) A 2021 systematic review of interventions targeting people with multimorbidity in primary care identified 16 RCTs but found limited evidence for interventions that improve outcomes including HRQoL and mental health outcomes.(7)

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The review did not identify any eligible social prescribing linkworker interventions but concluded that existing evidence suggests that future research should target a range of areas including patient health behaviours that can be addressed though social prescribing.

Link workers providing social prescribing may have an impact on health outcomes for people experiencing multimorbidity, particularly in areas of social deprivation, but despite their widespread roll out in the U.K., there is limited evidence for their effectiveness.(8) If effective, social prescribing should reduce health care costs, by addressing the social problems that reportedly drive 20% of primary care attendances and the social determinants of health that lead to poorer outcomes.(9) A recent systematic review however, concluded that there was a lack of evidence for how, for whom and when social prescribing was effective or how much it cost.(10) Previous reviews have only looked at U.K. based interventions and included a broad range of studies including those with uncontrolled designs.(11, 12) We aimed to systematically review the evidence of effectiveness and costs of link worker social prescribing interventions internationally and to establish the evidence, if any, for their effectiveness in people with multimorbidity and social deprivation.

METHODS

We conducted a systematic review of studies reporting effectiveness and/or costs of linkworkers based in primary or community care settings for community dwelling adults. We included randomized trials and non randomized trials that met the Cochrane Effectiveness of Practice and Organisation of Care (EPOC) guidance on eligible study designs.(13) We followed the PRISMA statement for reporting systematic reviews, (14) (Appendix 1) and registered our review on Prospero CRD42019134737 (04/07/2019).

Eligibility criteria

Participants/population

We included studies on community dwelling adults attending primary care. Participants did not need to have any specific index condition. We included all studies whether they focused on participants in areas of social deprivation or not, but we specifically extracted data on social deprivation and multimorbidity where it was reported. We excluded studies on children and those in residential or supported care.

Intervention

Link workers may be known by other terms such as community health workers, patient navigators or health facilitators. While all of these work in the area of health, they are generally considered "lay workers" as they have not completed formal professional health or social care qualifications. Similarly the process of social prescribing may be known by other terms such as "community referral" or "navigation". Inclusion was based on the function of the role, i.e. supporting people to improve their health and wellbeing through connecting them with community resources and health and social care coordination, recognising that there is a wide range of terms used to describe such roles.

We included interventions that involved

- A referral (including self-referrals) to a link worker (a non-health or social care professional) who was based either in a primary care practice or a community or voluntary organisation
- Participants meeting with a link worker face to face at least once

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Determining an individual range of health and social care supports and community resources that the person would be willing to engage with and being offered support and follow up to engage with their chosen supports and activities

We excluded interventions without a link worker that only involved signposting to services, used volunteers as link workers or were delivered by telephone. Interventions where additional support was being provided by health care professionals or personal care provided alongside health and social care coordination such as disability support workers were excluded as it was not possible to separate the effects of the different components of care. We excluded multi-faceted interventions, which mainly comprised of education and goal setting around disease control or health behavior change interventions, even if they had an element of social prescribing as it was not possible to separate the impact of the different components of the intervention. e.

Comparator(s)

We only included studies with a comparator group that did not involve any social prescribing and met the EPOC guidance on controlled before after (CBA) studies, i.e. contemporaneous data collection, controls drawn from similar sites and at least 2 intervention and 2 control sites.(13)

Setting

Primary care was generally defined as "care provided by clinicians that are available to treat all common conditions in all age groups and have an ongoing relationship with their patients".(15) This definition allowed for a more flexible interpretation in countries that have different models of healthcare. We excluded studies that focused on hospital inpatients or specialist services or were emergency department based. The definition of social deprivation

is debated. It varies from country to country and is usually based on relative socioeconomic capacity.(16) For this review, we did not have a definition of deprivation, rather we described how deprivation was defined in relevant studies.

Outcomes

Main outcome

We included all reported outcomes, but based on our interest in assessing link workers to support patient with multimorbidity, we focused on outcomes in the core outcome set for multimorbidity that recommends primary outcomes of quality of life, mental health and mortality for interventions focused on multimorbidity.(17)

The primary outcomes for the review were:

- Health related quality of life (HRQoL), as measured by a validated instrument.
- Mental health outcomes, as measured by a validated instrument for screening for mental health conditions.

Additional outcomes

Secondary outcomes included also focused on the core outcome set for multimorbidity.(17) While this is a wide range of outcomes it is in keeping with the MRC frameworks' guide on using multiple outcome measures for complex interventions.(18) These included:

 Patient-reported outcomes on social-connectedness or isolation, self-rated health, patient experience of care, treatment burden, self-management behaviour and selfefficacy.

- Physical activity and function included measures of physical activity (self-reported or objectively measured), physical function, activities of daily living.
- Health service utilisation defined as number of GP visits, ED attendances or hospital admissions as measured via primary care or hospital records or self-reported.
- Any physical health data reported was included.
- Any cost data or social return on investment data.

Search strategy

We searched 11 bibliographic and trials databases for randomised controlled trials and nonrandomised controlled trials that meet the criteria outlined in the Cochrane Effective Practice and Organisation of Care (EPOC) guidance on study design(13) from inception up to July 2021 with no language limits: Cochrane database, Cochrane Central register of Controlled trials, ClinicalTrials.gov and EU Clinical Trials Register, Cumulative Index of Nursing and Allied Health Literature (CINAHL), Embase, Global Health, PubMed/MEDLINE, Psychinfo, LILACS (Latin American and Caribbean Health Sciences Information database) and Web of Science. To identify economic evaluations that may be of relevance we also searched the NHS EED (NHS Economic Evaluation Database). Health Technology Assessment Database (both available via the Centre for Reviews and Dissemination (CRD), University of York) and CEA (Cost-Effectiveness Analysis Registry) up to July 2019. We conducted a grey literature search of the following databases: Irish Health Service Executive (HSE) Lenus, RIAN, Open Grey, DART EUROPE, Google and Google Scholar and WHOLIS (World Health Organization Library Information System) up to July 2021. We also conducted a forward and backward citation search of included studies. Relevant websites (The Kings Fund, NHS Social Prescribing, National Institute for Clinical Excellence, Social Prescribing Network, Health Foundation, Nuffield Trust, HSE Social Prescribing, and Oxford Social Prescribing Research Network) were searched for evaluations. The first 23 pages of a Google Search for "social prescribing" and the first 21 pages of a Google scholar search were reviewed for additional literature. Please see Extended data, Appendix 2 for sample search strategy.

Data management

Rayyan was used to sort abstracts for inclusion and exclusion. References were managed with Endnote 8 reference manager.

Review Process

The lead author (BK) did an initial screen to remove clearly ineligible titles. BK and AC independently reviewed the abstracts of all potentially eligible titles, discarded those that clearly did not meet inclusion criteria and independently reviewed the full texts of the remainder to assess eligibility for final inclusion. Any discrepancies were resolved through discussion with a third reviewer (SMS). Data extraction was completed by the lead author and checked by another author (MOS). Two authors (BK and AC) independently assessed and cross-checked the risk of bias in all included studies using the Cochrane EPOC Guidance for assessing risk of bias.(19) The certainty of the evidence for outcomes was independently assessed by two authors (BK and MOS) using the Grading of Recommendations Assessment, Development and Evaluation (GRADE) criteria including risk of bias, consistency of effect, imprecision, indirectness and other potential criteria such as publication bias.(20) Any discrepancies were discussed with the senior author (SMS) until consensus was reached. RCTs and CBAs were assessed separately. Overall certainty was based on assessment of evidence from RCTs where more than one was available.

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Strategy for data synthesis

Due to the heterogeneity in terms of study design, risk of bias, participants, interventions and outcomes, a narrative synthesis was performed and presented in tabular form to include the following headings: study design, setting, participants, nature of intervention, outcome measures used, effects and costs. We explored the possibility of completing meta-analysis, however, in the two studies that were similar in terms of study design, intervention characteristics and duration of follow up, there was insufficient data reported on the primary outcomes. As there were only two studies, authors were not contacted for additional data. We had planned to complete sub-group analyses based on multimorbidity, living in areas of social deprivation and link worker location, but this was not possible due to substantial methodological heterogeneity, including study design and definitions and reporting of multimorbidity and deprivation.

Public Patient Involvement

This review is part of one of four PhD projects under a Health Research Board collaborative doctoral award (CDA) in multimorbidity. The original CDA project application and PhD topics had input from a PPI advisory group. A multimorbidity PPI advisory group was set up specifically to support the four PhD projects in the CDA. The lead reviewer (BK) presented the results of this review to the group who provided input on implications for policy, practice and research, included in the discussion. See Appendix 3 Guidance on Reporting Involvement of Public and Patients (GRIPP) 2 form in extended data for further details on PPI methods.

RESULTS

The database search identified 20,656 records after duplicate removal. 19,726 were removed after title screening leaving 930 abstracts for review. 315 full texts were assessed for eligibility including 221 identified from the database search and 94 from other sources. (See Figure 1: PRISMA Flow diagram)

Included studies and participants

Eight papers reporting seven studies, including 3,341 participants were identified. Four were randomized trials (RCTs),(21-24) three controlled before after studies (CBAs)(25-27) and one paper reported the economic evaluation of an included trial.(28) Two studies were from the US(23, 24) and five from the UK.(21, 22, 25-27)

Participants were majority female ranging from 59% to 75% with only one study reporting majority male participants (62%).(25) Mean age ranged from 43.2 to 71 years age. One study focused on adults over 75, but did not report mean age.(21) Three of the seven studies clearly reported including participants experiencing multimorbidity and deprivation. The two US trials tested an intervention that targeted people with two or more chronic conditions, living in a high poverty zip code.(23, 24) One U.K. study was based in GP practices located in postcodes with high deprivation and reported a mean of 3.1 self- reported chronic conditions.(26) Otherwise, studies recruited participants based on a combination of factors including: social isolation,(21, 25, 27) mental health problems,(25, 27) age (21, 25) and GP perception of suitability for the intervention.(22, 26, 27)

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Interventions and comparators

All interventions included referral to a link worker or equivalent, who identified a set of personalized goals and supported participants to achieve these through connecting with community resources. There was considerable variation in the duration and intensity of the link worker interventions. Intervention duration ranged from one month to two years, with most interventions ranging from three to nine months in duration. Intensity in terms of link worker caseload and number of contacts was only reported in detail in two of the seven studies. The IMPaCT intervention evaluated in the two US trials was six months duration with weekly contacts as standard. Each link worker worked with 55 clients per year for an average of 38.4 hours.(29) No other studies reported on link worker caseload. Other interventions were less intense in terms of number of contacts. Carnes et al reported that 69% of participants met the link worker once and 17% had two or more contacts.(27) Grant et al reported a mean of 1.7 contacts and Mercer et al a mean of 3.1 contacts.(22, 26) The remaining two studies did not report on numbers of contacts.(21, 25)

All link workers had professional supervision arrangements, which varied across studies. They were managed and employed by either a research team or a host voluntary community organisation. While efforts were made to standardise the IMPaCT intervention,(29) with regular supervision and reviews, the other interventions were very flexible and fidelity was not assessed. In some cases, there was considerable variation in how the intervention was implemented across sites, but this was part of a general tailored approach.(25, 26) The setting also varied. In three studies, link workers were embedded within general practice or equivalent.(24, 26, 27) In two of these studies one link worker was assigned to a practice. (24, 26) In the other, three link workers were based across 22 practices.(27) The link workers were based in community settings in the remaining four studies.

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The comparator was usual care for all studies, with the inclusion of chronic disease goal setting as a co-intervention in two of the RCTs.(23, 24) The four RCTs randomized participants at the level of the individual. The three CBAs studies recruited controls from nearby GP practices with similar demographics. However, all of the CBAs reported significant differences in demographics and baseline outcome scores between intervention and control groups. See Table 1 for a summary of included studies.

Table 1. Summary of included study characteristics.

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Study ID	Participants	Intervention	Oucomes
Randomised 1	Trials		
Clarke et al,	523 adults over	Referral: Recruited via mail invitation	Primary outcome: Survival
1992 (21)	75 living alone.	Linkworker: Lay community-based health	Secondary outcomes:
		worker, training and experience not	Activities of daily living
Community,	Age, gender not	specified.	Information/orientation score
UK	reported	Contacts: Minimum 3 home visits with	Loneliness
		tailored support	Morale
		Duration: 2 years	Self-rated health
		Type of support: Tailored but fell into 4	Social contacts
		categories: Social & social services,	Primary healthcare utilisation
		financial, housing & healthcare coordination	Costs: None reported
		Comparator: Usual care	Data collection: 0, 24 months. Survival
			assessed at 6 monthly intervals from
			baseline to 3.5 years
Grant et al,	152 adults over	Referral: Recruited via GP referral	Primary Outcomes:
2000 (22)	16 who GP felt	Linkworker: Lay "referral facilitator" trained	Mental health: depression and anxiety
2000 (22)	would benefit	and employed by a community	Social Support
Community,	from	organisation. Based in community.	Secondary outcomes:
UK	intervention.	Contacts: 1 face-to-face assessment within	Quality of life
ÖK		a week of referral. Average of 1.7 telephone	Functional health
		or face-to-face contacts reported.	Primary healthcare utilisation includin
	Mean age 43.2,	Duration: 1 month	medications and referrals
	75% female.	Type of support: Assessment and referral to	Costs:
	7570 Territale.	appropriate community resources	Intervention
		Comparator: Usual care	Primary healthcare utilisation
		comparator: Osual care	Referrals to other agencies
			Data collection: 0, 1, 4 months
Kangovi at		Deferrel: Descrited via primary care clinics	
Kangovi et	592 adults	Referral: Recruited via primary care clinics	Primary outcome: Health related quali
al, 2018 (24)	attending 3	Linkworker: Community health workers,	of life, physical health component (SF-
Drimory	primary care clinics, who	with high school diploma. 1 month training	12-V2 PCS)
Primary		in motivational interviewing, action	Secondary outcomes:
Care, USA	resided in a	planning and on the job. Based in primary	Health related quality of life, mental
	high-poverty zip	care practices.	health component (SF-12-V2 MCS)
	code, were	Contacts: Monthly face-to-face meetings	Patient activation
	uninsured or	and weekly telephone check ins.	Chronic disease control (BP, HbA1C, BN
	publicly insured,	Duration: 6 months	or CPD)
	and had a	Type of support : Tailored supports to	Patient-reported quality of primary car
	diagnosis for 2	achieve chronic disease goals set with PCP	All cause hospitalisations
	or more chronic	including: Action planning and coaching,	Costs: None reported
	diseases.	health system navigation and advocacy,	Data Collection: 0, 6, 9 months
		long term social supports	
		Comparator: Chronic disease goal setting	
	Mean age 52.6.	with PCP only	
Kangavi -t	62.5% female.	Defermels Department with a minetane start	Duimen, euterman
Kangovi et	302 adults	Referral: Recruited via primary care clinics	Primary outcome:
al, 2017 (23)	attending GIM	Linkworker: Community health workers,	Change in chronic disease control
C	clinics,	with high school diploma. 1 month training	(HbA1C, BMI, BP, or CPD)
Community,	uninsured or	in motivational interviewing, action	Secondary outcomes:
USA	publicly insured,	planning and on the job. Based in primary	Achievement of chronic disease
	living in	care practices.	management goals
	deprived area,	Contacts: Monthly face-to-face meetings	Health related quality of life (SF-12-V2
	and were	and weekly telephone check ins.	PCS and MCS)
	diagnosed with	Duration: 6 months	Patient activation
	2 or more	Type of support: Tailored supports to	Patient reported quality of primary car
	chronic	achieve chronic disease goals set with PCP	All cause hospitalisations

	diseases. Mean age 56. 74% female	including: Action planning and coaching, health system navigation and advocacy, long term social supports Comparator: Chronic disease goal setting with PCP only	Costs: Return on investment analysis reported on cost savings related to reduced hospitalisations (28) Data collection: 0, 6 months for PROMs 6 and 12 months for hospitalisations
Controlled Be	fore After Studies		
Study ID	Participants	Intervention	Outcomes
Carnes et al, 2017 (27) Primary Care, UK	480 adults frequently attending primary care, who presented with social isolation or mild	Referral: GP referral Linkworker: 3 lay "social prescribing coordinators" (SPC) trained in social work and managed by community organisation. Based across 22 GP practices. Additional support from volunteers available. Contacts: Initial 1 hour meeting and up to 6	Primary outcome: Not specified Secondary outcomes: Self-rated health Mental Health: depression and anxiety Wellbeing Positive and active engagement in life Number of regular activities
	mental health problems. Median age 56.	sessions with the SPC, unlimited volunteer support Duration: 6 months Type of support : Assessment and well- being plan, referral and support to access	A&E visits in past 3 months Annual GP consultation rate Number of medications in previous 6 months Costs: None reported
	59% Female.	community resources. Volunteers available to accompany to resources if required. Comparator: Propensity matched controls drawn from GP practices in nearby areas with no social prescribing service.	Data collection: 0, 8 months
Dickens et al, 2011 (25)	392 adults over 50 attending primary care at	Referral: GP referral Linkworker: Mentors often with teaching or creative skills, managed by a community	Primary outcome: Health related qualit of life, mental health component (SF- 12-V2 MCS)
Community, UK	risk of social isolation.	organisation. Training not described. Based in community. Contacts: Face to face meetings, frequency not specified Duration: 3 months	Secondary outcomes: Health related quality of life, physical health component (SF-12-V2 PCS) Health related quality of life (EQ-5D-3L) Mental health: depression
	Mean age 71. 62% male	Type of support : Build confidence for personal social activities using personalised incremental goal setting Comparator : Matched controls from a sample drawn from 3 GP practices in nearby	Social activities Social support Social participation Costs: None reported Data collection: 0, 3 months
Mercer et al, 2019 (26)	900 adults attending	areas with no mentoring service Referral: GP referral Linkworker: Community links practitioners with prior experience of community work	Primary outcome: Health related qualit of life (EQ-5D-5L)
Primary Care, UK	primary care in most deprived areas of Glasgow deemed suitable for intervention by GP.	with prior experience of community work, managed by a community organisation. 1 month training on role, supporting clients, engaging practices and mapping resources. Based in GP practices. Contacts: Face to face meetings. Average of 3 meetings reported. Duration: 9 months	Secondary outcomes: Wellbeing Mental Health: depression and anxiety Work and social adjustment scale Self-reported lifestyle behaviors (smoking, alcohol, exercise)
	Median age 49. 60% Female.	Type of support : Assessment of needs and tailored support to connect with relevant community resources. Comparator: Sample drawn from 6 GP practices in Glasgow without a community links practitioner	Costs: None reported Data collection: 0, 9 months

Risk of Bias

We used the EPOC guidance to assess risk of bias for both RCTs and CBAs, but have reported them separately for each study design. The RCTs had low risk of bias overall, despite blinding of participants not being possible given the nature of the intervention. Randomization processes were not clearly reported in one RCT.(21) There was high risk of bias in the CBAs. This was due to differences in baseline characteristics and limitations in randomization and allocation concealment due to study design. A summary of the risk of bias is shown in Figure 2. The full risk of bias assessment for all outcomes is available in Appendix 4 in extended data.

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Certainty of Evidence

For the primary outcomes, the certainty across all study types was low for HRQoL and very low for mental health due to risk of bias, indirectness resulting from differences in interventions and populations across studies, inconsistencies in results and imprecision. The certainty was low for social supports, self-rated health and very low for physical function and activities. For health care utilization, there was low certainty evidence for hospitalisations based on the two RCTs of the IMPaCT intervention.(23, 24) There was low certainty evidence for primary care visits, due to indirectness, imprecision and risk of bias. See Table 2.

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Table 2. Grade Summary of Findings

Title: The effectiveness of link workers providing social prescribing on health outcomes and costs for adults in primary care and community settings Patients or population: Community dwelling adults Settings: Primary and community care

Intervention: Social prescribing link workers

Comparison: Usual care

		Contributing	Overall
		studies	GRADE
Outcome	Review finding	(participants)	assessment
Health related quality of	Link workers providing	2 RCTs (894).	$\oplus \oplus \ominus \ominus$
life	social prescribing may		Low
	have little or no impact on	2 CBAs (1292)	
	HRQoL.		(Low for RCTs
	4		^{b, c, d} . Low for
			CBAs)
Mental health	It is unknown if social	1 RCT (152).	$\oplus \Theta \Theta \Theta$
	prescribing link workers		Very Low ^f
	improve mental health	3 CBAs (1772)	
	because the certainty of		(Low for RCT
	the evidence is very low.		^{b,c} and Very
			Low for CBAs
	· L .		a,b)
Social contacts and	Social prescribing link	2 RCTs (714).	$\oplus \oplus \ominus \ominus$
support	workers may lead to little		Low
	or no difference in social	1 CBA (392)	
	contacts.		(Low for RCTs
			^{b,d} , Low for
			CBAs)
Physical function and	It is unknown if social	2 RCTs (714)	$\Phi \Theta \Theta \Theta$
activities	prescribing link workers		Very low
	improve physical function	2 CBAs (1380)	
	and activity because the		(Very Low
	certainty of the evidence		RCTs ^{b,c,d} and
	is very low.		Very Low
~ 10 11 11	~		CBAs ^{a,d})
Self-rated health	Social prescribing link	2 RCTs (714)	$\oplus \oplus \ominus \ominus$
	workers may improve	1 CD A (490)	Low
	self-rated health.	1 CBA (480)	(Law DCT-bc
			(Low RCTs ^{b,c}
			and Low
			CBA ^a)

Health care utilisation:	Link workers providing	2 RCTs (894)	$\bigoplus \bigoplus \ominus \ominus^{\mathrm{b},\mathrm{c},\mathrm{e}}$
hospitalisation	social prescribing via a		Low
	structured intervention		
	and within a specific		
	health context may		
	decrease hospitalisations.		
Health care utilisation:	Social prescribing link	2 RCTs (714)	$\oplus \oplus \ominus \ominus$
primary care visits	workers may have little or		Low
	no impact on primary care	1 CBA (480)	
	visits.		(Low RCTs ^{b,d} ,
			Very Low for
			CBAs ^a)

RCTs and CBAs were assessed separately for each outcome. If there was limited RCT evidence then an overall judgement was applied. In this case if were inconsistencies in results between the two bodies of evidence this was downgraded by one level.

^a Downgraded for risk of bias . ^b Downgraded for indirectness. ^c Downgraded for Inconsistency. ^d Downgraded for imprecision. ^e Downgraded for publication bias ^f Downgraded for overall inconsistency

See Appendix 5 in extended data for the full GRADE summary sheet.

Effectiveness of link worker interventions

Primary outcomes

Four of the seven studies (two RCTs and two CBAs) reported on HRQoL (23-26). Two studies used the EQ-5D measure with one study reporting no difference, (26) while the other study reported a small significant difference between the intervention and control group, in favour of the control group. (25) Three studies used the SF-12 measure, with one of the three reporting a significant difference in favour of the intervention for the mental health component score, (23) whereas, none of the three studies reported any difference in physical component scores (23-25). Four studies reported on mental health (22, 25-27) using HADS-D, HADS-A or GDS-10. Only one of these studies reported evidence of a significant improvement in HADS-A, (aMD -1.9 (95% CI: -3.0 to -0.7).(22) The remaining three studies

found no evidence of a difference between groups for any mental health outcomes. See Table

3 for a summary of the primary outcome effects.

Table 3 Summary of review primary outcome effects

Health Related C	Quality of Life	
Study ID	Outcome measure	Adjusted mean differences (95% CI
		-0.7 (-2.2 to 0.7) ^a
	Physical Health Component (SF-12-V2 PCS)	P=0.3
Kangovi at al		
Kangovi et al, 2018		0.8 (-1.1 to 2.6) ^a
RCT (24)	Mental Health Component (SF-12-V2 MCS)	P=0.41
	Developed Haplete Component (SE 12)/2 DCC)	
	Physical Health Component (SF-12-V2 PCS)	Int 0.9, Control 0.5* P=0.66
Kangovi et al,		
2017		Int 2.3, Control 0.2*
RCT (23)	Mental Health Component (SF-12-V2 MCS)	P=0.008
	Physical Health Component (SF-12 PCS)	0.8 (-1.5, 3.2) ^b
		P=0.48
		0.1 (-1.9, 2.1) ^b
Dickens et al	Mental Health Component (SF-12 MCS)	P=0.9
2011		-0.09 (-0.14, -0.03) ^b
CBA (25)	EQ-5D-3L	P=<0.001
Mercer et al, 2019		0.008 (-0.028 to 0.045) °
CBA (26)	EQ-5D-5L	P=0.648
- (- /		
Mental Health	1	1
Study ID	Outcome measure	Adjusted mean differences (95% C
Grant et al,		- · · · · · · · ·
2000		
RCT (22)		-0.9 (-1.9 to 0.2) ^d
Corpos et al	Depression (HADS-D)	P=0.116
Carnes et al, 2017		0.857 (-0.737, 2.451) ^e
CBA (27)	Depression (HADS-D)	P=not reported

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Dickens et al,		
2015		0.2 (-0.2, 0.7) ^b
CBA (25)	Depression (GDS-10)	P=0.29
Mercer et al,		
2019		0.09 (–0.49 to 0.68) ^c
CBA (26)	Depression (HADS-D)	P=0.753
Grant et al,		
2000	Anxiety	–1.9 (–3.0 to –0.7)ª
RCT (22)	(HADS-A)	P=0.002
Carnes et al,		
2017	Anxiety	-0.119 (-0.847, 1.609) ^e
CBA(27)	(HADS-A)	P=not reported
Mercer et al,		
2019	Anxiety	–0.41 (–0.99 to 0.18) ^c
CBA (26)	(HADS-A)	P=0.172
Clarke et al,		
1992		
RCT (21)	HRQoL or Mental Health were not outcomes for this trial	

SF-12v2= Short Form Health Survey, is often used as a health related quality of life measure, with Physical (PCS) and Mental (MCS) health components reported separately on a scale of 0-100 with 100 representing maximal health. EQ-5D-5L=a standardized measure of self-reported health-related quality of life that assesses 5 dimensions at 5 levels of severity where 1 is the preferred state of health. EQ-5D-3L=a earlier version of EQ-5D-5L with 3 levels. GDS =Geriatric Depression Scale, a screening tool for depression in older people with a score of 4 or more indicating possible depression. HADS = Hospital Anxiety and Depression Scale measured on a scale of 0-42 where a higher score indicates worse mental health. HADS-A=Hospital Anxiety and Depression Scale, Anxiety, where a score above 10 indicates possible caseness; HADS-D=Hospital Anxiety and Depression, where a score above 10 indicates possible caseness.

.* Unadjusted mean difference- adjusted mean differences not reported ^a Longitudinal estimated difference in difference from 6 to 9 months adjusted for site and chronic disease. ^b Adjusted for employment status, accommodation type and living circumstances. ^cAdjusted for age, sex, SIMD, comorbidity, and significant baseline outcome measures as covariates and includes practice identifier as a random effects term. ^dAdjusted for baseline results ^e Adjusted for age, sex, ethnicity, employment status and living arrangement.

Secondary outcomes

A wide range of other outcomes was reported, with the studies reporting a mean of six outcomes each, including a range of patient reported outcomes (PROMS). Three reported on a measure of social contact or support and found no evidence of a difference between groups (21, 22, 25). One study reported that intervention participants were more likely to rate getting along with others as "worse" than controls, indicating a possible negative effect (25). In terms of other PROMs, two studies found a positive impact on self-rated health (21, 22), one study found a positive effect for general quality of life, assessed by the Delighted Terrible Faces

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scale (22) and two studies reported a positive finding on patient rating of high quality care (23, 24). There were no reported differences for patient activation (23, 24), wellbeing (26, 27), loneliness (21), morale (21), work and social adjustment (26) or active participation in life (27). Of the four studies that reported a measure of physical activity and function, one study found an improvement in functional health (22), while two others found no evidence of a difference in ADLs (21), or physical activity (26) and the final study found a reduction in usual activities (27). Three studies reported clinical outcomes, one reported on survival over a three year period (21) and two looked at chronic disease control for smoking, diabetes, obesity and hypertension (23, 24). None reported a statistically significant difference between groups.

Five studies reported on health care utilization, with three reporting on primary care utilization (21, 22, 27) and two on hospitalisations (23, 24). One study reported a reduction in primary care attendances in the intervention group, but the control group were significantly different and the authors concluded that their findings more likely represented regression to the mean (27); the remaining two studies found no evidence of an effect on primary health care attendances. One of the two US studies found a 24 % risk reduction in repeat hospital admissions during the 12 month follow up period (24); the other US study reported a similar reduction, but it did not reach statistical significance (23). See Appendix 6 in extended data for a full list of outcomes and effects for each study.

Costs and cost effectiveness

No cost utility or cost effectiveness analyses were identified in our search. Two RCTs reported on costs (22, 28); one as a cost analysis and the other as a separately published return on investment analysis of an included RCT (23). The cost analysis looked at primary care visits, medications, referrals and interventions costs. While the study found a reduction

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in healthcare costs due to a reduction in referrals, these savings did not offset the costs of the intervention. Therefore, the authors concluded that the intervention was more costly than usual care. The analysis did not consider any measure of health benefits to participants such as quality of life years gained.(22) The return on investment study examined cost savings related to hospitalisations and outpatient attendances from routine data and included detailed costing of the intervention, which was calculated at \$1721.06 per participant. While the number of reduced hospital days was statistically non-significant, they estimated a return of \$2.47 for every \$1 spent on the intervention.(28)

Subgroup synthesis- Multimorbidity and social deprivation

Three of the seven studies reported number of chronic conditions. Two of these were RCTs of the IMPaCT intervention in the US and recruited participants with two or more chronic conditions including hypertension, diabetes, obesity and tobacco dependence.(23, 24) The other was a CBA of the Glasgow Deep End link worker intervention and reported a mean of 3.1 chronic conditions in the intervention group, but this was not an inclusion criterion.(26) All three of these studies targeted participants in areas of deprivation. Within these multimorbidity studies, there was no conclusive effect on HRQoL, with two of the studies finding no effect and one of the US trials finding an effect on the Mental Health Component of the SF-12-V2 only,(23) which was not replicated in the second trial of this intervention.(24) Only the Deep End link worker CBA reported on mental health and found no evidence of a difference between groups. There were no reported significant effects on other patient reported outcome measures or chronic disease control. The RCTs of the IMPaCT intervention found a consistent improvement in the proportion of participants reporting high quality primary care. Both also examined hospitalisations, reporting fewer

total days in hospital, although this only reached statistical significance in one of the two studies.

DISCUSSION

We identified seven studies and one economic evaluation of an included study, but found no consistent evidence to support the effectiveness of link worker interventions for improving health related quality of life or mental health. There was no evidence for effectiveness in improving social support, physical function and activities, or primary healthcare utilization, though there was a suggestion from two studies that interventions led to improved self-rated health and two others reported higher patient ratings for quality care. Three of the studies specifically included participants experiencing multimorbidity and social deprivation with similar findings for health related quality of life, though two U.S. RCTs reported a reduction in total days in hospital for people with multimorbidity with low certainty evidence. The certainty of the evidence is low or very low overall due to risk of bias, heterogeneity amongst studies, inconsistency and imprecision.

Our systematic review has not identified any evidence on the cost effectiveness of social prescribing. There is some evidence of cost savings based on reduced hospitalisations, but this was a US based study of an intense structured six-month intervention and may not translate to other healthcare systems.(28) Only one UK based study reported costs, showing a reduction in referral costs, but no cost benefit analysis or cost utility analysis was undertaken.(22) The economic evaluation of social prescribing in the literature is weak.

There remains a lack of studies with a randomized design since the 2017 review (10) that called for "less rhetoric and more reality". There have been many uncontrolled before after studies identified in subsequent reviews, (11, 12, 30) but the last RCT in a UK setting was over 20 years ago. (22) Widening our search beyond the UK setting resulted in the

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identification of two relevant RCTs and a return on investment analysis in a US setting. (23, 24, 28) Ours is the first review to look specifically at populations experiencing multimorbidity or deprivation. We identified some evidence to support reduced hospital admissions for people experiencing multimorbidity and deprivation in the US. Two of these studies also found an improvement in patients rating of the quality of their primary care, which has been reported in previous multimorbidity studies. (31). The 2021 systematic review of multimorbidity highlighted the potential for interventions to improve patients experience of care, (7) which some have argued should be an end in itself. (32). We reported on the intensity of the intervention, often omitted from previous reviews and indeed in many of the articles in this review. While intensity varied, a more intense intervention with a healthcare coordination component was the only one with a positive impact on healthcare utilisation.(28) Setting also varied, with some link workers embedded in general practice, which may facilitate healthcare coordination.

The main outcomes for the current review were HRQoL and mental health based on the core outcome set in multimorbidity (17), but only two of the seven studies reported on both of these (25, 26). With one exception (21) the rest reported on at least one. Most studies did cover some of the NHS draft outcome framework for social prescribing recommended outcomes: wellbeing, social connectedness, ability to manage day-to-day and physical activity. (3) However, as per previous reviews (10, 11, 33) there was a lot of variation in outcomes included and how they were measured, making it difficult to synthesise studies and further weakening the evidence.

Strengths and Limitations

This review involved a rigorous search of the international literature including all languages and the Grey Literature. We used a wide range of terms to describe the link worker role,

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providing additional evidence on link worker social prescribing interventions. We had robust study design inclusion criteria and only included studies that met the Cochrane EPOC guidance for inclusion in a systematic review.(19) Additional potentially eligible studies did not meet the inclusion criteria for this review due to non-contemporaneous comparisons, too few sites or offering some sort of social prescribing intervention to control groups.(34-36) Previous reviews have included uncontrolled studies with the argument that they are used by policy makers as evidence of effectiveness,(12) however, including these studies with weaker designs can lead to inflated effect sizes and distort the current evidence base. Unlike previous reviews, (10-12, 30, 37) we appraised the overall certainty of the evidence for our selected outcomes, which was low or very low for most outcomes. This review provides the most up to date review of evidence internationally for link worker social prescribing interventions.

Due to the complex nature of link worker interventions, there may have been a degree of subjectivity in determining which ones to include. To minimize this all full texts were independently reviewed and where there was a question over intervention inclusion, it was discussed with a third author. Our protocol made it clear that it was important that social prescribing was the main element of the intervention, but interpretation of this is also dependent on reporting in potentially eligible studies (38). The field is rapidly expanding and we may have missed studies published since July 2021. Our forward citation search carried out in September 2021 will go some way to mitigate this. We are also aware of protocols that have not published results or were suspended due to COVID-19, including an RCT that we have conducted with analysis ongoing.(39)

Implications for policy and practice

It could be argued that only four of the studies tested interventions that reflect the format of current social prescribing activities in the UK, which are relatively short and tailored to the

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individual and locality, with a high degree of flexibility (22, 25-27). Even among these, there is variation in terms of the intensity of support and link worker location, with both community and primary care settings. Embedding link workers in a general practice setting can facilitate more intense support and a focus on healthcare coordination, such as in the US IMPaCT intervention.(29) One of the UK studies reported that a sub-group of participants who met a link worker three or more times had improvements in HRQoL, mental health and exercise, suggesting intervention duration and intensity is important to consider.(26) Current plans for social prescribing in Ireland and the UK suggest at least double the linkworker caseload of the IMPaCT intervention, (40, 41) and a shorter intervention, that may limit link worker capacity to provide the level of support required to provide benefit, particularly for people with multimorbidity living in deprived areas. There is a need to consider greater flexibility in how new link worker social prescribing interventions are implemented until more evidence is available on how much and what type of support is required.

Policy makers need to be aware that there is insufficient evidence to assess the effectiveness of social prescribing and none on the cost effectiveness so the opportunity cost is unknown. While it is anticipated that social prescribing will reduce healthcare utilization at the primary care level (9), many evaluation of social prescribing services struggle to get access to healthcare utilisation data.(42) Going forward robust evaluations with both patient reported outcome data and access to healthcare utilisation data to assist economic evaluations need to be embedded into social prescribing programmes.

The PPI group felt a flexible approach was necessary as some people may need longer support, but it would not be fair to exclude those who have less complex needs who could benefit from shorter interventions. They agreed with the author team's conclusions that social prescribing should not be rolled out more widely without evaluations built in and also felt that outcomes and the way they were measured should be decided with patient input.

Implications for future research

For future research and evaluations to address the evidence gap a number of challenges need to be overcome. Social prescribing interventions are meant to be flexible and tailored, not just to the individual, but also the context. This however results in a lot of heterogeneity and difficulty in assessing an overall body of evidence. Future studies could address this by reporting on reasons for referral, caseload, duration of intervention, number of contacts and link worker caseload. Further research is also needed to better understand the components of social prescribing and indeed is underway.(43)

There are no agreed outcomes or measures for social prescribing. The NHS does not recommend any specific measures, although for personalized care it does recommend using the patient activation measure (PAM), (44) which was not used in any UK studies in this review, although it is relatively new. The Health Service Executive in Ireland also recommends assessing wellbeing and social connectedness, but not mental health or HRQoL (42). Without the inclusion of a measure that can be used for cost utility analysis, building the evidence base around cost effectiveness will be challenging. The EuroQoL HRQoL measure, EQ-5D-5L (45), is one such measure, but it can be difficult to show changes in a relatively short timeframe (46) and is quite health focused whereas social prescribing has potentially wider social benefits. The ICECAP-A (The ICEpop CAPability measure for Adults) is an alternative. (47) It measures capability well-being, can be used in economic evaluations and is recommended by NICE for use in evaluations of interventions with potential health and social benefits. (48) Future studies should consider its inclusion as an outcome. The Medical Research Council Framework for the Evaluation of Complex Intervention to Improve Health Outcomes recommends multiple outcome measures. In the case of social prescribing a more refined outcomes framework with specified measures developed with input from service users, providers and academics is needed.

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The widespread policy of rolling out social prescribing projects regardless of the lack of certainty around cost effectiveness makes it challenging for researchers to address the evidence gap, especially in identifying suitable controls. While some CBAs in this review attempted to match controls, there were often significant differences in baseline characteristics as controls were drawn from different populations. (25, 27) Where social prescribing has already been adopted by policy makers stepped wedge cluster RCTs and interrupted time series offer an alternative approach to CBAs and can control better for confounding. (49) Other jurisdictions considering implementing social prescribing should carefully consider how they evaluate it from inception. RCTs are feasible as shown by the trials in the review. It is clear, however, that further uncontrolled before after studies will not advance the evidence base.

CONCLUSIONS

Our systematic review suggests that link workers providing social prescribing may have little or no impact on HRQoL, mental health or a range of patient reported outcomes though may improve self-rated health. For patients with multimorbidity in areas of deprivation an intensive link worker intervention probably improves patients' ratings of high quality primary care and reduces hospitalisations, but these findings are based on two studies in the US and require evaluation in other health systems. The opportunity costs of investing in social prescribing may be considerable and it is essential that high quality trials determining cost effectiveness are conducted so that the evidence can catch up with the policy and we avoid wasting valuable time and resources.

COMPETING INTERESTS

The authors declare that they have no competing interests.

ETHICS STATEMENT

This study did not involve human or animal subjects and did not require ethical approval.

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DATA AVAILABILITY

Extended and supplementary data are available on the Open Science Framework: Effectiveness of link workers providing social prescribing on health outcomes and costs for adult patients in primary care and community settings. A protocol for a systematic review of

the literature. Extended Data.

https://osf.io/p5nv2/#:~:text=DOI%2010.17605/OSF.IO/P5NV2

This project contains the following extended data:

- Appendix 1: PRISMA checklist for "A systematic review of the effectiveness of link workers providing social prescribing on health outcomes and costs for adults in primary care and community settings."
- Appendix 2: Pubmed Search Strategy for Effectiveness of link workers systematic review.docx (PubMed search strategy)
- Appendix 3: GRIPP 2 Form for PPI

- Appendix 4: Risk of Bias tables
 - Appendix 5: GRADE Assessment Sheets
 - Appendix 6: All outcomes table
- <u>https://doi.org/10.17605/OSF.IO/X6V2K</u>

Data are available under the terms of the <u>Creative Commons Zero "No rights reserved" data</u> <u>waiver</u> (CC0 1.0 Public domain dedication).

CONTRIBUTORSHIP STATEMENT

BK was the primary reviewer and designed and conducted the search, reviewed identified texts, extracted data, performed the narrative synthesis and wrote the main draft. AC was a second reviewer of identified texts and for the quality assessment. MOS performed citation searches, verified data extraction and was second reviewer for certainty of evidence assessment. FB provided statistical support, wrote the protocol for meta-analysis and advised on feasibility of same. EOS provided health economics expertise and advised on identification and summary of cost analysis studies. DC provided input into the search protocol, in particular descriptions and definitions of the link worker role. SMS conceptualised the original review questions, was involved in designing methods of the review and acted as a third reviewer. All authors contributed to critique and revisions of draft manuscripts and have approved the final version.

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FIGURE LEGENDS

Figure 1. PRISMA Flow Diagram

Figure 2. Risk of Bias Summary

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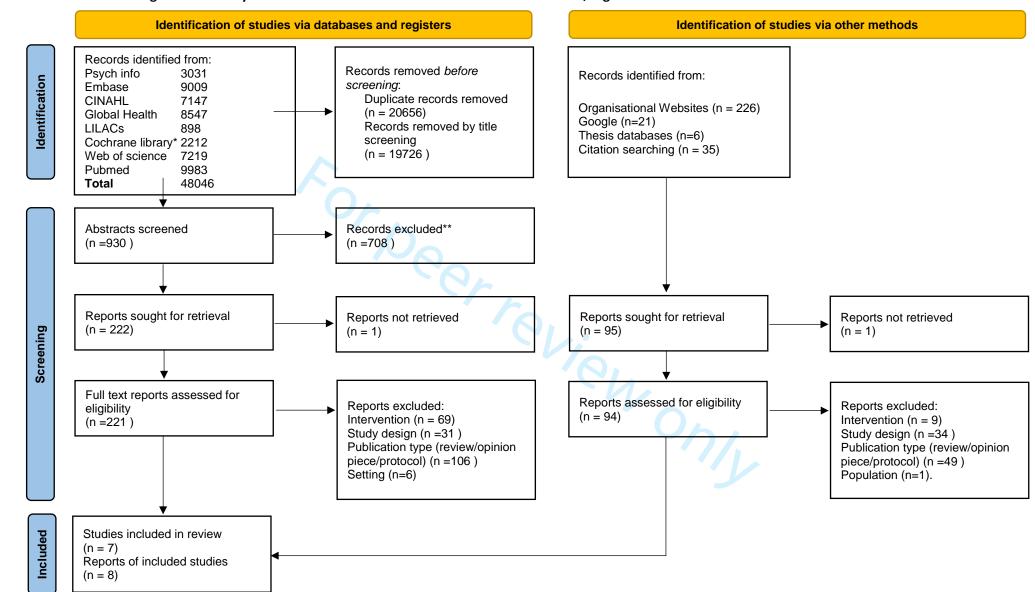
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PRISMA 2020 flow diagram for new systematic reviews which included searches of databases, registers and other sources

* Including Central Registry of Clinical Trials, Clinical Trials.gov and WHO International Clinical Trials Registry Platform ICTRP. EU Clinical Trials registry search returned no results

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Random sequence generation
Allocation concealment
Baseline outcome measurements similar
Baseline characteristics similar
Incomplete outcome data
Knowledge of the allocated interventions adequately prevented
Protection against contamination
Selective outcome reporting
Other risks of bias

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PRISMA 2020 Checklist

3 4 5	Section and Topic	ltem #	Checklist item	Location where item is reported
6	TITLE			
7	Title	1	Identify the report as a systematic review.	Page 1
8	ABSTRACT	1		
9	Abstract	2	See the PRISMA 2020 for Abstracts checklist.	Page 3
10	INTRODUCTION	1		
12	Rationale	3	Describe the rationale for the review in the context of existing knowledge.	Page 5
13	Objectives	4	Provide an explicit statement of the objective(s) or question(s) the review addresses.	Page 6
14	METHODS	1		
15	Eligibility criteria	5	Specify the inclusion and exclusion criteria for the review and how studies were grouped for the syntheses.	Page 6
16 17	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.	Page 9
18	Search strategy	7	Present the full search strategies for all databases, registers and websites, including any filters and limits used.	Page 9
19 20	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.	Page 10
21 22 23	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.	Page 10
24 25 26	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.	Page 8
20 27 28		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.	Page 10
29 30	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.	Page 10
31	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.	Page 20
32 33	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)).	Page 10
34 35		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
36		13c	Describe any methods used to tabulate or visually display results of individual studies and syntheses.	Page 10
37 38		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.	Page 10
39 40		13e	Describe any methods used to explore possible causes of heterogeneity among study results (e.g. subgroup analysis, meta-regression).	N/A
41		13f	Describe any sensitivity analyses conducted to assess robustness of the synthesized results.	N/A
42	Reporting bias	14	Describe any methods used to assess risk of bias due to missing results in a synthesis (arising from reporting biases).	Page 10
43 44 45 46 47	-		For peer review only - http://bmjopen.bmj.com/site/about/guidelines.xhtml	· · · · · · · · · · · · · · · · · · ·

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PRISMA 2020 Checklist

2 3 4 5	Section and Topic	ltem #	Checklist item	Location where item is reported						
6	assessment									
7 8	Certainty assessment	15	Describe any methods used to assess certainty (or confidence) in the body of evidence for an outcome.	Page 10						
9	RESULTS									
10 11	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.								
12		16b	Cite studies that might appear to meet the inclusion criteria, but which were excluded, and explain why they were excluded.	Page 25						
13 14	Study characteristics	17	Cite each included study and present its characteristics.	Page 15						
15 16 17 18	Risk of bias in studies	18	Present assessments of risk of bias for each included study.	Page 17 and extended data						
19 20 21 22 23	Results of individual studies	19	For all outcomes, present, for each study: (a) summary statistics for each group (where appropriate) and (b) an effect estimate and its precision (e.g. confidence/credible interval), ideally using structured tables or plots.	Table 3, Page 20 and see extended data						
24 25 26 27	Results of syntheses	20a	For each synthesis, briefly summarise the characteristics and risk of bias among contributing studies.	Page 18, Summary of findings table						
28 29		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						
30		20c	Present results of all investigations of possible causes of heterogeneity among study results.	N/A						
31		20d	Present results of all sensitivity analyses conducted to assess the robustness of the synthesized results.	N/A						
32 33	Reporting biases	21	Present assessments of risk of bias due to missing results (arising from reporting biases) for each synthesis assessed.	Page 18						
34 35 36 37 38 39	Certainty of evidence	22	Present assessments of certainty (or confidence) in the body of evidence for each outcome assessed.	Page 18 and see extended data GRADE assessment tables						
40	DISCUSSION									
41 42	Discussion	23a	Provide a general interpretation of the results in the context of other evidence.	Page 23						
43		23b	Discuss any limitations of the evidence included in the review.	Page 25						
44 45 46			For peer review only - http://bmjopen.bmj.com/site/about/guidelines.xhtml							

PRISMA 2020 Checklist

Section and Topic	ltem #	checklist item								
	23c	Discuss any limitations of the review processes used.	Page 25							
	23d	Discuss implications of the results for practice, policy, and future research.	Page 26							
OTHER INFORMA	TION									
Registration and	24a	Provide registration information for the review, including register name and registration number, or state that the review was not registered.	Page 3							
protocol	24b	Indicate where the review protocol can be accessed, or state that a protocol was not prepared.	Page 25							
	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.								
Competing interests	26	Declare any competing interests of review authors.								
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.								

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

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Pubmed Search Strategy for "Effectiveness of link workers providing social prescribing on health outcomes and costs for adult patients in primary care and community settings. A protocol for a systematic review of the literature"

Query	ltems found
Search ((((((((("wellbeing program*"[Title/Abstract]) OR "community health advisor"[Title/Abstract]) OR "lay health worker*"[Title/Abstract]) OR "community	
facilitator"[Title/Abstract]) OR community navigator) OR "patient	
navigator"[Title/Abstract]) OR "link-worker"[Title/Abstract]) OR (("linkworker" OR "link worker" OR "link-worker"))) OR "social prescrib*") OR "community health	
worker "[Title/Abstract]) OR "community referral"[Title/Abstract]) Sort by: [pubsolr12]	69
Search "wellbeing program*"[Title/Abstract] Sort by: [pubsolr12]	
Search "community health advisor"[Title/Abstract] Sort by: [pubsolr12]	
Search "lay health worker*"[Title/Abstract] Sort by: [pubsolr12]	3
Search "social referral"[Title/Abstract] Schema: all Sort by: [pubsolr12]	
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Search "community facilitator"[Title/Abstract] Sort by: [pubsolr12]	
Search community navigator Sort by: [pubsolr12]	52
Search "community navigator"[Title/Abstract] Sort by: [pubsolr12]	
Search "patient navigator"[Title/Abstract] Sort by: [pubsolr12]	2
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Search "link-worker"[Title/Abstract] Sort by: [pubsolr12]	
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Search "social prescrib*"[Title/Abstract] Sort by: [pubsolr12]	
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Table 2 Public Patient Involvement reported according to Guidance for Reporting Involvement of Patients and the Public (GRIPP) 2 Short Form

1: Aim

The aim of the PPI was to provide the perspective of people living with multimorbidity on the implications of the results of a systematic review on the effectiveness of social prescribing link workers.

2: Methods

An advisory panel of six people living with multimorbidity was recruited via existing networks of students on a PhD program in multimorbidity. The panel meets quarterly to provide input on issues brought to them by the PhD students. The members are voluntary but receive a voucher to acknowledge their time and associated costs attending. The panel had been meeting for three years prior to providing input on this study. The meeting at which this study was discussed took place online, lasted two hours in total including a break and was facilitated by BK and 2 other PhD students on the multimorbidity PhD program. There was one hour dedicated to discuss the systematic review with them.

The group received a 500 word plain language summary of the findings of the systematic review one week in advance of the meeting. BK also summarised the methods and findings in a powerpoint presention during the meeting. The group divided into small groups and discussed the implications for practice, policy and future research and fed back to a plenary discussion afterwards.

3: Study results

The group were surprised about the limited evidence and wondered if the outcomes had been appropriate or asked in the right way. They agreed that quality of life was a good overall outcome and felt hospitalisations would matter from the taxpayer perspective. Determining a set of outcomes was felt to be beyond the time available and we agreed it would involve a separate piece of research work. As individuals they did not feel that social prescribing needed to be presented as an experimental intervention, as many interventions or medications may not work for an individual and they felt their healthcare provider would recommend what they thought might work for them, but acknowledged this wasn't guaranteed in the case of social prescribing. They felt policy makers should roll social prescribing out on a pilot basis over a number of years and evaluate it along the way. In terms of targeting specific groups the PPI group felt that social prescribing should be available to whoever might need it, but that it would have to be flexible to allow longer support for those with more complex needs.

Table 2 Public Patient Involvement reported according to Guidance for Reporting Involvement of Patients and the Public (GRIPP) 2 Short Form

4: Discussion and conclusions

The group clearly came to the meeting with a positive perception of social prescribing and felt it was a great idea that should be tested. Despite this possible lack of objectivity, the group broadly agreed with the conclusions that the research team had made. Their input highlighted the need for a set of core outcomes for social prescribing with input from potential beneficiaries. They took a more flexible approach on recommendations around specific target groups and intervention intensity, preferring an individually tailored intervention rather than limit access to those with the highest need.

5: Reflections/critical perspective

While the lack of cost effectiveness evidence was highlighted the idea of opportunity cost was not discussed. Presenting an intervention with no cost evidence base against one with cost evidence base however would be an impossible comparison. It is hard in a group format to check understanding of what has been presented, but given that conclusions were aligned with those of the research team it is reasonable to assume the group understood what was presented and asked of them.

review only

HRQOL Allocation concealme nt	Baseline outcome measureme nts similar	Baseline characteris tics similar	Incomple te outcome data	Knowledge of the allocated interventions adequately prevented during the study	Protection against contaminatio n	Selective outcome reporting	Other risks of bias	Overall Judgeme nt per study	Overall judgeme nt for outcome
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team or	were		were						
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patient or	"Low risk" if	characterist	on and	were assessed blindly, or the	community,	there is no e	evidence		
episode of	imbalanced	ics of the	control	outcomes are objective, e.g.	institution or	that outcom	ies were	See Table	See Table
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ion scheme, an on-site computer system or sealed opaque envelopes were used.	Analysis of covariance).		less than the effect size i.e. unlikely to overturn the study result)	5		
Controlled before- after studies should be scored "High risk"	Score "High risk" if important differences were present and not adjusted for in analysis.	Score "High risk" if there is no report of characterist ics in text or tables or if there are differences between control and interventio n providers. Note that in some cases imbalance in patient characterist ics may be due to	Score "High risk" if missing outcome data was likely to bias the results	Score "High risk" if the outcomes were not assessed blindly.	Score "High risk" if it is likely that the control group received the intervention (e.g. if patients rather than professionals were randomised).	Score "High risk" if some important outcomes are subsequen tly omitted from the results.

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the paper.	risk".	presented).		specified in the paper	practices	synthesis.

			were allocated to intervention or control)			
Low risk: there were slighly more Low risk: baseline centralised randomisat ion scheme baseline outcome measures were similar vs 3.7%	Low risk: 79% ad 81% f/up in int and control and multiple imputatio n technique s used for missing data	Unclear risk: not possible to blind to intervention and outcome was patient reported, although RAs collecting data were blinded	Unclear risk: randomisatio n was at the patient level, however unlikely controls received the intervention, but not explicitedly stated whether intervention was avaialble outside the trial setting	Low risk: all outcomes are reporoted	Unclear:T he authors offer commeric al consulting services on setting up similar CHW interventi ons since 2018 after this publicatio n	Low risk: low risk of bias in 6/9 areas, and other areas unlikely to have significan t impact on ROB. While the paper is at risk of overly presentin g positive fidnings all outcomes are reported

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								along with statistical significan ce.	
Low risk: centralised randomisat ion scheme	Low risk: Baseline outcome measures were similar	Low risk: Interventio n group were more likely to be empolyed 20% vs 8%	Low risk: 88% and 87% complete data, multiple imputatio n	Unclear risk: not possible to blind to intervention and outcome was patient reported, although RAs collecting data were blinded	Unclear risk: randomisatio n was at the patient level, however unlikely they received controls received the intervention, so not a major factor for overall ROB	Low risk: all outcomes are reported	Unclear- The authors offer commeric al consulting services on setting up similar CHW interventi ons	Low risk: low risk of bias in 6/9 areas, and other areas unlikely to have significan t impact on ROB. While the paper is at risk of overly presentin g positive fidnings all outcomes are reported along with statistical	Summary Judgeme nt RCTs: Low risk of bias

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before-	differences	in some	if missing		(e.g. if	are	
after	were	cases	outcome		patients	subseque	
studies should be	present and not	imbalance in patient	data was likely to	Score "High risk" if the	rather than professionals	ntly omitted	
scored	adjusted for	characteris	bias the	outcomes were not assessed	were	from the	
	aujusteu IUI	characteris	bias the	outcomes were not assessed	WEIE		

due to recruitmen t bias whereby the provider was responsible for recruiting patients into the trial.	
recruitmen t bias whereby the provider was responsible for recruiting patients into the	
t bias whereby the provider was responsible for recruiting patients into the	
whereby the provider was responsible for recruiting patients into the	
the provider was responsible for recruiting patients into the	
provider was responsible for recruiting patients into the	
was responsible for recruiting patients into the	
for recruiting patients into the	
for recruiting patients into the	
patients into the	
into the	
trial.	
Score Score	
"Unclear "Unclear	
risk" if risk" if not	
professionals specified	
were in the	
allocated paper. For	
within a further	
Score clinic or informatio	
"Unclear Score practice and n see	
risk" if it is "Unclear it is possible Chapter	
not clear in risk" if not that 13 of the If the paper specified in communicati Cochrane	
randomised (e.g. the paper on between handbook: trials have characteris (Do not intervention Assessing	
no baseline tics are assume and control risk of bias	
. Score measure of mentioned 100% professionals due to	
"Unclear outcome, in text but follow up could have missing	
risk" if not score no data unless occurred results in	
specified in "Unclear were stated Score "Unclear risk" if not (e.g. a	
the paper. risk". presented). explicitly). specified in the paper physicians synthesis.	

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					within practices were allocated to intervention or control)				
					Unclear risk:				
					randomisatio				
		low risk:			n was at the				
		control			patient level				
		were	Low risk:		within				
		slighlty	similar		practices,			Low risk:	
		more likely	amounts of		unclear if the			low risk	
		to be male	missing		intervention		Low risk:	in 7 of 9	
Low risk:		and	data in		was availale		No other	areas,	
sealed		younger	both arms,		outside the		risks	blinding	
opaque		but	at 67%,		trial-		identified.	very	
envelopes,		otherwise	however		suggestion it		Funded	challengi	
while there	Low risk: no	comparabl	this		was already		by Avon	ng given	
was an	important	e, this had	reduced		running, so		health	nature of	
early error-	differences	no impact	power to		people may		autothirty	interventi	
this was	and	on reuslts	detect a		have	Low risk:	, no	on and	Summary
identifed	baseline	when	difference	High risk: due to the nature	received it	all	competin	were	Judgeme
and those	scores were	adjusted	as required	of the intervention not	before	outcomes	g	using	nt RCTs:
participant	adjusted for	for in	sample size	possible to blind participants	entering the	were	interests	validated	low risk
s excluded	in analysis	analysis	was 161	and self reported outcome	trial	reported	declared.	PROMs	of bias

High risk:	Low risk: significant differences in baseline scores, althouhg linear regression model used which would have corrected for baseline	High risk: significant differences in living arrnageme nt, education, work status, adjustment s for same did not significantl y alter results, suggesting other unknown	High risk: control follow up 43%, int 35%, no data on whether those LTFup had different baseline characteris	High risk: due to the nature of the intervention not possible to assess outcomes blindly and patients self	Low risk: the service was not available in areas where the	Low risk: all outcomes were	Low risk: No other risks identified. Funded by DoH, independ ent research group, no competin g interests	High risk: high risk in 5 of 9	
CBA High risk: CBA and evidence of	scores Low risk: significant differences in baseline	imbalances	tics	reported	control lived	reported	declared. Low risk: No other	areas	
selection bias with those from	scores, although linear	High risk: differences in baseline	Low risk:				risks identified. Funded		
more	regression	characteris	low rates				by NHS		
deprived	model used	tics	of missing		Low risk: the		Hackney	High risk:	
backgroun	which	although	data, 84%	Unclear risk: due to the	service was	Low risk:	CCG, no	high risk	
ds not	would have	these were	follow up	nature of the intervention	not available	all	competin	or	
being	corrected	adjusted	interventio	not possible to blind	in areas	outcomes	g	unclear	
offered	for baseline	for in	n and 96%	participants and unclear	where the	were	interests declared.	risk in 4	
entry	scores	analysis	control	how follow up collected	control lived	reported	declared.	of 9 areas	

No other risks differences in baselineHigh risk: differences in baselineHigh risk: characterisHigh risk: risks characterisNo other risks identified. Funded by NHSNo other risks all Funded by NHSNo other risks all Funded by NHSNo other risks all Funded by NHSNo other risks all risks all riskUnclear risk: offferences in baseline practices randomly explicitly but howInbaseline these were adjusted for inHigh risk: due to the nature of the intervention not possible to assess outcomes blindly and patients self in areas where theNo other risk these were all outcomes grHigh or risk of risk of the reported, statisticians wereLow risk: the service was outcomes where the wereNo other risk of the reported, statisticians wereNo other the wereNo other risk of the reported, statisticians wereNo other the reported, statisticians wereNo other the reported, statisticians wereNo other the wereNo other the risk of the reported, statisticians wereNo other the reported, statisticians wereNo other the reported, statisticians wereNo other the reported, statisticians wereNo other the reported, statisticians wereNo othe								Summ Judge nt nR0 high r of bia due to difficu
High risk: differences significantHigh risk: differences in baselineHigh risk: differences tio characterisHigh risk: dust characterisHigh risk: dust characterisHigh risk: dust characterisHigh risk: dust dust dust dust dust 						Low risk: No other		in conce
Low risk:in baselinein baselineFunded, bSignificantcharacteristicsHigh risk: due to the natureLow risk: theScotland,espracticesin baseline-althoughof the intervention notservice wasLow risk: noHigh orcorandomlyexplicitlythese wereLow risk:possible to assess outcomesnot availableallcompetinuncleargrbut howfor infor inup int, 92%reported, statisticians wereoutcomesgrisk ofnonot statedanalysiscontrolblindedcontrol livedreporteddeclared.of 9 areased		High risk:						
Unclear risk: offferences in baseline- explicitly not statedcharacteris ticscharacteris 								alloca
risk: differences in baseline- practices in baseline- explicitly explicitly these were adjusted for in for in analysis control bindly and patients self not stated analysis control bindly and patients self of the index of the i								, base
practices randomly assigned but how not statedin baseline- explicitly corrected 	-							differ
randomly assigned but how not stated analysis these were for in analysis these were adjusted for in analysis these were adjusted for in analysis these were adjusted for in analysis these were adjusted for in analysis these were control these these were blindly and patients self reported, statisticians were blinded these th								es in
assigned but how not stated analysis analysis 26% follow not stated bindly and patients self in areas control bindly and patients self in areas control bindly and patients self in areas control lived reported declared. risk of interests interests declared. of 9 areas ed								contr
but how for in analysis for in analysis control up int, 92% reported, statisticians were control lived reported declared. bias in 4 rates of 9 areas ed				and the second				group
not stated analysis analysis control blinded control lived reported declared. of 9 areas ed		•				-		non
- V			• •					rando
		analysis	control	blinded		declared.	of 9 areas	ed o

	Score "Low	Score							
	risk" if the	"Low risk"		Score					
	unit of	if		"Low risk"					
	allocation	performan		if missing					
	was by	ce or		outcome					
	institution,	patient		measures					
	team or	outcomes		were					
	professiona	were		unlikely					
	l and	measured		to bias					
	allocation	prior to		the					
	was	the		results					
	performed	interventi		(e.g. the					
	on all units	on, and no		proportio					
	at the start	important		n of					
	of the	difference		missing					
	study; or if	s were		data was					
	the unit of	present		similar in	Score "Low risk" if				
	allocation	across		the	the authors state				
	was by	study		interventi	explicitly that the				
Score "Low	patient or	groups. In		on and	primary outcome				
risk" if a	episode of	randomise		control	variables were	Score "Low			
random	care and	d trials,		groups or	assessed blindly, or	risk" if			
component	there was	score	Score "Low	the	the outcomes are	allocation			
in the	some form	"Low risk"	risk" if	proportio	objective, e.g.	was by			
sequence	of	if	baseline	n of	length of hospital	community,	Score "Low risk" if	See	
generation	centralised	imbalance	characteristi	missing	stay. Primary	institution	there is no evidence	Table	с. т.
process is	randomisati	d but	cs of the	data was	outcomes are those variables that	or practice	that outcomes were	8.7.a of	See Ta
described	on scheme,	appropriat	study and	less than the effect		and it is	selectively reported	EPOC	8.7.a o EPOC
(e.g. Poforring to	an on-site	e adjusted	control providers	size i.e.	correspond to the	unlikely that the control	(e.g. all relevant outcomes in the	summar	
Referring to a random	computer system or	analysis was	are	unlikely	primary hypothesis or question as		methods section are	y risk of bias for	summa risk of
number	sealed	was performed	reported	to	defined by the	group received the	reported in the	guidanc	bias fo
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	envelopes were used.	Analysis of covariance		the study result)				
).						
			Score "High					
Score "High			risk" if there					
risk" when			is no report of					
а			characteristi					
nonrandom method is			cs in text or tables or if					
used (e.g.			there are			Score "High		
performed			differences			risk" if it is		
by date of			between			likely that		
admission).		Score	control and			the control		
Non-		"High risk"	intervention	Coord		group	Score	
randomised trials and		if important	providers. Note that in	Score "High		received the intervention	"High risk" if some	
controlled	Controlled	difference	some cases	risk" if		(e.g. if	important	
before-	before-	s were	imbalance	missing		patients	outcomes	
after	after	present	in patient	outcome		rather than	are	
studies	studies	and not	characteristi	data was	Score "High risk" if	professional	subsequen	
should be	should be	adjusted	cs may be	likely to	the outcomes were	s were	tly omitted	
scored	scored	for in	due to	bias the	not assessed	randomised)	from the	

			bias				
			whereby				
			the provider				
			was				
			responsible				
			for				
			recruiting				
			patients				
			into the				
			trial.				
						Casua	
						Score	
					revio	"Unclear risk" if	
						professional	Score
						s were	"Unclear
						allocated	risk" if not
						within a	specified
						clinic or	in the
				Score		practice and	paper. For
			Score	"Unclear		it is possible	further
			"Unclear	risk" if		that	informatio
		If	risk" if it is	not		communicat	n see
		randomise	not clear in	specified		ion between	Chapter 13
		d trials	the paper	in the		intervention	of the
		have no	(e.g.	paper (Do		and control	Cochrane
		baseline	characteristi	not		professional	handbook:
		measure	cs are	assume		s could have	Assessing
Score	. Score	of	mentioned	100%		occurred	risk of bias
"Unclear	"Unclear	outcome,	in text but	follow up		(e.g.	due to
risk" if not	risk" if not	score	no data	unless	Score "Unclear risk"	physicians	missing
specified in	specified in	"Unclear	were	stated	if not specified in	within	results in a
the paper.	the paper.	risk".	presented).	explicitly).	the paper	practices	synthesis.

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						were allocated to intervention or control)			
Unclear			<u>.</u>						
risk-									
register of									
all >75s									
living alone									Low
compiled									risk-
and						Low risk-			while
arranged			High risk-			while			some
into deciles			characterisit			randomised			areas
by social			ics such as			at patient			unclear
contact			age, gender,			level it			due to
score and			education			seems very	Louriele		lack of
randomly allocated			etc not reported,			unlikely control	Low risk- all	Low	reportin a
into control		Low risk-	only	Low risk-		group would	outcomes	risk-	g, unlikely
and		reported	baseline	similar		have recived	reporte	pulicly	to
experiment	Unclear	and no	outcome	loss to	Unclear risk-	intervention	din	funded,	affect
al arms-	risk-	signficant	measures	follow up	participants would	as it was not	baseline	no	outcom
how	Method of	difference	referred to	in both	be aware of their	available	were	competi	e, low
randomised	randomisati	s in	as	arms,	allocation, although	other than	reported	ng	risk in 5
not	on not	baseline	characteristi	with	interview assesors	through the	at follow	interests	of 9
specified	sepcified	outcomes	CS	reasons	were blinded	trial	up	declared	areas

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Low risk: Sequenced numbered envelopes prepared by research	Low risk: sealed opaque envelopes, howevere reported that there were isssues in ealr y stages and	Low risk: no important difference s and baseline scores were	low risk: control were slighlty more likely to be male and younger but otherwise comparable , this had no impact on reuslts	Low risk: similar amounts of missing data in both arms, at 67%, however this reduced power to detect a difference as required	High risk: due to the nature of the intervention not possible to assess	Unclear risk: randomisati on was at the patient level within practices, unclear if the intervention was running in the local area so possible patients could have	Low risk: all	Low risk: No other risks identifie d. Funded by Avon health autothir ty, no competi ng	Low risk:	Low risk: Both RCTs mainly low risk- risks arise from poor reporting and
team, block randomisati	some patients	adjusted for in	when adjusted for	sample size was	outcomes blindly and patients self	accessed it outside the	outcomes were	interests declared	low risk in 7 of 9	nature of interventi
on	excluded	analysis Low risk:	in analysis	161	reported	trial	reported		areas	on
	High risk: CBA and evidence of selection bias with those from more deprived	significant difference s in baseline scores, although linear regression model	High risk: differences in basleine characteristi	Low risk: low rates of missing data, 84% follow up	Unclear risk: due to the nature of the intervention cannot	Low risk: the service was	Low risk:	Low risk: No other risks identifie d. Funded by NHS Scotland	High risk: bigb or	High risk:
High risk: controlled before after study	deprived background s not being offered entry	model used which would have	characteristi cs although these were adjusted for in analysis	follow up interventi on and 96% control	and not stated how outcomes were assessed	not available in areas where the control lived	Low risk: all outcomes were reported	scotland , no competi ng interests	high or unclear risk in 4 of 9 areas	only one CBA and it is at high risk of bias

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		corrected for baseline					declared		
		scores							
									Low ris
									Evidenc
								Overall:	from tv RCTs
								overail.	iters
Physical Activi	tv								
Filysical Activi	-								
	Score "Low	Score		Score "Low					
	risk" if the	"Low risk"		risk" if					
	unit of	if		missing					
	allocation	performa		outcome	Score "Low risk" if				
	was by	nce or		measures	the authors state				
	institution,	patient		were	explicitly that the				
Score "Low	team or	outcomes		unlikely to	primary outcome				
risk" if a	professiona	were		bias the	variables were	Score "Low			
random	land	measured		results (e.g.	assessed blindly,	risk" if			
component	allocation	prior to		the	or the outcomes	allocation			
in the	was	the	Score "Low	proportion	are objective, e.g.	was by			
sequence	performed	interventi	risk" if	of missing	length of hospital	community,		See	
generation	on all units	on, and	baseline	data was	stay. Primary	institution	Score "Low risk" if	Table	
process is	at the start	no	characterist	similar in	outcomes are	or practice	there is no evidence	8.7.a of	
described	of the	important	ics of the	the	those variables	and it is	that outcomes were	EPOC	See Ta
(e.g.	study; or if	difference	study and	interventio	that correspond to	unlikely that	selectively reported	summa	8.7.a o
Referring	the unit of	s were	control	n and	the primary	the control	(e.g. all relevant	ry risk	EPOC
to a	allocation	present	providers	control	hypothesis or	group	outcomes in the	of bias	summa
random	was by	across	are	groups or	question as	received the	methods section are	for	risk of
			ام مشتر میں	tha	defined by the		reported in the results	guidana	hin fr
number	patient or	study	reported	the	defined by the	intervention	reported in the results	guidanc	bias fo

	care and	randomis		of missing				
	there was	ed trials,		data was				
	some form	score		less than				
	of	"Low risk"		the effect				
	centralised	if		size i.e.				
	randomisat	imbalance		unlikely to				
	ion	d but		overturn				
	scheme, an	appropria		the study				
	on-site	te 🖉		result)				
	computer	adjusted						
	system or	analysis						
	sealed	was						
	opaque	performe						
	envelopes	d (e.g.						
	were used.	Analysis						
		of						
		covarianc						
		e).						
Score "High			Score "High					
risk" when			risk" if			Score "High		
а			there is no			risk" if it is		
nonrandom			report of			likely that		
method is		Score	characterist			the control	Score	
used (e.g.		"High	ics in text			group	"High risk"	
performed		risk" if	or tables or			received the	if some	
by date of		important	if there are	Score		intervention	important	
admission).	Controlled	difference	differences	"High risk"		(e.g. if	outcomes	
Non-	before-	s were	between	if missing		patients	are	
randomise	after	present	control and	outcome		rather than	subseque	
d trials and	studies	and not	interventio	data was	Score "High risk" if	professional	ntly	
controlled	should be	adjusted	n providers.	likely to	the outcomes	s were	omitted	
before-	scored	for in	Note that in	bias the	were not assessed	randomised	from the	
after	"High risk"	analysis.	some cases	results	blindly.	1	results.	

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studies			imbalance				
should be			in patient				
scored			characterist				
"High risk".			ics may be				
			due to				
			recruitment				
			bias				
			whereby				
			the				
			provider				
			was				
			responsible				
			for				
			recruiting				
			patients				
			into the				
			trial.			<u> </u>	
						Score	Score
						"Unclear	"Unclear
			Coore			risk" if	risk" if not
			Score	(a a r a		professional	specified
		lf	"Unclear risk" if it is	Score "Unclear		s were allocated	in the
		randomis	not clear in	risk" if not		within a	paper. For further
		ed trials	the paper	specified in		clinic or	informatio
		have no	(e.g.	the paper		practice and	n see
		baseline	characterist	(Do not		it is possible	Chapter
		measure	ics are	assume		that	13 of the
Score	. Score	of	mentioned	100%		communicat	Cochrane
"Unclear	"Unclear	outcome,	in text but	follow up	Score "Unclear	ion between	handbook:
risk" if not	risk" if not	score	no data	unless	risk" if not	intervention	Assessing
specified in	specified in	"Unclear	were	stated	specified in the	and control	risk of bias

			С О 4			s could have occurred (e.g. physicians within practices were allocated to intervention or control)	missing results in a synthesis.		
Unclear risk- register of all >75s									
living alone									Low
compiled						Low risk-			risk-
and						while			while
arranged			High risk-			randomised			some
into deciles			characterisi			at patient			areas
by cosial			tics such as			level it			unclear
contact			age,			seems very			due to
score and			education			unlikely			lack of
randomly			etc not			control	Low risk-		reporti
allocated		Lowrick	reported,			group would have	all	Lour state	ng, uplikalı
into control and		Low risk-	only baseline		Unclear risk-	recived	outcomes	Low risk-	unlikely to
experiment	Unclear	reported and no	outcome	Low risk-	participants would	intervention	reporte din	pulicly funded,	affect
al arms-	risk-	signficant	measures	similar loss	be aware of their	as it was not	baseline	no	outcom
how	Method of	difference	referred to	to follow	allocation,	available	were	competin	e, low
randomise	randomisat	s in	as	up in both	although interview	other than	reported	g	risk in 5
d not	ion not	baseline	characterist	arms, with	assesors were	through the	at follow	в interests	of 9
anot	sepcified	Suscinc	characterist		blinded	trial		declared	015

Low risk: Sequenced numbered envelopes prepared by research team, block randomisat	Low risk: sealed opaque	Low risk: no important difference s and baseline scores were adjusted for in	low risk: control were slighlty more likely to be male and younger but otherwise comparable , this had no impact on reuslts when adjusted for	Low risk: similar amounts of missing data in both arms, at 67%, however this reduced power to detect a difference as required sample size	Unclear risk: due to the nature of the intervention not possible to blind participants but assessors	Unclear risk: randomisati on was at the patient level within practices, unclear if it participants could self refer to the project which was running in the local	Low risk: all outcomes were	Low risk: No other risks identified. Funded by Avon health autothirty , no competin g interests	Low risk: low risk in 7 of 9	Overall RCTs:Low risk, mos evidence comes from RCT at low ris
ion	envelopes	analysis	in analysis	was 161	blinded	area	reported	declared.	areas	of bias
		low risk: significant difference s in baseline scores, althouhg linear regression model used	High risk: significant differences in living arrangeme nt, education, work status, adjustment s for same	High risk: control follow up 43%, int 35%, no data on whether those	High risk: due to the nature of the	Low risk: the service		Low risk: No other risks identified. Funded by DoH, independ ent research	High	
		which	did not	LTFup had	intervention not	was not	Low risk:	group, no	risk:	
High risk:		would	significantly	different	possible to assess	available in	all	competin	high	
controlled		have	alter	baseline	outcomes blindly	areas where	outcomes	g	risk in 5	
before	High risk:	corrected	results,	characteris	and patients self	the control	were	interests	of 9	
	CBA	for	suggesting	tics	reported	lived	reported	declared.		

	baseline scores	other unknown imbalances							
High risk: randomly controlled before after study not stated	Low risk: significant difference s in baseline- explicitly corrected for in analysis	High risk: differences in baseline characterist ics although these were adjusted for in analysis	Low risk: 76% follow up int, 92% control	High risk: due to the nature of the intervention not possible to assess outcomes blindly and patients self reported	Low risk: the service was not available in areas where the control lived	Low risk: all outcomes were reported	Low risk: No other risks identified. Funded by NHS Hackney CCG, no competin g interests declared.	High risk: High or unclear risk in 4 of 9 areas	Overall nRCTs: High Risk: One study at very high risk of bias and one at high risk of bias Overall: High risk due to inclusion of CBAs, without these low risk, altohugh some concerns about allocation concealm ent that is inherent

									to the interver on
lealth Care U			C						
	Score "Low	Score		Score					
	risk" if the	"Low risk"		"Low					
	unit of	if		risk" if					
	allocation	performa		missing					
	was by	nce or		outcome					
	institution,	patient		measures					
	team or	outcomes		were	Score "Low risk" if				
	professiona I and	were		unlikely	the authors state				
Score "Low	allocation	measured		to bias the	explicitly that the				
risk" if a	was	prior to the		results	primary outcome variables were	Score "Low			
random	performed	interventi		(e.g. the	assessed blindly,	risk" if			
component	on all units	on, and		proportio	or the outcomes	allocation			
in the	at the start	no	Score "Low	n of	are objective, e.g.	was by			
sequence	of the	important	risk" if	missing	length of hospital	community,			See
generation	study; or if	difference	baseline	data was	stay. Primary	institution	Score "Low risk" if		Tab
process is	the unit of	s were	characterist	similar in	outcomes are	or practice	there is no evidence		8.7.
described	allocation	present	ics of the	the	those variables	and it is	that outcomes were	See Table	EPC
(e.g.	was by	across	study and	interventi	that correspond to	unlikely that	selectively reported	8.7.a of	sum
Referring	patient or	study	control	on and	the primary	the control	(e.g. all relevant	EPOC	ry ri
to a	episode of	, groups. In	providers	control	hypothesis or	group	outcomes in the	summary	, of b
random	care and	randomis	are	groups or	question as	received the	methods section are	risk of bias	for
number	there was	ed trials,	reported	the	defined by the	intervention	reported in the results	for	guio
table).	some form	score	and similar.	proportio	authors.		section).	guidance	e

	of	"Low risk"		n of				
	centralised	if		missing				
	randomisat	imbalance		data was				
	ion	d but		less than				
	scheme, an	appropria		the effect				
	on-site	te		size i.e.				
	computer	adjusted		unlikely				
	system or	analysis		to				
	sealed	was 🧹		overturn				
	opaque	performe		the study				
	envelopes	d (e.g.		result)				
	were used.	Analysis						
		of						
		covarianc						
		e).	- "…					
c //////			Score "High					
Score "High			risk" if					
risk" when			there is no					
a a			report of			Coorto (11) ah		
nonrandom method is			characterist ics in text			Score "High risk" if it is		
used (e.g.			or tables or			likely that		
performed		Score	if there are			the control	Score	
by date of		"High	differences			group	"High risk"	
admission).		risk" if	between	Score		received the	if some	
Non-		important	control and	"High		intervention	important	
randomise	Controlled	difference	interventio	risk" if		(e.g. if	outcomes	
d trials and	before-	s were	n providers.	missing		patients	are	
controlled	after	present	Note that in	outcome		rather than	subseque	
before-	studies	and not	some cases	data was	Score "High risk" if	professional	ntly	
after	should be	adjusted	imbalance	likely to	the outcomes	s were	omitted	
studies	scored	for in	in patient	bias the	were not assessed	randomised	from the	
should be	"High risk"	analysis.	characterist	results	blindly.).	results.	

scored			ics may be				
"High risk".			, due to				
0			recruitment				
			bias				
			whereby				
			the				
			provider				
			was				
			responsible				
			for				
			recruiting				
			patients				
			into the				
			trial.				
						Score	
						"Unclear	Score
						risk" if	"Unclear
						professional	risk" if not
				Score		s were	specified
				"Unclear		allocated	in the
			Score	risk" if		within a	paper. For
			"Unclear	not		clinic or	further
		lf	risk" if it is	specified		practice and	informatio
		randomis	not clear in	in the		it is possible	n see
		ed trials	the paper	paper (Do		that	Chapter
		have no	(e.g.	not		communicat	13 of the
		baseline	characterist	assume		ion between	Cochrane
		measure	ics are	100%		intervention	handbook:
Score	. Score	of	mentioned	follow up		and control	Assessing
"Unclear	"Unclear	outcome,	in text but	unless	Score "Unclear	professional	risk of bias
risk" if not	risk" if not	score	no data	stated	risk" if not	s could have	due to
specified in	specified in	"Unclear	were	explicitly)	specified in the	occurred	missing

					physicians within practices were allocated to intervention or control)	a synthesis.		
Unclear risk-								
register of								
all >75s living alone								
compiled					Low risk-			
and					while			
arranged		High risk-			randomised			
into deciles		characterisi			at patient			
by cosial		tics such as			level it			
contact		age,			seems very			t avve state
score and randomly		education etc not			unlikely control	Low risk-		Low risk- while some
allocated		reported,		Low risk-	group	all		areas
into control	Low risk-	only	Low risk-	participants would	would have	outcomes		unclear due
and	reported	baseline	similar	be aware of their	recived	reporte	Low risk-	to lack of
experiment Unclear	and no	outcome	loss to	allocation,	intervention	din	pulicly	reporting,
al arms- risk-	signficant	measures	follow up	although interview	as it was not	baseline	funded,	unlikely to
how Method of	difference	referred to	in both	assesors were	available	were	no	affect
randomise randomisat		as	arms,	blinded. HCU was	other than	reported	competing	outcome,
d not ion not	baseline	characterist	with	self reported to	through the	at follow	interests	low risk in
specified sepcified	outcomes	ics	reasons	assessors	trial	up	declared	5 of 9 areas

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Low risk: Sequenced numbered envelopes prepared by research team, block randomisat	Low risk: sealed opaque	Low risk: no important difference s and baseline scores were adjusted for in	low risk: control were slighlty more likely to be male and younger but otherwise comparable , this had no impact on reuslts when adjusted for	Low risk: similar amounts of missing data in both arms, data on HCU available	Unclear risk: not reported if outcome assessors were blinded or how health care utilisation data	Unclear risk: randomisati on was at the patient level within practices. GPs were more interested in social intervention	Low risk: all outcomes were	Low risk: No other risks identified. Funded by Avon health autothirty, no competing interests	Low risk: low risk in
ion Low risk: conputeris	envelopes	analysis	in analysis	for 157	was obtained	s Low risk: randomisati	reported	declared.	7 of 9 areas Low risk: low risk of
ed generated algorithm						on was at the patient level,		The	bias in 7/9 areas, and other areas
with blocks <i>,</i> performed						however unlikely they		authors offer commeric	unlikely to have significant
by study team			Low risk: there were	Low risk:		received controls		al consulting	impact on ROB. While
member not		Low risk: Baseline	slighly more participants	100% data	Low risk- Hospitalisation	received the intervention	Low risk:	services on setting	the paper is at risk of
assocaited	Low risk:	outcome	of hispanic	available	data from routine	, so not a	all	up similar	overly
with	centralised	measures	ethnicity in	for health	sources and	major factor	outcomes	CHW	presenting
outcomes	randomisat ion scheme	were similar	one arm-0 vs 3.7%	care utilisation	assessors/statistici ans were blinded.	for overall ROB	are	interventi	positive fidnings all
assessment	ion scheme	SITTIIdf	VS 3.7%	utilisation	ans were blinded.	RUB	reporoted	ons	fidnings all

									outcomes are reported along with statistical significance Low risk-	
Low risk:						High risk:			low risk 7/9	
conputeris						randomisati			areas and	
ed						on was at			other	
generated						the patient level,		The	domains such as	
algorithm with						however		authors	allocation	
blocks,						unlikely		offer	inherent to	
performed						they		commeric	nature of	
by study						received		al	interventio	
team			Low risk:	Low risk:		controls		consulting	n or	
member		Low risk:	Interventio	100%	Low risk-	received the	1	services	contaminat	
not assocaited	Low risk:	Baseline outcome	n group were more	data available	Hospitalisation data from routine	intervention , so not a	Low risk: all	on setting up similar	ion due to patient	Overall RCTs:
with	centralised	measures	likely to be	for health	sources and	major factor	outcomes	CHW	level	Low
outcomes	randomisat	were	empolyed	care	assessors/statistici	for overall	are	interventi	randomisat	risk of
assessment	ion scheme	similar	20% vs 8%	utilisation	ans were blinded.	ROB	reporoted	ons	ion	bias
		High risk:	High risk:	Low risk:				Low risk:		Overall
		significant	significant	use of		Low risk:		No other		nRCTs:
		difference	differences	anonymis		the service	Louriele	risks identified.		High risk of
High risk:		s in baseline	in living arrnageme	ed GP data		was not available in	Low risk: all	Funded by		bias
controlled		scores,	nt,	meant no	Low risk-	areas where	outcomes	DoH,	High risk:	due to
before	High risk:	and	education,	missing	anonymised data	the control	were	independe	high risk in	control
after study	CBA	controls	work	data	frm GP records	lived	reported	nt	4 of 9 areas	mismat

werestatus,drawnadjustmentfroms for samesamedid notpracticesignificantlypopulatioaltern, but notresults,deemedsuggestingsuitableotherforunknownreferralimbalances(differenttocontrolsfor other	research group, no competing interests declared.	ch in particu ar
outcomes)	en on free of the second secon	Overal Low risk of bias fo RCTs, only 1 CBA at high risk

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Social prescribing link workers compared to usual care for people with multimorbidity

Patient or population: people with multimorbidity

Setting: Primary Care

Intervention: social prescribing link workers

Comparison: usual care

Outcomes	Impact	№ of participants (studies)	Certainty of th evidence (GRADE)
Health related quality of life (RCTs) assessed with: SF-12 HRQoL measure follow-up: range 6 months to 9 months	Two RCTs reported no difference in the physical health component of the SF-12. One of these trials showed a postive impact on the mental health component of the SF-12 ($2.3 \text{ vs} - 0.2 \text{ p} = 0.008$.), but the other showed no difference.	894 (2 RCTs)	⊕⊕⊖C Low ^{a,b}
Health related quality of life (CBAs) assessed with: EQ-5D and SF-12 HRQoL measures follow-up: range 3 months to 9 months	One CBA reported no difference in the MCS or PCS of the SF-12. The same trial reported a small change in the EQ-5D-3L in favour of the control group (-0.09 (-0.14 to -0.03) p=<0.001). The second CBA found no difference in the EQ-5D-5L.	1292 (2 observational studies)	⊕⊖⊖⊂ Very low ^c
Mental Health (RCTs) assessed with: Mental Health as assessed by the hospital anxiety depression scale follow-up: mean 4 months	One RCT found an improvement in the anxiety component of the HADS (-1.9 (-3.0 to - 0.7)a p=0.002) , but not the depression component (-0.9 (-1.9 to 0.2) p=0.116)	152 (1 RCT)	⊕⊕⊖⊂ Low ^{d,e}
Mental Health (CBAs) assessed with: Mental health as assessed by a screening tool for mental illness follow-up: range 3 months to 9 months	One CBA reported no difference in the geriatric depression scale. Two CBAs found no difference in the HADS anxiety or depression scales.	1772 (3 observational studies)	⊕⊖⊖⊂ Very low ^{f,g}
Social support and contacts (RCTs) follow-up: range 4 months to 24 months	One RCT of a two year intervention for people aged over 75 found no difference in Tunstalls social cotact score. One RCT of a one month intervention found no difference in Dukes Social Support Scale.	714 (2 RCTs)	⊕⊕⊖⊂ Low ^{h,i}
Social contacts and supports (CBAs) follow-up: mean 8 months	One CBA looked at social support as measured by the Medical outcomes survey: social support scale and found no difference.	392 (1 observational study)	⊕⊖⊖⊂ Very low ^j
Self rated health (RCTs) follow-up: range 4 months to 24 months	Two RCTs examined self rated health. One using a simple scale reported a greater % improved in the intervention (20%) than control group (11%). The other used the WONCA-COOP functional health scale that includes a measure of overall health and found an improvement favouring the intervention group (-0.4 (-0.7 to -0.1) p=0.003).	734 (2 RCTs)	

Summary of findings:		

Social prescribing lin	nk workers compared to	usual care for people with multimorbidit	y

Patient or population: people with multimorbidity

Setting: Primary Care

Intervention: social prescribing link workers

Comparison: usual care

Outcomes	Impact	№ of participants (studies)	Certainty of th evidence (GRADE)
Self rated health (CBAs) assessed with: Likert scale from 1 (poorest health) to 5 (best health) follow-up: mean 8 months	One CBA examined self rated health and found no difference between groups. (0.127 (-0.221, 0.9475) p=not reported)	480 (1 observational study)	⊕⊖⊖⊂ Very low ^m
Physical Activities (RCTs) assessed with: Any measurement of daily activities or exercise follow-up: range 4 months to 24 months	One RCT of 152 adults found an improvement in daily activities (Daily Activities -0.5 (-0.6 to -0.2) p=0.001) but no effect on physical fitness (-0.3 (-0.6 to 0.05) p=0.98). The other of a 2 year intervention in adults over 75 found no difference in activities of daily living.	712 (2 RCTs)	⊕⊖⊖⊂ Very low ^{n,o,p}
Physical activities (CBAs) assessed with: Any measure of daily activities or exercise follow-up: mean 8.5 months	One CBA found no difference in self reported exercise. The other found a decrease in daily activities in the intervention group (-0.897 (-1.729 to -0.065) p=0.035).	1380 (2 observational studies)	€ Very low ^{q,r,s}
Hospitalisations (RCTs)	Two RCTs reported a decrease in hospitalisations in the intervention group. One found a reduction in days in hospital (300 days vs 471 days; absolute event rate	894	⊕⊕⊖⊂
assessed with: Number of hospital admissions and number of days hospitalised follow-up: range 9 months to 12 months	reduction,65%) at nine months. The other reported a reducton in hospitalisations and hospital days in the intervention group-68 total hospitalizations (278 hospital days) versus 98 (414 hospital days) in the control group. Neither reached statistical significance.	(2 RCTs)	Low ^{t,u}
Primary Care Utilisation (RCTs) follow-up: range 4 months to 24 months	Neither RCT found a difference between groups for contacts with the primary care team.	714 (2 RCTs)	⊕⊕⊖⊂ Low ^{v,w}
Primary Care Utilisation (CBAs) follow-up: mean 8 months	The authors reported a reduction in the number of primary care visits in the intervention group and an increase in the control group, but because of baseline imbalances in the groups it was difficult to attribute this change to the intervention.	480 (1 observational study)	⊕⊖⊖⊂ Very low ^{x,y}
ne risk in the intervention group (and its 95% confidence interval) is based on the assumed risk in	the comparison group and the relative effect of the intervention (and its 95% CI).		

Social prescribing link workers compared to usual care for people with multimorbidity

Patient or population: people with multimorbidity			
Setting: Primary Care			
Intervention: social prescribing link workers			
Comparison: usual care			
Outcomes	Impact	№ of participants (studies)	Certainty o evidenc (GRADE
GRADE Working Group grades of evidence High certainty: we are very confident that the true effect lies close to that of the estimate of the effect. Moderate certainty: we are moderately confident in the effect estimate: the true effect is likely to be close to Low certainty: our confidence in the effect estimate is limited: the true effect may be substantially different fin Very low certainty: we have very little confidence in the effect estimate: the true effect is likely to be substantially different find the effect estimate is limited.	rom the estimate of the effect.		
Explanations			
a. The two RCTs examined a similar intervention but found different results for the MCS of the SF-12			
b. The two RCTs were conducted in a single health care setting and may not transfer to other healthcare setting	ngs		
c. One RCT looked at a deprived population over nine months, the other looked at an older, less deprived population	pulation over three months		
d. The population was less deprived than in other studies and the usual target populations for link worker inter	rventions and the intervention was only one month long		
e. The confidence interval for anxiety included a change that was clinically insignificant.			
f. Risk of bias was high in one CBA due to missing data, baseline differences and in all due to blinding			
g. One CBA looked at an older less deprived population over three months, while the other two included a mo	re deprived younger population over eight to nine months		
h. One study looked at a two year intervention in over 75s which would not be typical of link worker intervention	ons. The other study looked at a less deprived population than usually targeted for link wor	rker interventions	
i. One study did not provide confidence intervals and the other had a small sample size.			
j. The CBA looked at a less deprived population than usually targeted for link worker interventions.			
k. One study looked at participants aged over 75 with an intervention duration of 2 years, whereas the other w	vas in a younger, less deprived population and intervention was 4 months.		
I. Studies used different measures, one being a subscale of the WONCA/COOP Functional Health questionna	ire. One RCT had a small sample size of 152.		
m. There were baseline differences between the intervention and control groups. There was a significant loss	to follow up of almost 70%.		
n. Studies used slightly different measures and had different findings			
o. One study looked at a two year intervention and another at a one month intervention. Populations differed v For peer review only - http:/	with one being adults over 75, older than the typical social prescribing population targeted //bmjopen.bmj.com/site/about/guidelines.xhtml	and the other less deprived.	

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- p. One study did not report any confidence interval so cannot assess imprecision
- g. One CBA had baseline differences between the intervention and control group and significant loss to follow up of almost 70%.
- r. Studies used different measures and had slightly different results.
- s. One study did not provide confidence intervals so imprecision could not be assessed.
- t. The two RCTs were conducted in a single healthcare setting and may not transfer to other settings. The intervention was also longer and more intense than other social prescribing interventions.
- u. Neither study found a statistically significant reductions in hospitalisations or days in hospital but there was a trend towards significance.
- v. One RCT looked at a two year intervention for the over 75s. The other looked at a younger less deprived population than usually targeted for social prescribing interventions. ρς .ent.
- w. Neither RCT reported confidence intervals or results of statitical analysis making it difficult to comment.
- x. The CBA had baseline imbalances between groups and almost 70% loss to follow up
- y. The baseline attendance rates between the two groups were very different and fidnings liekly reflect regression to the mean.

Study ID	Primary Outcomes: Results	Secondary Outcomes: Results
Clarke et al, RCT	Survival (% at 3.5 years) 73% in Intervention vs. 78% in	Activities of daily living, loneliness (Wenger scale), morale (Geriatric Morale Scale), social contact score (Tunstall): no
19	control. Reported as non- significant.	significant changes at 2 years. Information orientation score: not reported. Self-perceived health (% improved): 20% Intervention, 11% Control - reported as significant. HCU: 17% and 12% of both groups had seen GP and PHN respectively in previous month - reported as non-significant.
Grant et al	Mental Health: Anxiety (HADS- A) -1.9 (-3.0 to -0.7) ^a p=0.002, Depression (HADS-D) -0.9 (-1.9 to 0.2) p=0.116. Social Support (Dukes Social Support Scale): Confidant -0.9 (-2.4 to 0.6) p=0.221, Affective -0.3 (-1.2 to 0.7) p=0.594	Quality of life (delighted terrible faces scale): - 0.5 (-0.9 to -0.1) p=0.006. Functional health (COOP/WONCA functional health assessment scale): Pain -0.5 (-0.8 to -0.1), Physical fitness -0.3 (-0 to 0.05) p=0.98, Feelings -0.5, (-0.8 to -0.2), Daily Activities -0.5 (- 0.6 to -0.2) p=0.001, Social Activities -0.3 (-0.6 to 0.1) p=0.196, Change in health -0.3 (-0.6 to -0.03) p=0.03, Overall Health -0.4 (- 0.7 to -0.1) p=0.003. HCU: both groups had similar contacts with the PCT, but the intervention group were reported as having mor prescriptions, including mental health prescriptions and fewer referrals to general and mental health services, although no statistical analysis was performed.
Kangovi et al, 2018	Health Related Quality of Life (HRQoL), Physical Health Component (SF-12-V2 PCS) - 0.7 (-2.2 to 0.7) ^b p=0.3	HRQoL Mental Health Component (SF-12-V2 MCS) 0.8 (-1.1 to 2.6)b p=0.3 . Patient Activation (PAM score): 1.9 (-0.1 to 3.8) p= 0.06. Chronic disease control: HBA1c -0.2 (-1.3 to 0.9), BMI -0.2 (-0.7 to 0.4), CPD -0.5 (-2.2 to 1.2), SBP -6.3 (-14.3 to 1.8). Patient reported quality of primary care: Intervention group were more likely to report highest rating for quality comprehensive care and supportiveness for self-management - risk difference 0.12 p=<0.001. HCU: Intervention group had fewer repeat admissions 0.24 (-0.40 to -0.07) p=0.02 and 30d readmissions -0.17 (-0.32 to 0.02) p=0.04, fewer total hospital days (300 vs 471) and statistically non significant fewer total hospitalisations -0.3 (-0.6 0.0) p=0.07 and shorter length of stay -3.1 (-6.3 to 0.2) p=0.06.
Kangovi et al, 2017	Change in chronic disease control: HBA1C -0.2 (-1.3 to 0.9) ^c , BMI -0.2 (-0.7 to 0.4), CPD -0.5 (-2.2 to 1.2), SBP -6.3 (-14.3 to 1.8) p=0.08	Achievement of chronic disease management goals (% achieved) 18.3% vs 17.2% p=0.81 . HRQoL Physical Health Component (change in SF-12-V2 PCS): 0.9 vs 0.5 p=0.67 and HRQoL Mental Health Component (change in SF-12- V2 MCS) 2.3 vs -0.2 p= 0.000 Patient activation (change in PAM) 2.2 vs 1.5 p=0.66. Proportion people reporting high quality of patient centred care that was comprehensive (49.2% vs 39.7% p=0.01) and supportive of diseas management (62.9% vs 38% p=0.001). HCU: Intervention group had a total of 68 hospitalisations with 278 hospital days vs 98 hospitalisations and 414 hospital days in the control p=0.17.
Carnes et al	Not specified	Self rated health (scale 1 to5): $0.127 (-0.221 \text{ to } 0.9475)^d$. Mental health, anxiety (HADS-A): $-0.119 (-0.847 \text{ to } 1.609)$. Mental health depression (HADS-D): $0.857 (-0.737 \text{ to } 2.451)$ Wellbeing (Scale of 0-6 in last week): $-0.013 (-0.623 \text{ to } 0.596)$. Positive and active engagement in life (HeiQ Scale 0-20): $-0.073 (-1.278 \text{ to } 1.131)$. Number of regular activities (range 0-6): $-0.897 (-1.729 \text{ to } -0.065)$) p=0.035. HCU: A&E visits in the previous 3 months (mean (SD): Intervention 0.3 (0.68), Control 0.5 (1.15), but no baseline rate reported for the intervention group. Annual GP consultation rate before referral decreased in the intervention group and slightly increased in the control group, but there were significant baseline differences- Intervention 8.3 to 7.3, p=0.001, Control 2.9 to 3.3 p=0.014 and p=<0.001 for between group differences at baseline and follow up. The intervention group were prescribed

alMental Health Component (SF-12 MCS) 0.1 (-1.9, 2.1)°p=0.9. HRQoL (EQ-5D-3L): -0.09 (-0.14 to -0.03) p=<0.001. Depression (GDS): 0.2 (-0.2 to 0.7) p=0.29. Social Support (Me 0.03 (-0.2 to 0.2) p=0.75. Social Activities: No significant differences were reported between groups for number of friends/family, club/group membership or frequency of get together with friends/family. The intervention group were le likely to report getting along with others (OR 0.6 (0.4 to 0.9) p<0.01). Social Participation (General Household Survey item housework, transport, childcare, advice, emotional support) not different between groups.Mercer et alHealth Related Quality of Life (EQ-5D-5L) 0.008 (-0.028 to 0.045) ^f Well-being (ICECAP-A): -0.011 (-0.039 to 0.016) p=0.411. M health, anxiety (HADS-A): -0.41 (-0.99 to 0.18) p=0.172. Mer health, depression (HADS-D): 0.09 (-0.49 to 0.68) p=0.753. W			control p <0.001.
Mercer et al Health Related Quality of Life (EQ-5D-5L) 0.008 (-0.028 to 0.045) ^f Well-being (ICECAP-A): -0.011 (-0.039 to 0.016) p=0.411. M. health, anxiety (HADS-A): -0.41 (-0.99 to 0.18) p=0.172. Mer health, depression (HADS-D): 0.09 (-0.49 to 0.68) p=0.753. W and social adjustment scale: 0.05 (-1.37 to 1.48) p=0.940. Sel reported lifestyle activities (smoking, alcohol, exercise): no difference (95% CI) adjusted for baseline results. ^b Longitudinal estimated difference in difference (95% CI) from 6 to 9 months adjusted for sit chronic disease. ^c Difference in difference (95% CI) controlled for baseline results and any imbalanced baseline variables ^d Mean difference (95% CI) adjusted for age, sex, SIMD, comorbidity, and significant baseline outcome measures as covariates a includes practice identifier as a random effects term. SF-12V2= Short Form Health Survey, is often used as a health related quality of life measure, with Physical (PCS) and Mental (MCS) health component reported separately on a scale of 0-100 with 100 representing maximal health. EQ-5D-3L=an earlier version of EQ-5D-5L with 3 levels. ^c Geriatric Depression Scale, a screening tool for depression in older people with a score of 4 or more indicating possible depression. HADS = Hospital and Depression Scale measured on a scale of 0-42 where a higher score indicates worse mental health. HDS-A=Hospital Anxiety and Depression Scale Anxiety, where a score above 10 indicates possible caseness; HADS-D=Hospital Anxiety and Depression Scale, bepression, where a score above 10 indicates possible caseness; HADS-D=Hospital Anxiety and Depression scale of 1-6 indicates more sup ICECAPA= Investigating Choice Experiments for the Preferences of Older People Capability Measure for Adults, a capability based wellbeing measure adults where 0 is no capability and 1 is full capability; WASAS = Work and Social Adjustent Scale that measures impact of mental health		Mental Health Component	Depression (GDS): 0.2 (-0.2 to 0.7) p=0.29. Social Support (MOS 0.03 (-0.2 to 0.2) p=0.75. Social Activities: No significant differences were reported between groups for number of friends/family, club/group membership or frequency of get together with friends/family. The intervention group were less
al (EQ-5D-5L) 0.008 (-0.028 to 0.045) ^f health, anxiety (HADS-A): -0.41 (-0.99 to 0.18) p=0.172. Mer health, anxiety (HADS-A): -0.41 (-0.99 to 0.18) p=0.172. Mer health, depression (HADS-D): 0.09 (-0.49 to 0.68) p=0.753. We and social adjustment scale: 0.05 (-1.37 to 1.48) p=0.940. Sel reported lifestyle activities (smoking, alcohol, exercise): no difference (95% CI) adjusted for baseline results. ^b Longitudinal estimated difference in difference (95% CI) adjusted for baseline results. ^b Longitudinal estimated difference (95% CI) form 6 to 9 months adjusted for sit chronic disease. ^c Difference in difference (95% CI) adjusted for age, sex, stimulate of the easure of self-reported health related quality of life measure, with Physical (PCS) and Mental (MCS) health component reported separately on a scale of 0-100 with 100 representing maximal health. EQ-5D-5L=a standardized measure of self-reported health-related quality of life that assesses 5 dimensions at 5 levels of severity where 1 is the preferred state of health. EQ-5D-3L=a nearlier version of EQ-5D-5L with 3 levels. ^C Geriatric Depression Scale, a screening tool for depression in older people with a score of 4 or more indicating possible depression. HADS = Hospital anxiety and Depression Scale, Depression, where a score above 10 indicates possible caseness; HADS-D=Hospital Anxiety and Depression scale, a capability and scale of 0-42 where a higher score indicates worse mental health. HADS-A=Hospital Anxiety and Depression for the Medical Outcomes Study Social Support Survey [MOS-SSS] where a higher score indicates stronger supports. MOS Social support (six items from the Medical Outcomes Study Social Support Survey [MOS-SSS] where a higher score indicates more sup ICECAPA= Investigating Choice Experiments for the Preferences o			not different between groups.
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PRISMA 2020 Checklist

Section and Topic	ltem #	Checklist item	Location where iten is reported				
TITLE							
Title	<u> 1</u>	Identify the report as a systematic review.	Page 1				
ABSTRACT							
Abstract	2	See the PRISMA 2020 for Abstracts checklist.	Page 3				
INTRODUCTION							
Rationale	3	Describe the rationale for the review in the context of existing knowledge.	Page 5				
Objectives	4	Provide an explicit statement of the objective(s) or question(s) the review addresses.	Page 6				
METHODS							
Eligibility criteria	5	Specify the inclusion and exclusion criteria for the review and how studies were grouped for the syntheses.	Page 6				
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.	Page 9				
Search strategy	7	Present the full search strategies for all databases, registers and websites, including any filters and limits used.	Page 9				
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.	Page 10				
Data collection process			Page 10				
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.	Page 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.	Page 10				
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.	Page 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.	Page 20				
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)).	Page 10				
	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				
I I	13c	Describe any methods used to tabulate or visually display results of individual studies and syntheses.	Page 10				
	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.	Page 10				
I.	13e	Describe any methods used to explore possible causes of heterogeneity among study results (e.g. subgroup analysis, meta-regression).	N/A				
ſ	13f	Describe any sensitivity analyses conducted to assess robustness of the synthesized results.	N/A				
Reporting bias	14	Describe any methods used to assess risk of bias due to missing results in a synthesis (arising from reporting biases).	Page 10				
Reporting bias	14	Describe any methods used to assess risk of bias due to missing results in a synthesis (arising from reporting biases). For peer review only - http://bmjopen.bmj.com/site/about/guidelines.xhtml	Page				

PRISMA 2020 Checklist

3 4 5	Section and Topic	ltem #	Checklist item	Location where item is reported				
6	assessment							
8	Certainty 15 Describe any methods used to assess certainty (or confidence) in the body of evidence for an outcome. assessment 15		Page 10					
9 10	RESULIS							
10 11 12	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.	Page 11				
13		16b	Cite studies that might appear to meet the inclusion criteria, but which were excluded, and explain why they were excluded.	Page 25				
14 15	Study characteristics	17	Cite each included study and present its characteristics.	Page 15				
16 17 18 19	Risk of bias in studies	18	Present assessments of risk of bias for each included study.	Page 17 and extended data				
20 21 22 23	Results of individual studies	19	For all outcomes, present, for each study: (a) summary statistics for each group (where appropriate) and (b) an effect estimate and its precision (e.g. confidence/credible interval), ideally using structured tables or plots.	Table 3, Page 20 and see extended data				
24 25 26 27	Results of syntheses	20a	For each synthesis, briefly summarise the characteristics and risk of bias among contributing studies.	Page 18, Summary of findings table				
28 29		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				
30 31		20c	Present results of all investigations of possible causes of heterogeneity among study results.	N/A				
32		20d	Present results of all sensitivity analyses conducted to assess the robustness of the synthesized results.	N/A				
33	Reporting biases	21	Present assessments of risk of bias due to missing results (arising from reporting biases) for each synthesis assessed.	Page 18				
34 35 36 37 38 39 40	Certainty of evidence	22	Present assessments of certainty (or confidence) in the body of evidence for each outcome assessed.	Page 18 and see extended data GRADE assessment tables				
41	DISCUSSION							
42	Discussion	23a	Provide a general interpretation of the results in the context of other evidence.	Page 23				
43		23b	Discuss any limitations of the evidence included in the review.	Page 25				
44 45 46 47	5For peer review only - http://bmjopen.bmj.com/site/about/guidelines.xhtml6							



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PRISMA 2020 Checklist

Location Section and Item Checklist item where item # Topic is reported 23c Discuss any limitations of the review processes used. Page 25 23d Discuss implications of the results for practice, policy, and future research. Page 26 **OTHER INFORMATION** Registration and Provide registration information for the review, including register name and registration number, or state that the review was not registered. Page 3 24a protocol 24b Indicate where the review protocol can be accessed, or state that a protocol was not prepared. Page 25 24c Describe and explain any amendments to information provided at registration or in the protocol. N/A 25 Describe sources of financial or non-financial support for the review, and the role of the funders or sponsors in the review. Support Competing 26 Declare any competing interests of review authors. interests 27 Report which of the following are publicly available and where they can be found: template data collection forms; data extracted from included Availability of studies; data used for all analyses; analytic code; any other materials used in the review. data, code and other materials

19 <u>∟</u> 20

21 *From:* Page MJ, McKenzie JE, Bossuyt PM, Boutron I, Hoffmann TC, Mulrow CD, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. BMJ 2021;372:n71. doi: 10.1136/bmj.n71 22 For more information, visit: <u>http://www.prisma-statement.org/</u>

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Effect of social prescribing link workers on health outcomes and costs for adults in primary care and community settings: a systematic review

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Secondary Subject Heading:	Evidence based practice, Health services research
Keywords:	SOCIAL MEDICINE, PRIMARY CARE, Health policy < HEALTH SERVICES ADMINISTRATION & MANAGEMENT



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Effect of social prescribing link workers on health outcomes and costs for adults in primary care and community settings: a systematic review

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ABSTRACT

 Objectives: To establish the evidence base for the effects on health outcomes and costs of social prescribing link workers (non-health or social care professionals who connect people to community resources) for people in community settings focusing on people experiencing multimorbidity and social deprivation.

Design: Systematic review and narrative synthesis using the Grading of Recommendations Assessment, Development, and Evaluation (GRADE) approach.

Data sources: Cochrane database, Cochrane Central Register of Controlled Trials, ClinicalTrials.gov, EU Clinical Trials Register, CINAHL, Embase, Global Health, PubMed/MEDLINE, PsycInfo, LILACS, Web of Science, and grey literature were searched up to 31st July 2021. A forward citation search was completed on 9th June 2022.

Eligibility criteria: Controlled trials meeting the Cochrane Effectiveness of Practice and Organisation of Care (EPOC) guidance on eligible study designs assessing the effect of social prescribing link workers for adults in community settings on any outcomes. No language restrictions were applied.

Data extraction and synthesis: Two independent reviewers extracted data, evaluated study quality using the Cochrane EPOC risk of bias tool and judged certainty of the evidence. Results were synthesised narratively.

Results: Eight studies (n=6,500 participants), with five randomised controlled trials at low risk of bias and three controlled before-after studies at high risk of bias, were included. Four included participants experiencing multimorbidity and social deprivation. Four (n=2186) reported no impact on HRQoL. Four (n=1924) reported mental health outcomes with three reporting no impact. Two US studies found improved ratings of high-quality care and

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reduced hospitalisations for people with multimorbidity experiencing deprivation. No cost effectiveness analyses were identified. The certainty of the evidence was low or very low.

Conclusion: There is an absence of evidence for social prescribing link workers. Policy makers should note this and support evaluation of current programmes before mainstreaming.

PROSPERO registration number: CRD42019134737.

STRENGTHS AND LIMITATIONS OF THIS STUDY

- This systematic review only included randomised trials and controlled before-after studies that met the Cochrane Effectiveness of Practice and Organisation of Care guidance, to avoid potentially biased results from poorer quality studies.
- Our literature search involved an in-depth search for social prescribing link worker interventions, using a wide range of search terms and with no language, country or date limitations.
- The area of social prescribing is a rapidly evolving field, and we conducted a forward citation search of included papers to capture any relevant studies published after our search.
- Our broad search resulted in a large number of studies and an initial screen of clearly ineligible studies was conducted by one author only, which may have introduced bias.
- The limited number of studies and heterogeneity in study design and intervention meant a meta-analysis was not possible and thus a robust narrative synthesis including an assessment of the certainty of the evidence was conducted.

INTRODUCTION

Social prescribing is a way of linking people with complex needs to non-medical supports in the community. There are different models of social prescribing, ranging from online signposting services to individual support from a link worker to access community resource. The link worker model of social prescribing is most frequently used in the UK.(1) Link workers are non-health or social care professionals, usually based in primary care or community organisations, who determine the health and well-being needs of people referred to them (usually by health care professionals), co-produce a health and well-being plan and provide support to connect with community resources to meet these needs. No qualifications are specified for link workers, rather there is a focus on relevant experience and skills, such as listening and empathising, to perform the role.(2) Many health systems are developing social prescribing initiatives and NHS England is funding link workers in primary care and recommends their use for people who have one or more chronic conditions, need support with their mental health, are isolated or who have complex social problems.(3)

People experiencing multimorbidity (defined as two or more chronic health conditions) experience fragmented care, poorer health outcomes and more psychological stress and as multimorbidity becomes the norm among an aging population, it poses a significant challenge to health systems.(4) People with complex multimorbidity account for a higher proportion of hospital admissions and therefore costs, and have higher consultation rates than those without.(5) In socially deprived areas, the impact is greater as people experience earlier onset of multimorbidity and are more likely to have mental health comorbidities.(6) A 2021 systematic review of interventions targeting people with multimorbidity in primary care identified 16 RCTs but found limited evidence for interventions that improve outcomes

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including HRQoL and mental health outcomes.(7) The review did not identify any eligible social prescribing link worker interventions but concluded that existing evidence suggests that future research should target a range of areas including patient health behaviours that can be addressed though social prescribing.

Social prescribing link workers may have an impact on health outcomes for people experiencing multimorbidity, particularly in areas of social deprivation, but despite their widespread roll out in the U.K., there is limited evidence for their effectiveness.(8) If effective, social prescribing link workers should reduce health care costs, by addressing the social problems that reportedly drive 20% of primary care attendances and the social determinants of health that lead to poorer outcomes.(9) A recent systematic review, however, concluded that there was a lack of evidence for how, for whom and when social prescribing was effective or how much it cost.(10) Previous reviews have only looked at U.K. based interventions and included a broad range of studies including those with uncontrolled designs.(11, 12). Social prescribing is however gaining momentum internationally and while interventions are adapted to the local context, there are similarities and potential to learn from experiences in other countries. (13) We aimed to systematically review the evidence of effectiveness and costs of social prescribing link worker interventions internationally and to establish the evidence, if any, for their effectiveness in people with multimorbidity and social deprivation.

METHODS

We conducted a systematic review of studies reporting effectiveness and/or costs of social prescribing link workers based in primary or community care settings for community dwelling adults. We included randomised trials and non-randomised trials that met the Cochrane Effectiveness of Practice and Organisation of Care (EPOC) guidance on eligible

study designs.(14) We followed the PRISMA statement for reporting systematic reviews, (15) (Appendix 1, (16)), registered our review on Prospero CRD42019134737 (04/07/2019) and published the protocol. (17)

Eligibility criteria

Participants/population

We included studies on community dwelling adults attending primary care. Participants did not need to have any specific index condition. We included all studies whether they focused on participants in areas of social deprivation or not, but we specifically extracted data on social deprivation and multimorbidity where it was reported. We excluded studies on children and those in residential or supported care.

Intervention

Social prescribing link workers may be known by other terms such as community health workers, patient navigators or health facilitators. While all of these work in the area of health, they are generally considered "lay workers" as they have not completed formal professional health or social care qualifications. Similarly, the process of social prescribing may be known by other terms such as "community referral" or "navigation". Inclusion was based on the function of the role, i.e. supporting people to improve their health and wellbeing through connecting them with community resources and health and social care coordination, recognising that there is a wide range of terms used to describe such roles. (18)

We included interventions that involved:

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- A referral (including self-referrals) to a link worker (a non-health or social care professional) who was based either in a primary care practice or a community or voluntary organisation.
- Participants meeting with a link worker face to face at least once, although additional contacts could be via telephone or other remote methods.
- Determining an individual range of health and social care supports and community resources that the person would be willing to engage with and being offered support and follow up to engage with their chosen supports and activities.

We excluded interventions without a link worker that only involved signposting to services, used volunteers as link workers or were delivered by telephone. Interventions where additional support was being provided by health care professionals or personal care provided alongside health and social care coordination such as disability support workers were excluded as it was not possible to separate the effects of the different components of care. We excluded multi-faceted interventions, which mainly comprised of education and goal setting around disease control or health behaviour change interventions, even if they had an element of social prescribing as it was not possible to separate the impact of the different components of the intervention.

Comparator(s)

We only included studies with a comparator group that did not involve any social prescribing and met the EPOC guidance on controlled before-after (CBA) studies, i.e. contemporaneous data collection, controls drawn from similar sites and at least 2 intervention and 2 control sites.(14)

Setting

Primary care was generally defined as "care provided by clinicians that are available to treat all common conditions in all age groups and have an ongoing relationship with their patients".(19) This definition allowed for a more flexible interpretation in countries that have different models of healthcare. We excluded studies that focused on hospital inpatients or specialist services or were emergency department based. The definition of social deprivation is debated. It varies from country to country and is usually based on relative socioeconomic capacity.(20) For this review, we did not have a definition of deprivation, rather we described how deprivation was defined in relevant studies.

Outcomes

Main outcome

We included all reported outcomes, but based on our interest in assessing link workers to support patient with multimorbidity, we focused on outcomes in the core outcome set for multimorbidity that recommends primary outcomes of quality of life, mental health and mortality for interventions focused on multimorbidity.(21)

The primary outcomes for the review were:

- Health related quality of life (HRQoL), as measured by a validated instrument.
- Mental health outcomes, as measured by a validated instrument for screening for mental health conditions.

Additional outcomes

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Secondary outcomes included also focused on the core outcome set for multimorbidity.(21) While this is a wide range of outcomes it is in keeping with the MRC frameworks' guide on using multiple outcome measures for complex interventions.(22) These included:

- Patient-reported outcomes on social-connectedness or isolation, self-rated health, patient experience of care, treatment burden, self-management behaviour and self-efficacy.
- Physical activity and function included measures of physical activity (self-reported or objectively measured), physical function, activities of daily living.
- Health service utilisation defined as number of GP visits, ED attendances or hospital admissions as measured via primary care or hospital records or self-reported.
- Any physical health data reported was included.
- Any cost data or social return on investment data.

Search strategy

We searched 11 bibliographic and trials databases for randomised controlled trials and nonrandomised controlled trials that meet the criteria outlined in the Cochrane Effective Practice and Organisation of Care (EPOC) guidance on study design(14) from inception up to July 2021 with no language limits: Cochrane database, Cochrane Central Register of Controlled Trials, ClinicalTrials.gov, EU Clinical Trials Register, Cumulative Index of Nursing and Allied Health Literature (CINAHL), Embase, Global Health, PubMed/MEDLINE, PsycInfo, LILACS (Latin American and Caribbean Health Sciences Information database), and Web of Science. To identify economic evaluations that may be of relevance we also searched the NHS EED (NHS Economic Evaluation Database), Health Technology Assessment Database (both available via the Centre for Reviews and Dissemination (CRD), University of York) and CEA (Cost-Effectiveness Analysis Registry) up to July 2019. The search strategy focused on the use of a range of key words associated with the intervention and was developed with input from a senior information specialist.

We conducted a grey literature search of the following databases: Irish Health Service Executive (HSE) Lenus, RIAN, Open Grey, DART EUROPE, Google and Google Scholar and WHOLIS (World Health Organization Library Information System) up to July 2021. We also conducted a forward and backward citation search of included studies. Relevant websites (The Kings Fund, NHS Social Prescribing, National Institute for Clinical Excellence, Social Prescribing Network, Health Foundation, Nuffield Trust, HSE Social Prescribing, and Oxford Social Prescribing Research Network) were searched manually for evaluations. The first 23 pages of a Google Search for "social prescribing" and the first 21 pages of a Google scholar search were reviewed for additional literature. Please see supplementary data, Appendix 2 for detailed search strategy. (16)

Data management

Rayyan was used to sort abstracts for inclusion and exclusion. References were managed with Endnote 8 reference manager. Excel was used to manage extracted data.

Review process

Duplicates were removed using the EndNote function, which identifies potential duplicates, which were then checked and manually reviewed by the lead author (BK). The lead author (BK) then did an initial screen to remove clearly ineligible titles. This step was necessary due to the large number of potentially eligible reports returned by our search strategy. Where it was clear from the title that our eligibility criteria on population, intervention or methods were not met the title was excluded. For example, a title clearly reporting a qualitative study of a healthcare intervention delivered by lay people to children, such as a qualitative study of

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a community health worker intervention for childhood diarrhoea, would have been excluded. Any report where it was not clear from the title if eligibility criteria were met was reviewed by abstract by BK and AC, who independently reviewed the abstracts of all potentially eligible titles, discarded those that clearly did not meet inclusion criteria and independently reviewed the full texts of the remainder to assess eligibility for final inclusion. Any discrepancies were resolved through discussion with a third reviewer (SMS). Data extraction was completed by the lead author and checked by another author (MOS). Two authors (BK and AC) independently assessed and cross-checked the risk of bias in all included studies using the Cochrane EPOC Guidance for assessing risk of bias.(23) The certainty of the evidence for outcomes was independently assessed by two authors (BK and MOS) using the Grading of Recommendations Assessment, Development and Evaluation (GRADE) criteria including risk of bias, consistency of effect, imprecision, indirectness and other potential criteria such as publication bias.(24) Any discrepancies were discussed with the senior author (SMS) until consensus was reached. RCTs and CBAs were assessed separately. Overall certainty was based on assessment of evidence from RCTs where more than one was available.

Strategy for data synthesis

Due to the heterogeneity in terms of study design, risk of bias, participants, interventions and outcomes, a narrative synthesis was performed and presented in tabular form to include the following headings: study design, setting, participants, nature of intervention, outcome measures used, effects and costs. We explored the possibility of completing meta-analysis, however, in the two studies that were similar in terms of study design, intervention characteristics and duration of follow up, there was insufficient data reported on the primary outcomes. As there were only two studies, authors were not contacted for additional data. We

had planned to complete sub-group analyses based on multimorbidity, living in areas of social deprivation and link worker location, but this was not possible due to substantial methodological heterogeneity, including study design and definitions and reporting of multimorbidity and deprivation.

Public patient involvement

This review is part of one of four PhD projects under a Health Research Board collaborative doctoral award (CDA) in multimorbidity. The original CDA project application and PhD topics had input from a PPI advisory group. A multimorbidity PPI advisory group was set up specifically to support the four PhD projects in the CDA. The lead reviewer (BK) presented the results of this review to the group who provided input on implications for policy, practice and research, included in the discussion. See Appendix 3 Guidance on Reporting Involvement of Public and Patients (GRIPP) 2 form in supplementary data for further details ien on PPI methods. (16)

RESULTS

The database search identified 20,656 records after duplicate removal. 19,738 were removed after title screening leaving 918 abstracts for review. 553 full texts were assessed for eligibility including 216 identified from the database search and 397 from other sources. Seven reports of six studies were identified from the database search, one from backward citation searches and one from forward citation searches. Our forward citation search did not identify any corrections or errata related to the included studies. (See Figure 1: PRISMA Flow diagram)

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Included studies and participants

Nine papers reporting eight studies, including 6,500 participants were identified. Five were randomised trials (RCTs),(25-29) three controlled before-after studies (CBAs)(30-32) and one paper reported the economic evaluation of an included trial.(33) Three studies were from the US (27-29) and five from the UK.(25, 26, 30-32)

Participants were majority female ranging from 59% to 75% with only one study reporting majority male participants (62%).(30) Mean age ranged from 29 to 71 years age. One study focused on adults over 75, but did not report mean age.(25) Three of the seven studies clearly reported including participants experiencing multimorbidity and deprivation. Two of the US trials tested an intervention, (the IMPaCT intervention) that targeted people with two or more chronic conditions, living in a high poverty zip code.(27, 28) One U.K. study was based in GP practices located in postcodes with high deprivation and reported a mean of 3.1 self-reported chronic conditions.(31) Otherwise, studies recruited participants based on a combination of factors including: social isolation,(25, 30, 32) mental health problems,(30, 32) age (25, 30), frequent ED attendance, (29) and GP perception of suitability for the intervention.(26, 31, 32)

Interventions and comparators

All interventions included referral to a link worker or equivalent, who identified a set of personalized goals and supported participants to achieve these through connecting with community resources. There was considerable variation in the duration and intensity of the link worker interventions. Intervention duration ranged from one month to two years, with most interventions ranging from three to nine months in duration. Intensity in terms of link worker caseload and number of contacts was only reported in detail in two of the seven

studies. The IMPaCT intervention evaluated in the two US trials was six months duration with weekly contacts as standard. Each link worker worked with 55 clients per year for an average of 38.4 hours suggesting an average of one hour per meeting.(34) No other studies reported on link worker caseload. Other interventions were less intense in terms of number of contacts. Carnes et al reported that 69% of participants met the link worker once and 17% had two or more contacts.(32) Grant et al reported a mean of 1.7 contacts and Mercer et al a mean of 3.1 contacts.(26, 31) The remaining two studies did not report on numbers of contacts.(25, 30) Resources referred to were tailored to the individual in all interventions with counselling services, social and craft groups, exercises classes, addiction supports, welfare and employment advice all mentioned as examples of resources. Only one study specifically reported on uptake of community resources with uptake of resources positively associated with number of link worker contacts and ranging from 36% of participants who had met once to 71% of participants who had met 4 times. (31)

All link workers had professional supervision arrangements, which varied across studies. They were managed and employed by either a research team or a host voluntary community organisation. While efforts were made to standardise the IMPaCT intervention,(34) with regular supervision and reviews, the other interventions were very flexible, and fidelity was not assessed. In some cases, there was considerable variation in how the intervention was implemented across sites, but this was part of a general tailored approach.(30, 31) The setting also varied. In three studies, link workers were embedded within general practice or equivalent.(28, 31, 32) In two of these studies one link worker was assigned to a practice. (28, 31) In the other, three link workers were based across 22 practices.(32) The link workers were based in community settings in the remaining five studies.

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The comparator was usual care for all studies, with the inclusion of chronic disease goal setting as a co-intervention in two of the RCTs.(27, 28) The five RCTs randomised participants at the level of the individual. The three CBAs studies recruited controls from nearby GP practices with similar demographics but reported significant differences in

Study ID	Participants	Intervention	Outcomes
Randomised to	rials		1
Clarke et al,	523 adults over	Referral: Recruited via mail invitation	Primary outcome: Survival
1992 (25)	75 living alone.	Link worker: Lay community-based health	Secondary outcomes:
		worker, training and experience not	Activities of daily living
Community,	Age, gender not	specified.	Information/orientation score
UK	reported	Contacts: Minimum 3 home visits with	Loneliness
		tailored support	Morale
		Duration: 2 years	Self-rated health
		Comparator: Usual care	Social contacts
			Primary healthcare utilisation
			Costs: None reported
			Data collection: 0, 24 months. Surviva
			assessed at 6 monthly intervals from
			baseline to 3.5 years
Grant et al,	152 adults over	Referral: Recruited via GP referral	Primary outcomes:
2000 (26)	16 who GP felt	Link worker: Lay "referral facilitator"	Mental health: depression and anxiety
	would benefit	trained and employed by a community	Social Support
Community,	from	organisation. Based in community.	Secondary outcomes:
UK	intervention.	Contacts: 1 face-to-face assessment within	Quality of life
		a week of referral. Average of 1.7	Functional health
		telephone or face-to-face contacts	Primary healthcare utilisation includin
	Mean age 43.2,	reported.	medications and referrals
	75% female.	Duration: 1 month	Costs:
		Comparator: Usual care	Intervention
			Primary healthcare utilisation
			Referrals to other agencies
			Data collection: 0, 1, 4 months
Heisler et al,	3,159 adults	Referral: Recruited via Medicaid	Primary outcomes:
2022 (29)	aged <65	Link worker: Community health workers,	Healthcare utilisations including
	residing in a low	familiar with zip code, trained and	Ambulatory care visits
Community,	income zip code	employed by community organisations	ED visits
USA	with >3 ED visits	Contacts: 55% at least one contact, mean	Hospital admissions
	or 1 ambulatory	of 1.9 contacts	Costs: Healthcare utilisation costs
	care sensitive	Duration: Tailored, but up to 1 year	Data collection: 12 months pre and
	admission in	Comparator: Usual care	post randomisation
	last year.		
	Mean age 29,		
	64% female.		

Kangovi et al,	592 adults	Referral: Recruited via primary care clinics	Primary outcome: Health related
2018 (28)	attending 3	Link worker: Community health workers,	quality of life, physical health
	primary care	with high school diploma. 1 month training	component (SF-12-V2 PCS)
Primary Care,	clinics, who	in motivational interviewing, action	Secondary outcomes:
USA	resided in a	planning and on the job. Based in primary	Health related quality of life, mental
	high-poverty zip	care practices.	health component (SF-12-V2 MCS)
	code had a	Contacts: Monthly face-to-face meetings	Patient activation
	diagnosis for 2	and weekly telephone check ins.	Chronic disease control (BP, HbA1C,
	or more chronic	Duration: 6 months	BMI or CPD)
	diseases.	Comparator: Chronic disease goal setting	Patient-reported quality of primary car
		with PCP only	All cause hospitalisations
			Costs: None reported
	Mean age 52.6,		Data collection: 0, 6, 9 months
	62.5% female.		
Kangovi et al,	302 adults	Referral: Recruited via primary care clinics	Primary outcome:
2017 (27)	attending GIM	Link worker: Community health workers,	Change in chronic disease control
. ,	clinics, living in	with high school diploma. 1 month training	(HbA1C, BMI, BP, or CPD)
Community,	deprived area,	in motivational interviewing, action	Secondary outcomes:
USA	and were	planning and on the job. Based in primary	Achievement of chronic disease
	diagnosed with	care practices.	management goals
	2 or more	Contacts: Monthly face-to-face meetings	Health related quality of life (SF-12-V2
	chronic	and weekly telephone check ins.	PCS and MCS)
	diseases.	Duration: 6 months	Patient activation
		Comparator: Chronic disease goal setting	Patient reported quality of primary car
		with PCP only	All cause hospitalisations
	Mean age 56,		Costs: Return on investment analysis
	74% female.		reported on cost savings related to
			reduced hospitalisations (33)
			Data collection: 0, 6 months for PROM
			6 and 12 months for hospitalisations
Controlled before	ore-after studies		· · ·
Study ID	Participants	Intervention	Outcomes
Carnes et al,	480 adults	Referral: GP referral	Primary outcome: Not specified
2017 (32)	frequently	Link worker: 3 lay "social prescribing	Secondary outcomes:
	attending	coordinators" (SPC) trained in social work	Self-rated health
Primary Care,	primary care,	and managed by community organisation.	Mental Health: depression and anxiety
	1		

Based across 22 GP practices. Additional

Contacts: Initial 1 hour meeting and up to

Comparator: Propensity matched controls

drawn from GP practices in nearby areas

support from volunteers available.

6 sessions with the SPC, unlimited

with no social prescribing service.

volunteer support

Duration: 6 months

UK

with social

problems.

who presented

isolation or mild

mental health

Median age 56,

59% female.

Positive and active engagement in life

Number of medications in previous 6

Number of regular activities

A&E visits in past 3 months

Annual GP consultation rate

Data collection: 0, 8 months

Costs: None reported

Wellbeing

months

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Dickens et al,	392 adults over		Primary outcome: Health related
2011 (30)	50 attending	Link worker: Mentors often with teaching	quality of life, mental health component
	primary care at	or creative skills, managed by a community	(SF-12-V2 MCS)
Community,	risk of social	organisation. Training not described. Based	Secondary outcomes:
UK	isolation.	in community.	Health related quality of life, physical
		Contacts: Face to face meetings, frequency	health component (SF-12-V2 PCS)
		not specified	Health related quality of life (EQ-5D-3L)
		Duration: 3 months	Mental health: depression
	Mean age 71,	Comparator: Matched controls from a	Social activities
	62% male.	sample drawn from 3 GP practices in	Social support
		nearby areas with no mentoring service	Social participation
			Costs: None reported
			Data collection: 0, 3 months
Mercer et al,	900 adults	Referral: GP referral	Primary outcome: Health related
2019 (31)	attending	Link worker: Community links practitioners	quality of life (EQ-5D-5L)
	primary care in	with prior experience of community work,	Secondary outcomes:
Primary Care,	most deprived	managed by a community organisation. 1	Wellbeing
UK	areas of	month training on role, supporting clients,	Mental Health: depression and anxiety
	Glasgow	engaging practices and mapping resources.	Work and social adjustment scale
	deemed	Based in GP practices.	Self-reported lifestyle behaviors
	suitable for	Contacts: Face to face meetings. Average	(smoking, alcohol, exercise)
	intervention by	of 3 meetings reported.	Costs: None reported
	GP.	Duration: 9 months	Data collection: 0, 9 months
		Comparator: Sample drawn from 6 GP	
	Median age 49,	practices in Glasgow without a community	
	60% female.	links practitioner	

Risk of bias

We used the EPOC guidance to assess risk of bias for both RCTs and CBAs, but have reported them separately for each study design. The RCTs had low risk of bias overall, despite blinding of participants not being possible given the nature of the intervention. Randomization processes were not clearly reported in one RCT.(25) There was high risk of bias in the CBAs. This was due to differences in baseline characteristics and limitations in randomization and allocation concealment due to study design. A summary of the risk of bias is shown in Figure 2. The full risk of bias assessment for all outcomes is available in Appendix 4 in supplementary data. (16)

Certainty of evidence

For the primary outcomes, the certainty across all study types was low for HRQoL and very low for mental health due to risk of bias, indirectness resulting from differences in interventions and populations across studies, inconsistencies in results and imprecision. The certainty was low for social supports, self-rated health and very low for physical function and activities. For health care utilization, there was very low certainty evidence for hospitalisations based on the US based RCTs.(27-29) There was low certainty evidence for primary care visits, due to indirectness, imprecision and risk of bias. See Table 2.

Table 1. GRADE summary of findings

Title: Effect of social prescribing link workers on health outcomes and costs for adults in primary care and community settings

Patients or population: Community dwelling adults Settings: Primary and community care

Intervention: Social prescribing link workers

Comparison: Usual care

		Contributing	
		studies	Overall GRADE
Outcome	Review finding	(participants)	assessment
Health related quality of life	Social prescribing link workers	2 RCTs (894).	$\oplus \oplus \ominus \ominus$
	may have little or no impact on		Low
	HRQoL.	US based	
			(Low for RCTs ^{b, c, d} .
		2 CBAs (1292)	Low for CBAs)
		UK based	
Mental health	It is unknown if social	1 RCT (152).	0000
	prescribing link workers		Very Low ^f
	improve mental health because	3 CBAs (1772)	
	the certainty of the evidence is		(Low for RCT ^{b,c}
	very low.	All UK based	and Very Low for
			CBAs ^{a,b})
Social contacts and support	Social prescribing link workers	2 RCTs (714).	$\oplus \oplus \ominus \ominus$
	may lead to little or no		Low
	difference in social contacts.	1 CBA (392)	
			(Low for RCTs ^{b,d} ,

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		All UK based	Low for CBAs)
Physical function and activities	It is unknown if social	2 RCTs (714)	0000
	prescribing link workers		Very low
	improve physical function and	2 CBAs (1380)	
	activity because the certainty of		(Very Low RCTs
	the evidence is very low.	All UK based	^{b,c,d} and Very Low
			CBAs ^{a,d})
Self-rated health	Social prescribing link workers	2 RCTs (714)	$\oplus \oplus \ominus \ominus$
	may improve self-rated health.		Low
		1 CBA (480)	
			(Low RCTs ^{b,c} and
		All UK based	Low CBA ^a)
Health care utilisation:	It is unknown if social	3 RCTs (4053)	$\bigoplus \ominus \ominus \ominus^{b,c_{\prime}}$
hospitalisation	prescribing link workers reduce		Very Low
	hospitalisations because the	US based	
	certainty of the evidence is very		
	low.		
Health care utilisation: primary	Social prescribing link workers	3 RCTs (3873)	$\oplus \oplus \ominus \ominus$
care visits	may have little or no impact on		Low
	primary care visits.	2 UK and 1 US	
		based	(Low RCTs ^{b,d} , Very
			Low for CBAs ^a)
		1 CBA (480)	
		UK based	

RCTs and CBAs were assessed separately for each outcome. If there was limited RCT evidence, then an overall judgement was applied. In this case if were inconsistencies in results between the two bodies of evidence this was downgraded by one level.

^a Downgraded for risk of bias. ^b Downgraded for indirectness. ^c Downgraded for Inconsistency. ^d Downgraded for imprecision. ^e Downgraded for publication bias ^f Downgraded for overall inconsistency.

See Appendix 5 in supplementary data for the full GRADE summary sheet. (16)

Effectiveness of link worker interventions

Primary outcomes

Four of the eight studies (two RCTs and two CBAs) reported on HRQoL (27, 28, 30, 31).

Two studies used the EQ-5D measure with one study reporting no difference, (31) while the

other study reported a small significant difference between the intervention and control

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group, in favour of the control group. (30) Three studies used the SF-12 measure, with one of the three reporting a significant difference in favour of the intervention for the mental health component score, (27) whereas, none of the three studies reported any difference in physical component scores (27, 28, 30). Four studies reported on mental health (26, 30-32) using HADS-D, HADS-A or GDS-10. Only one of these studies reported evidence of a significant improvement in HADS-A, (aMD -1.9 (95% CI: -3.0 to -0.7).(26) The remaining three studies found no evidence of a difference between groups for any mental health outcomes. See Table 3 for a summary of the primary outcome effects.

Table 2. Primary outcomes: mean at follow up and adjusted mean differences

Health-related quality of life						
Study ID	Outcome measure	Intervention Mean (SD)	Control Mean (SD)	Adjusted mean differences (95% CI)		
	Physical Health Component (SF- 12-V2 PCS)	1.8 (11.2)	1.6 (9.9)	–0.7 (–2.2 to 0.7) ª P=0.3		
Kangovi et al, US 2018 RCT (28)	Mental Health Component (SF- 12-V2 MCS)	2.2 (13.3)	1.2 (14.1)	0.8 (-1.1 to 2.6) ª P=0.41		
	Physical Health Component (SF- 12-V2 PCS)	0.9*	0.5*	P=0.66		
Kangovi et al, US 2017 RCT (27)	Mental Health Component (SF- 12-V2 MCS)	2.3*	0.2*	P=0.008		
	Physical Health Component (SF- 12-V2 PCS)	34.8 (11.4)	42.7 (12.6)	0.8 (-1.5, 3.2) ^b P=0.48		
Dickens et al	Mental Health Component (SF- 12-V2 MCS)	46.7 (11.2)	49.2 (10.0)	0.1 (-1.9, 2.1) ^b P=0.9		
UK 2011 CBA (30)	EQ-5D-3L	0.6 (0.3)	0.8 (0.2)	-0.09 (-0.14, -0.03) ^b P=<0.001		

Mercer et al, UK 2019 CBA (31)	EQ-5D-5L	Not reported	Not reported	0.008 (-0.028 to 0.045 P=0.648
Mental health		1		
Grant et al, UK 2000				
RCT (26)				-0.9 (-1.9 to 0.2) ^d
	Depression (HADS-D)	7.1 (4.5)	9.4 (4.9)	P=0.116
Carnes et al,				
UK 2017		10.1 (5.0)		0.857 (-0.737, 2.451)
CBA (32)	Depression (HADS-D)	10.1 (5.0)	5.9 (5.2)	P=not reported
Dickens et al, UK 2015				0.2 (-0.2, 0.7) ^b
CBA (30)	Depression (GDS-10)	4.1 (2.4)	2.2 (2.1)	P=0.29
Mercer et al,				
UK 2019		Not	Not	0.09 (–0.49 to 0.68) ^c
CBA (31)	Depression (HADS-D)	reported	reported	P=0.753
Grant et al, UK				
2000 RCT (26)	Anxiety (HADS-A)	10.6 (4.2)	12.7 (4.3)	-1.9 (-3.0 to -0.7) ^a P=0.002
Carnes et al,	(HADS-A)	10.0 (4.2)	12.7 (4.3)	F-0.002
UK 2017	Anxiety			-0.119 (-0.847, 1.609
CBA(32)	(HADS-A)	11.2 (5.0)	7.6 (5.4)	P=not reported
Mercer et al,		-		
UK 2019	Anxiety	Not	Not	-0.41 (-0.99 to 0.18)
CBA (31)	(HADS-A)	reported	reported	P=0.172
Clarke et al,				
UK 1992				
RCT (25)	HRQoL or mental health were not	t outcomes for t	this trial	
Heisler et al,				
US 2022				
RCT (29)	HRQoL or mental health were not			
	Health Survey, is often used as a health-rel d separately on a scale of 0-100 with 100 re			
	ted quality of life that assesses 5 dimension			
	n of EQ-5D-5L with 3 levels. GDS =Geriatric D	•		
	idicating possible depression. HADS = Hospi			
-	es worse mental health. HADS-A=Hospital Ar ADS-D=Hospital Anxiety and Depression Sca		-	
-	difference - SD and adjusted mean difference	-	-	
	d for site and chronic disease. ^b Adjusted for <, SIMD, comorbidity, and significant baselin			
	i. ^d Adjusted for baseline results. ^e Adjusted f			
	-		-	-

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Secondary outcomes

A wide range of other outcomes was reported, with the studies reporting a mean of six outcomes each, including a range of patient reported outcomes (PROMS). Three reported on a measure of social contact or support and found no evidence of a difference between groups (25, 26, 30). One study reported that intervention participants were more likely to rate getting along with others as "worse" than controls, indicating a possible negative effect (30). In terms of other PROMs, two studies found a positive impact on self-rated health (25, 26), one study found a positive effect for general quality of life, assessed by the Delighted Terrible Faces scale (26) and two studies reported a positive finding on patient rating of high quality care (27, 28). There were no reported differences for patient activation (27, 28), wellbeing (31, 32), loneliness (25), morale (25), work and social adjustment (31) or active participation in life (32). Of the four studies that reported a measure of physical activity and function, one study found an improvement in functional health (26), while two others found no evidence of a difference in ADLs (25), or physical activity (31) and the final study found a reduction in usual activities (32). Three studies reported clinical outcomes, one reported on survival over a three year period (25) and two looked at chronic disease control for smoking, diabetes, obesity and hypertension (27, 28). None reported a statistically significant difference between groups.

Six studies reported on health care utilization, with four reporting on primary care utilization (25, 26, 29, 32) and three on hospitalisations (27-29). One study reported a reduction in primary care attendances in the intervention group, but the control group were significantly different and the authors concluded that their findings more likely represented regression to the mean (32); of the remaining studies two found no evidence of an effect on primary health care attendances and one US based study actually found an increase in ambulatory care

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utilisation.(29) One of the two US studies evaluating the IMPaCT intervention found a 24 % risk reduction in repeat hospital admissions during the 12 month follow up period (28); the other reported a similar reduction, but it did not reach statistical significance (27). The third study that reported hospital admissions found no significant decrease, but there was a decrease in ED attendances. (29) See Appendix 6 in supplementary data for a full list of outcomes and effects for each study.

Costs and cost effectiveness

No cost utility or cost effectiveness analyses were identified in our search. Three RCTs reported on costs (26, 29, 33); one as a cost analysis, one on health care utilisation costs only, and the third as a separately published return on investment analysis of an included RCT (27). The cost analysis looked at primary care visits, medications, referrals and interventions costs. While the study found a reduction in healthcare costs due to a reduction in referrals, these savings did not offset the costs of the intervention. Therefore, the authors concluded that the intervention was more costly than usual care. The analysis did not consider any measure of health benefits to participants such as quality of life years gained.(26) The trial that looked at health cate utilization did not report intervention costs. They found that the intervention group had slightly lower ED costs, higher ambulatory care costs and no difference in hospitalisation costs. (29) The return-on-investment study examined cost savings related to hospitalisations and outpatient attendances from routine data and included detailed costing of the intervention, which was calculated at \$1721.06 per participant. While the number of reduced hospital days was statistically non-significant, they estimated a return of \$2.47 for every \$1 spent on the intervention.(33)

Subgroup synthesis: multimorbidity and social deprivation

Four of the eight studies reported a measure of multimorbidity or comorbidity. Two of these were RCTs of the IMPaCT intervention in the US and recruited participants with two or more chronic conditions including hypertension, diabetes, obesity and tobacco dependence. (27, 28) One was a CBA of the Glasgow Deep End link worker intervention and reported a mean of 3.1 chronic conditions in the intervention group, but this was not an inclusion criterion.(31) The final study was a US based RCT and reported that 27% of participants had a Charlson Comorbidity index of greater than two. All four studies targeted participants in areas of deprivation. Three of these studies measure HRQoL. Two of the studies found no effect and one of the US trials finding an effect on the Mental Health Component of the SF-12-V2 only,(27) which was not replicated in the second trial of this intervention. (28) Only the Deep End link worker CBA reported on mental health and found no evidence of a difference between groups. There were no reported significant effects on other patient reported outcome measures or chronic disease control. The RCTs of the IMPaCT intervention found a consistent improvement in the proportion of participants reporting high quality primary care. Both also examined hospitalisations, reporting fewer total days in hospital, although this only reached statistical significance in one of the two studies. The other US based trial that focused on frequent ED attenders in a deprived zip code found a reduction in ED attendances, but increased costs of ambulatory care and no difference in hospitalisations. (29)

DISCUSSION

We identified eight studies and one economic evaluation of an included study, but we found no consistent evidence to support the effectiveness of social prescribing link worker interventions for improving health related quality of life or mental health. There was no evidence for effectiveness in improving social support, physical function and activities, or

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primary healthcare utilization, though there was a suggestion from two studies that interventions led to improved self-rated health and two others reported higher patient ratings for quality care. Three of the studies specifically included participants experiencing multimorbidity and social deprivation with similar findings for health-related quality of life, though two U.S. RCTs reported a reduction in total days in hospital for people with multimorbidity with low certainty evidence. The certainty of the evidence is low or very low overall due to risk of bias, heterogeneity amongst studies, inconsistency and imprecision.

Our systematic review has not identified any evidence on the cost effectiveness of social prescribing link workers. There is some evidence of cost savings based on reduced hospitalisations, but this was a US based study of an intense structured six-month intervention and may not translate to other healthcare systems.(33) Only one UK based study reported costs, showing a reduction in referral costs, but no cost benefit analysis or cost utility analysis was undertaken.(26) The economic evaluation of social prescribing link workers in the literature is weak.

There remains a lack of studies with a randomised design since the 2017 review (10) that called for "less rhetoric and more reality". There have been many uncontrolled before-after studies identified in subsequent reviews, (11, 12, 35) but the last RCT in a UK setting was over 20 years ago. (26) Widening our search beyond the UK setting resulted in the identification of three relevant RCTs and a return-on-investment analysis in a US setting. (27, 28, 33). Ours is the first review to look specifically at populations experiencing multimorbidity or deprivation. We identified some evidence to support reduced hospital admissions for people experiencing multimorbidity and deprivation in the US. Two of these studies also found an improvement in patients rating of the quality of their primary care, which has been reported in previous multimorbidity studies. (36). The 2021 systematic review of multimorbidity highlighted the potential for interventions to improve patients

experience of care, (7) which some have argued should be an end in itself. (37). We reported on the intensity of the intervention, often omitted from previous reviews and indeed in many of the articles in this review. While intensity varied, a more intense intervention with a healthcare coordination component was the only one with a positive impact on healthcare utilisation.(33) These findings demonstrate that it is possible to conduct RCTs of social prescribing link worker interventions, but for those with complex needs more intense interventions delivered alongside chronic disease management programmes may be required to improve outcomes.

The main outcomes for the current review were HRQoL and mental health based on the core outcome set in multimorbidity (21), but only two of the seven studies reported on both of these (30, 31). With one exception (25) the rest reported on at least one. Most studies did cover some of the NHS draft outcome framework for social prescribing recommended outcomes: wellbeing, social connectedness, ability to manage day-to-day and physical activity. (3) However, as per previous reviews (10, 11, 38) there was a lot of variation in outcomes included and how they were measured, making it difficult to synthesise studies and further weakening the evidence. The outcomes chosen, in particular HRQoL may also have been difficult to improve in the short time frame of most studies. Improving social connections is one of the key mechanisms by which social prescribing is thought to improve outcomes, (39, 40), but only three studies reported on this. Including this as an outcome in future may help demonstrate interim impact, with the caveat that both relationships and causal mechanisms between social connection and health and well-being are still contested.

Strengths and limitations

This review involved a rigorous search of the international literature including all languages and the Grey Literature. We used a wide range of terms to describe the link worker role,

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providing additional evidence on social prescribing link worker interventions. We had robust study design, inclusion criteria and only included studies that met the Cochrane EPOC guidance for inclusion in a systematic review.(23) Additional potentially eligible studies did not meet the inclusion criteria for this review due to non-contemporaneous comparisons, too few sites or offering some sort of social prescribing intervention to control groups.(41-43) Previous reviews have included uncontrolled studies with the argument that they are used by policy makers as evidence of effectiveness,(12) however, including these studies with weaker designs can lead to inflated effect sizes and distort the current evidence base. Unlike previous reviews, (10-12, 35, 44) we appraised the overall certainty of the evidence for our selected outcomes, which was low or very low for most outcomes. This review provides the most up to date review of evidence internationally for social prescribing link worker interventions.

Due to the complex nature of social prescribing link worker interventions, there may have been a degree of subjectivity in determining which ones to include. To minimize this all full texts were independently reviewed and where there was a question over intervention inclusion, it was discussed with a third author. Our protocol made it clear that it was important that social prescribing was the main element of the intervention, but interpretation of this is also dependent on reporting in potentially eligible studies (17). The field is rapidly expanding, and we may have missed studies published since July 2021. Our forward citation search carried out in June 2022 will go some way to mitigate this. We are also aware of protocols that have not published results or were suspended due to COVID-19, including an RCT that we have conducted with analysis ongoing.(45)

Implications for policy and practice

It could be argued that only four of the studies tested interventions that reflect the format of current social prescribing link worker activities in the UK, which are relatively short and

tailored to the individual and locality, with a high degree of flexibility (26, 30-32). Even among these, there is variation in terms of the intensity of support and link worker location, with both community and primary care settings. Embedding link workers in a general practice setting can facilitate more intense support and a focus on healthcare coordination, such as in the US IMPaCT intervention.(34) One of the UK studies reported that a sub-group of participants who met a link worker three or more times had improvements in HRQoL, mental health and exercise, suggesting intervention duration and intensity is important to consider.(31) Current plans for social prescribing link workers in Ireland and the UK suggest at least double the link worker caseload of the IMPaCT intervention, (46, 47) and a shorter intervention, that may limit link worker capacity to provide the level of support required to provide benefit, particularly for people with multimorbidity living in deprived areas. There is a need to consider flexibility in how new link worker social prescribing interventions are implemented until more evidence is available on how much and what type of support is required and whether such support needs to be better targeted given ever tighter budget constraints and existing health inequalities.

Policy makers need to be aware that there is insufficient evidence to assess the effectiveness of social prescribing link workers and none on the cost effectiveness so the opportunity cost is unknown. While it is anticipated that social prescribing link workers will reduce healthcare utilization at the primary care level (9), many evaluations of social prescribing link worker services struggle to get access to healthcare utilisation data.(48) Robust evaluations with both patient reported outcome data and access to healthcare utilisation data to assist economic evaluations need to be embedded into social prescribing programmes. Evidence from this review suggests that such evaluations are possible and that more intense interventions for certain high-need subgroups are worth developing and evaluating in local health care contexts.

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The PPI group felt a flexible approach was necessary as some people may need longer support, but also raised the issue of fairness for those who have less complex needs who could benefit from shorter interventions. They agreed with the author team's conclusions that social prescribing link workers should not be rolled out more widely without evaluations built in and also felt that outcomes and the way they were measured would benefit from patient input.

Implications for future research

For future research and evaluations to address the evidence gap a number of challenges need to be overcome. Social prescribing interventions are meant to be flexible and tailored, not just to the individual, but also the context. This however results in a lot of heterogeneity and difficulty in assessing an overall body of evidence. Future studies could address this by reporting on reasons for referral, duration of intervention, number of contacts and link worker caseload. Further research is also needed to better understand the components of social prescribing and indeed is underway.(49) Since the pandemic link workers have adapted to restrictions and use more remote supports, which has impacted participants experiences. (50) The impact of this on outcomes is yet to be evaluated.

There are no agreed outcomes or measures for social prescribing. The NHS does not recommend any specific measures in its draft outcomes framework that recommends selfmanagement, physical activity and social connectedness as individual outcomes. (3). The Health Service Executive in Ireland also recommends assessing wellbeing and social connectedness, but not mental health or HRQoL (48). Without the inclusion of a measure that can be used for cost utility analysis, building the evidence base around cost effectiveness will be challenging. The EuroQoL HRQoL measure, EQ-5D-5L (51), is one such measure, but it can be difficult to show changes in a relatively short timeframe (52) and is quite health

focused whereas social prescribing has potentially wider social benefits. The ICECAP-A (The ICEpop CAPability measure for Adults) is an alternative. (53) It measures capability well-being, can be used in economic evaluations and is recommended by NICE for use in evaluations of interventions with potential health and social benefits. (54) Future studies should consider its inclusion as an outcome. As mentioned previously social connectedness is another important interim measure to consider. The Medical Research Council Framework for the Evaluation of Complex Intervention to Improve Health Outcomes recommends multiple outcome measures. In the case of social prescribing a more refined outcomes framework with specified measures developed with input from service users, providers and academics is needed.

The widespread policy of rolling out social prescribing projects regardless of the lack of certainty around cost effectiveness makes it challenging for researchers to address the evidence gap, especially in identifying suitable controls. While some CBAs in this review attempted to match controls, there were often significant differences in baseline characteristics as controls were drawn from different populations. (30, 32) Where social prescribing has already been adopted by policy makers stepped wedge cluster RCTs and interrupted time series offer an alternative approach to CBAs and can control better for confounding. (55) Other jurisdictions considering implementing social prescribing should carefully consider how they evaluate it from inception. RCTs are feasible as shown by the trials in the review. They are of course challenging given the tailored nature of social prescribing link worker interventions, and parallel process evaluations are recommended to evaluate contextual factors and mechanisms of action, (56), which in turn can inform further refining of existing programmes. It is clear, however, that further uncontrolled before-after studies will not advance the evidence base.

CONCLUSIONS

Our systematic review suggests that link workers providing social prescribing may have little or no impact on HRQoL, mental health or a range of patient reported outcomes though may improve self-rated health. For patients with multimorbidity in areas of deprivation an intensive link worker intervention probably improves patients' ratings of high-quality primary care and reduces hospitalisations, but these findings are based on two studies in the US and require evaluation in other health systems. The opportunity costs of investing in social prescribing link workers are unknown and it is essential that high quality trials determining cost effectiveness are conducted so that the evidence can catch up with the rate] policy and we avoid wasting valuable time and resources.

CONTRIBUTORS

BK was the primary reviewer and designed and conducted the search, reviewed identified texts, extracted data, performed the narrative synthesis and wrote the main draft. AC was a second reviewer of identified texts and for the quality assessment. MOS performed citation searches, verified data extraction and was second reviewer for certainty of evidence assessment. FB provided statistical support, wrote the protocol for meta-analysis and advised on feasibility of same. EOS provided health economics expertise and advised on

identification and summary of cost analysis studies. DC provided input into the search protocol, in particular descriptions and definitions of the link worker role. SMS conceptualised the original review questions, was involved in designing methods of the review and acted as a third reviewer. All authors contributed to critique and revisions of draft manuscripts and have approved the final version.

COMPETING INTERESTS

The authors declare that they have no competing interests.

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ETHICS STATEMENT

This study did not involve human or animal subjects and did not require ethical approval.

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DATA AVAILABILITY STATEMENT

Supplementary data are available on the Open Science Framework: Kiely, B. (2022, July 19). Effect of social prescribing link workers on health outcomes and costs for adults in primary care and community settings: a systematic review. <u>https://doi.org/10.17605/OSF.IO/G2Y4C</u>

This project contains the following supplementary data:

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2 3	• Appendix 1: PRISMA checklist for "A systematic review of the effectiveness of link
4 5	
6 7	workers providing social prescribing on health outcomes and costs for adults in
8	primary care and community settings."
9 10	• Appendix 2: Full Search Strategy and Results
11 12	
13	• Appendix 3: GRIPP 2 Form for PPI
14 15	• Appendix 4: Risk of Bias tables
16	
17 18	Appendix 5: GRADE Assessment Sheets
19 20	Appendix 6: All outcomes table
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22 23	Data are available under the terms of the <u>CC-By Attribution-NonCommercial-NoDerivatives 4.0</u>
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FIGURE TITLES

Figure 1. PRISMA flow diagram

Figure 2. Risk of bias summary



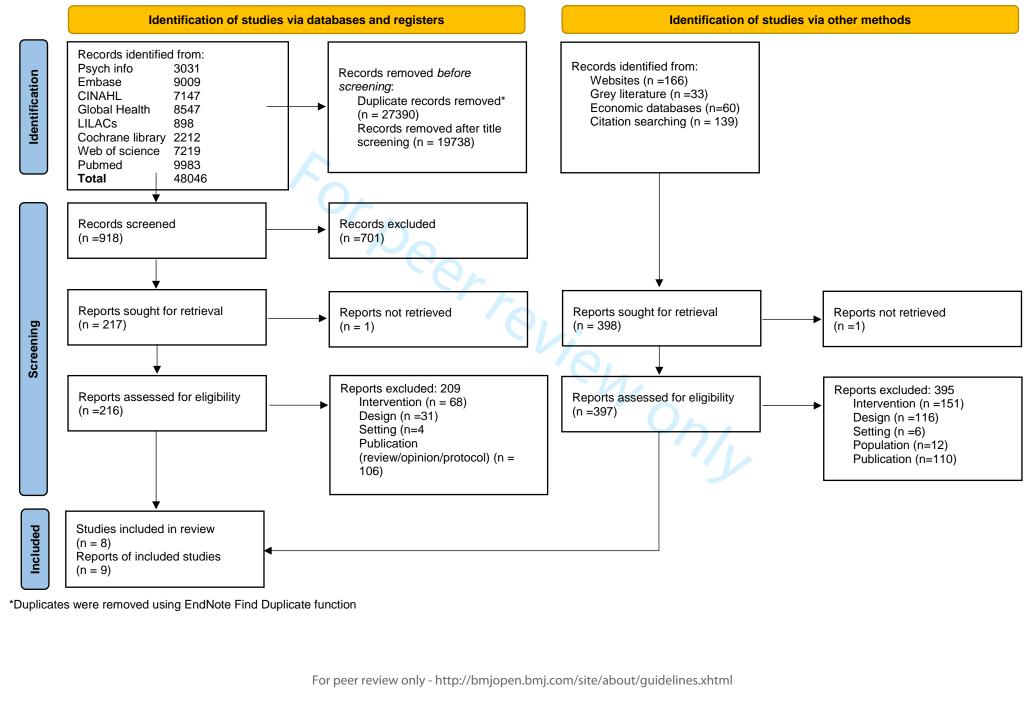


Figure 2. Risk of Bias Summary

Random sequence generation	
Allocation concealment	
Baseline outcome measurements similar	
Baseline characteristics similar	
Incomplete outcome data	
Knowledge of the allocated interventions adequately prevented	
Protection against contamination	
Selective outcome reporting	
Other risks of bias	

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PRISMA 2020 Checklist

Section and Topic	ltem #	Checklist item	Location where item is reported
TITLE			
Title	1	Identify the report as a systematic review.	Page 1
ABSTRACT			
Abstract	2	See the PRISMA 2020 for Abstracts checklist.	Page 3
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of existing knowledge.	Page 6
Objectives	4	Provide an explicit statement of the objective(s) or question(s) the review addresses.	Page 6
METHODS			
Eligibility criteria	5	Specify the inclusion and exclusion criteria for the review and how studies were grouped for the syntheses.	Page 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.	Page 10 and Appendix 2
Search strategy	7	Present the full search strategies for all databases, registers and websites, including any filters and limits used.	Appendix 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.	Page 11
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.	Page 12
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	Page 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.	Page 10
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.	Page 12
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.	Page 23
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)).	Page 12
	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.	Page 12
	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.	Page 12
	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



PRISMA 2020 Checklist

escribe any methods used to assess risk of bias due to missing results in a synthesis (arising from reporting biases). escribe any methods used to assess certainty (or confidence) in the body of evidence for an outcome. escribe the results of the search and selection process, from the number of records identified in the search to the number of studies included in a review, ideally using a flow diagram. te studies that might appear to meet the inclusion criteria, but which were excluded, and explain why they were excluded. te each included study and present its characteristics. esent assessments of risk of bias for each included study. r all outcomes, present, for each study: (a) summary statistics for each group (where appropriate) and (b) an effect estimate and its precision g. confidence/credible interval), ideally using structured tables or plots. r each synthesis, briefly summarise the characteristics and risk of bias among contributing studies.	is reported Page 12 Page 12 Page 12 Page 13 Page 29 Page 29 Page 17 Page 20 and Appendix 4 Table 3, Page 23 and see Appendix 6
escribe the results of the search and selection process, from the number of records identified in the search to the number of studies included in a review, ideally using a flow diagram. The studies that might appear to meet the inclusion criteria, but which were excluded, and explain why they were excluded. The each included study and present its characteristics. The each included study and present its characteristics. The each included study and present is characteristics.	Page 13 Page 29 Page 17 Page 20 and Appendix 4 Table 3, Page 23 and see Appendix 6
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	Page 21, GRADE Summary o findings table and Appendix 5
esent results of all statistical syntheses conducted. If meta-analysis was done, present for each the summary estimate and its precision (e.g. nfidence/credible interval) and measures of statistical heterogeneity. If comparing groups, describe the direction of the effect.	N/A
esent results of all investigations of possible causes of heterogeneity among study results.	N/A
esent results of all sensitivity analyses conducted to assess the robustness of the synthesized results.	N/A
esent assessments of risk of bias due to missing results (arising from reporting biases) for each synthesis assessed.	Page 21
esent assessments of certainty (or confidence) in the body of evidence for each outcome assessed.	Page 21 and see Appendix 5 GRADE assessmen tables
	Page 28
ovide a general interpretation of the results in the context of other evidence.	Page 28
	de a general interpretation of the results in the context of other evidence. Jss any limitations of the evidence included in the review.

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PRISMA 2020 Checklist

Section and Topic	ltem #	Checklist item	Location where item is reported
	23c	Discuss any limitations of the review processes used.	Page 29
	23d	Discuss implications of the results for practice, policy, and future research.	Page 30
OTHER INFORMAT	ΓΙΟΝ		
Registration and	24a	Provide registration information for the review, including register name and registration number, or state that the review was not registered.	Page 3
protocol	24b	Indicate where the review protocol can be accessed, or state that a protocol was not prepared.	Page 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.	Page 34
Competing interests	26	Declare any competing interests of review authors.	Page 34
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.	Page 34

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

For peer review only - http://bmjopen.bmj.com/site/about/guidelines.xhtml

Effect of social prescribing link workers on health outcomes and costs for adults in primary care and community settings. A systematic review.

	PubMed	Items
	21/07/2021	
1	"wellbeing program*"	59
2	"community health advisor*"	95
3	"community health worker"	8536
4	"community facilitator""	48
5	"community navigator""	17
6	"community referral*"	186
7	"lay health worker*"	421
8	"link-worker"	85
9	"link worker*"	85
10	"linkworker*"	26
11	"patient navigator*"	584
12	"social prescri*"	240
13	1 OR 2 OR 3 OR 4 OR 5 OR 6 OR 7 OR 8 OR 9 OR 10 OR 11 OR 12	9983

	EMBASE on Embase.com 21/07/2021	Items
1	'wellbeing program*'	234
2	'community health advisor*'	11
3	'community health worker*'	6272
4	'community facilitator*'	65
5	'community navigator*'	44
6	'community referral*'	324
7	'lay health worker*'	554
8	'link-worker*'	105
9	'link worker*'	105
10	'linkworker*'	23
11	'patient navigator*'	1225
12	'social prescri*'	284
13	1 OR 2 OR 3 OR 4 OR 5 OR 6 OR 7 OR 8 OR 9 OR 10 OR 11 OR 12	9009

	CINAHL on Ebscohost 22/07/2021	Items
1	social N1 prescri* OR patient N1 navigator* OR linkworker* OR link N1 worker* OR lay N1 health N1 worker* OR community N1 referral* OR community N1 navigator* OR community N1 facilitator* OR community N1 health N1 worker* OR community N1 health N1 advisor* OR wellbeing N1 program*	7147

	PSYCHINFO on Ebscohost 22/07/2021	Items
1	social N1 prescri* OR patient N1 navigator* OR linkworker* OR link N1 worker* OR lay N1 health N1 worker* OR community N1 referral* OR community N1 navigator* OR community N1 facilitator* OR community N1 health N1 worker* OR community N1 health N1 advisor* OR wellbeing N1 program*	3031

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	WEB OF SCIENCE, Science & Social Science Citation Indexes on Clarivate 22/07/2021	Item
1	TS=(social NEAR/1 prescri* OR patient NEAR/1 navigator* OR linkworker* link NEAR/1 worker* OR lay NEAR/1 health NEAR/1 worker* OR community NEAR/1 referral* OR community NEAR/1 navigator* OR community NEAR/1 facilitator* OR community NEAR/1 health NEAR/1 worker* OR community NEAR/1 health NEAR/1 advisor* OR wellbeing NEAR/1 program*)	7548
2	Limit 1 to articles, meeting, conference abstracts	7219
	COCHRANE LIBRARY and Central Registry of Clinical Trials 22/07/2021	Item
1	wellbeing NEAR/1 program*:ti,ab,kw	65
2	(community NEAR/1 health NEAR/1 advisor* OR community NEAR/1 health NEAR/1 worker*):ti,ab,kw	1691
3	(community NEAR/1 facilitator*OR community NEAR/1 navigator* OR community NEAR/1 referral):ti,ab,kw	21
4	(lay NEAR/1 health NEAR/1 worker* OR link NEAR/1 worker* OR linkworker*):ti,ab,kw	206
5	patient NEAR/1 navigator*:ti,ab,kw	286
6	social NEAR/1 prescri*:ti,ab,kw 1 OR 2 OR 3 OR 4 OR 5 OR 6	<u>20</u> 2212
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	Global Health on OVID 22/07/2021	
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	EU Clinical Trials Register <u>https://www.clinicaltrialsregister.eu/ctr-search/search</u> 22/07/2021	ltem
1	"wellbeing program" OR "wellbeing programs" OR "community health advisor" OR "community health advisors" OR "community health worker" OR "community health workers" OR "community facilitator" OR "community facilitators" OR "community navigator" OR "community navigators" OR "community referral" OR "lay health worker" OR "lay health workers" OR "link worker" OR "link workers" OR linkworker OR linkworkers OR "patient navigator" OR "patient navigators" OR "social prescribing" OR "social prescription"	0
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Summary of records retrieved from other sources

Grey literature search for Effect of link workers providing social prescribing on health outcomes and costs for adults in primary care and community settings: a systematic review".

Completed September 2021, updated July 2022

1. Search of Websites

Relevant websites were searched manually for a social prescribing section or publications section. If a search engine was available for these sections the search term "social prescribing" and "link worker" were used. Publications listed were reviewed by title/summary for relevant evaluations. Websites were searched sequentially so reports identified previously were not retrieved from subsequent website searches. Websites were searched in September 2021, expect for the Kings fund library and Social Prescribing Network resources, which were updated in June 2022.

2. Grey literature search Engines were searched using terms "link worker" and "social prescribing".

3. Google

Google Search term "Social prescribing"

Returned 29, 800, 000

23 pages results reviewed until results repeated or irrelevant

21 web pages visited.

9 evaluations of social prescribing retrieved. All were unpublished evaluations conducted for Clinical Commissioning Groups with no controls.

1 full report was not retrieved, despite email contact with the relevant CCG.

Rest were descriptive pages of services

4. Google Scholar

Search term "Social prescribing"

774, 000 results, up to page 37, 21 new potentially relevant reports retrieved. 0 titles added. 3 protocols, 12 design, 3 reviews, 2 wrong intervention, 1 population.

5. Economic Search

CEA registry (<u>https://cear.tuftsmedicalcenter.org/</u>) and York Centre for Reviews and Dissemination (<u>https://www.crd.york.ac.uk/CRDWeb/ResultsPage.asp</u>) search engines were searched with key words "wellbeing program OR wellbeing programs OR community health advisor OR community health advisors OR community health worker OR community health workers OR community facilitator OR community facilitators OR community navigator OR community navigators OR community referral OR lay health worker OR lay health workers OR link worker OR link workers OR linkworker OR linkworkers OR patient navigator OR patient navigators OR social prescribing OR social prescription".

Table 1: Details of Grey literature search including reasons retrieved reports were excluded

2						Reaso	ns not included			
3						neaso	ns not included			
4	Websites	Results	Records	Design		Dublication	Denulation	Already	Not	Catting
5 6		returned	reviewed	Design	Intervention	Publication	Population	included	retrieved	Setting
7	Kings Fund	77	77	17	11	48		1		
8	Social Prescribing Network	69	69	19	14	32	3			1
9	HSE Social Prescribing	3	1	1						
10	ESRI	2	0							
11	NHS	0								
12	Social Prescribing Academy	0								
13 14	Health Foundation	3	3	2	1					
14	Nuffield Trust	1	1	1						
16	Oxford Social Prescribing Network	5	5	3	1	1				
17	NICE	136	11	8		3				
18	Total=	296	167	51	27	84	3	1		1
19										
20 21	Grey literature search engines									
21	HSE Lenus	44	0							
23	Rian	2	2	1		1				
24	DART Europe	2	0							
25	Open Grey	2	1	1						
26 27	WHOLIS	0								
27	Google	N/A	9	8					1	
29	Google Scholar	N/A	21	12	2	6	1			
30	Total=	50	33	22	2	7	1	0	1	0
31										
32	Economic Search Engines									
33	CEA Register	33	33		30		3			
34 35	CRD York	27	27		17	6	4			
36	Total=	60	60		47	6	4 7			
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Citation Searches

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- 1. Systematic reviews identified in the search were reviewed to identify any additional evaluations referenced or included in the review.
- 2. Backward citation search was conducted by reviewing references of included articles.
- 3. Forward citation search was conducted using Web of Science and updated in June 2022.
- 4. Citation searches were conducted independently by BK and MOS and any discrepancies agreed through discussion.

Table 2: Details of Citation Searches included number records reviewed from each source and reasons excluded.

50 51	Citation searches	Systematic Reviews	Backward	Forward	Total
52	Intervention	43	5	27	75
53 54	Setting	2		3	5
55	Design	17	5	21	43
56	Publication	3		9	12
57	Population	0	1	1	2
58	Other			1	1
59 60	Total	65	11	62	138

Table 2 Public Patient Involvement reported according to Guidance for Reporting Involvement of Patients and the Public (GRIPP) 2 Short Form

1: Aim

The aim of the PPI was to provide the perspective of people living with multimorbidity on the implications of the

results of a systematic review on the effectiveness of social prescribing link workers.

2: Methods

An advisory panel of six people living with multimorbidity was recruited via existing networks of students on a PhD program in multimorbidity. The panel meets quarterly to provide input on issues brought to them by the PhD students. The members are voluntary but receive a voucher to acknowledge their time and associated costs attending. The panel had been meeting for three years prior to providing input on this study. The meeting at which this study was discussed took place online, lasted two hours in total including a break and was facilitated by BK and 2 other PhD students on the multimorbidity PhD program. There was one hour dedicated to discuss the systematic review with them.

The group received a 500 word plain language summary of the findings of the systematic review one week in advance of the meeting. BK also summarised the methods and findings in a powerpoint presention during the meeting. The group divided into small groups and discussed the implications for practice, policy and future research and fed back to a plenary discussion afterwards.

3: Study results

The group were surprised about the limited evidence and wondered if the outcomes had been appropriate or asked in the right way. They agreed that quality of life was a good overall outcome and felt hospitalisations would matter from the taxpayer perspective. Determining a set of outcomes was felt to be beyond the time available and we agreed it would involve a separate piece of research work. As individuals they did not feel that social prescribing needed to be presented as an experimental intervention, as many interventions or medications may not work for an individual and they felt their healthcare provider would recommend what they thought might work for them, but acknowledged this wasn't guaranteed in the case of social prescribing. They felt policy makers should roll social prescribing out on a pilot basis over a number of years and evaluate it along the way. In terms of targeting specific groups the PPI group felt that social prescribing should be available to whoever might need it, but that it would have to be flexible to allow longer support for those with more complex needs.

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Table 2 Public Patient Involvement reported according to Guidance for Reporting Involvement of Patients and the Public (GRIPP) 2 Short Form

4: Discussion and conclusions

The group clearly came to the meeting with a positive perception of social prescribing and felt it was a great idea that should be tested. Despite this possible lack of objectivity, the group broadly agreed with the conclusions that the research team had made. Their input highlighted the need for a set of core outcomes for social prescribing with input from potential beneficiaries. They took a more flexible approach on recommendations around specific target groups and intervention intensity, preferring an individually tailored intervention rather than limit access to those with the highest need.

5: Reflections/critical perspective

While the lack of cost effectiveness evidence was highlighted the idea of opportunity cost was not discussed. Presenting an intervention with no cost evidence base against one with cost evidence base however would be an impossible comparison. It is hard in a group format to check understanding of what has been presented, but given that conclusions were aligned with those of the research team it is reasonable to assume the group understood what was presented and asked of them.

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Study ID	HRQOL Allocation concealment	Baseline outcome measuremen ts similar	Baseline characteristi cs similar	Incomplete outcome data	Knowledge of the allocated intervention s adequately prevented during the study	Protection against contaminati on	Selective outcome reporting	Other risks of bias	Overall Judgement per study	Overall judgement for outcome
Kangovi et al, 2018, RCT, SF-12									Low risk: low risk of bias in 6/9 areas, and other	
						Unclear risk:			areas	
						randomisatio			unlikely to	
						n was at the			have	
						patient level, however			significant	
						unlikely			impact on ROB. While	
					Unclear risk:	controls		Unclear:The	the paper is	
					not possible	received the		authors offer	at risk of	
				Low risk:	to blind to	intervention,		commerical	overly	
			Low risk:	79% ad 81%	intervention	but not		consulting	presenting	
			there were	f/up in int	and outcome	explicitedly		services on	positive	
			slighly more	and control	was patient	stated		setting up	fidnings all	
		Low risk:	participants	and multiple	reported,	whether		similar CHW	outcomes	
	Low risk:	Baseline	of hispanic	imputation	although RAs	intervention	Low risk: all	interventions	are reported	
	centralised randomisatio	outcome	ethnicity in one arm-0 vs	techniques used for	collecting data were	was avaialble outside the	outcomes	since 2018 after this	along with statistical	
	n scheme	measures were similar	3.7%	missing data	blinded	trial setting	are reporoted	publication	significance.	
Kangovi et al,				0						
2017, RCT,			Low risk: Intervention	Low risk:	Unclear risk: not possible	Unclear risk: randomisatio		Unclear-The	Low risk: low risk of bias in	
SF-12		Low risk:	group were	88% and 87%	to blind to	n was at the		authors offer	6/9 areas,	
	Low risk:	Baseline	more likely	complete	intervention	patient level,		commerical	and other	Summary
	centralised	outcome	to be	data,	and outcome	however	Low risk: all	consulting	areas	Judgement
	randomisatio	measures	empolyed	multiple	was patient	unlikely they	outcomes	services on	unlikely to	RCTs: Low
	n scheme	were similar	20% vs 8%	imputation w only - http://bn	reported,	received	are reported	setting up	have	risk of bias

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1 2 3 4 5 6 7 8 9 10 11 12 13 14 15						although RAs collecting data were blinded	controls received the intervention, so not a major factor for overall ROB		similar CHW interventions	significant impact on ROB. While the paper is at risk of overly presenting positive fidnings all outcomes are reported along with statistical significance.
16 17 18 19 20 21 22 23 24 25 26 27 28 29 30	Dickens et al, 2011, CBA, SF-12	High risk: CBA and evidence of selection bias with those from more deprived backgrounds not being offered entry	Low risk: significant differences in baseline scores, although linear regression model used which would have corrected for baseline scores	High risk: differences in basleine characteristic s although these were adjusted for in analysis	Low risk: low rates of missing data, 84% follow up intervention and 93% control and did separate paired and unpaired analysis	Unclear risk- unclear how follow up assessments were done, by whom and if blinded	Low risk: the service was not available in areas where the control lived	Low risk: all outcomes were reported	Low risk: No other risks identified. Funded by NHS Devon, no competing interests declared.	High risk: high risk or unclear risk in 4 of 9 areas
31 32 33 34 35 36 37 38 39 40 41 42 43	Dickens et al, 2011, CBA, EQ-5D-3L	High risk: CBA and evidence of selection bias with those from more deprived backgrounds not being offered entry	Low risk: significant differences in baseline scores, although linear regression model used which would	High risk: differences in basleine characteristic s although these were adjusted for in analysis	Low risk: low rates of missing data, 84% follow up intervention and 96% control	Unclear risk- unclear how follow up assessments were done, by whom and if blinded	Low risk: the service was not available in areas where the control lived	Low risk: all outcomes were reported	Low risk: No other risks identified. Funded by NHS Devon, no competing interests declared.	High risk: high risk or unclear risk in 4 of 9 areas

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		have corrected for baseline scores								
Mercer et al,										Summary
2019, CBA,										Judgement
EQ-5D-5L								Low risk: No		NRCTS: High
			High risk:		High risk:			other risks		risk of Bias
		Low risk:	differences		due to the			identified.		due to non
	Unclear risk:	significant	in baseline		nature of the	Low risk: the		Funded by		randomised
	practices	differences	characteristic	Low risk:	intervention	service was		NHS		design and
	randomly	in baseline-	s although	76% follow	not possible	not available	Low risk: all	Scotland, no	Unclear or	challenge of
	assigned but	explicitly	these were	up int, 92%	to assess	in areas	outcomes	competing	High risk of	finding
	how not	corrected for	adjusted for	control, ITT	outcomes	where the	were	interests	bias in 4 of 9	suitable
	stated	in analysis	in analysis	analysis	blindly	control lived	reported	declared.	areas	controls.
Mental Health				664					_	

Mental Health

Study ID	Allocation concealmen t	Baseline outcome measureme nts similar	Baseline characterist ics similar	Incomplete outcome data	Knowledge of the allocated interventio ns adequately prevented during the study	Protection against contaminati on	Selective outcome reporting	Other risks of bias	Overall Judgement per study	Overall judgement for outcome
Grant et al,			low risk:	Low risk:	High risk:	Unclear risk:			Low risk:	
2000, RCT,	Low risk:		control	similar	due to the	randomisati		Low risk: No	low risk in 7	
HADS A and	sealed		were	amounts of	nature of	on was at		other risks	of 9 areas,	
HADS D	opaque	Low risk: no	slighlty	missing	the	the patient		identified.	blinding	
	envelopes,	important	more likely	data in both	intervention	level within		Funded by	very	
	while there	differences	to be male	arms, at	not possible	practices,		Avon health	challenging	
	was an early	and	and	67%,	to blind	unclear if		autothirty,	given	
	error- this	baseline	younger but	however	participants	the	Low risk: all	no	nature of	Summary
	was	scores were	otherwise	this reduced	and self	intervention	outcomes	competing	intervention	Judgement
	identifed	adjusted for	comparable	power to	reported	was availale	were	interests	and were	RCTs: low
	and those	in analysis	, this had no	detect a	outcome	outside the	reported	declared.	using	risk of bias

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1 2 3 4 5 6 7 8 9 10 11 12		participants excluded		impact on reuslts when adjusted for in analysis	difference as required sample size was 161		trial- suggestion it was already running, so people may have received it before entering the trial			validated PROMs	
13	Carnes et al,			High risk:							
	2017, CBA,			significant							
	HADS A and			differences							
16 17	HADS D		Lever viele	in living							
18			Low risk:	arrnagemen	Lligh rick						
19			significant differences	t, education,	High risk: control						
20			in baseline	work status,	follow up	High risk:			Low risk: No		
21			scores,	adjustments	43%, int	due to the			other risks		
22			althouhg	for same did	35%, no	nature of			identified.		
23 24			linear	not	data on	the			Funded by		
25			regression	significantly	whether	intervention	Low risk:		DoH,		
26			model used	alter	those LTFup	not possible	the service		independen		
27			which	results,	had	to assess	was not		t research		
28			would have	suggesting	different	outcomes	available in	Low risk: all	group, no		
29 30			corrected	other	baseline	blindly and	areas where	outcomes	competing	High risk:	
31		High risk:	for baseline	unknown	characteristi	patients self	the control	were	interests	high risk in	
32		CBA	scores	imbalances	CS	reported	lived	reported	declared.	5 of 9 areas	
	Dickens et	High risk:	Low risk:			Unclear risk:					
	al, 2011,	CBA and	significant	High risk:	Low risk:	due to the			Low risk: No		
	CBA, GDS	evidence of	differences	differences	low rates of	nature of	Low risk:		other risks		
36 37		selection	in baseline		missing	the	the service		identified.		
38		bias with	scores,	characteristi		intervention	was not		Funded by	High risk:	
39		those from	although	cs although	follow up	not possible	available in	Low risk: all	NHS	high risk or	
40		more	linear	these were	intervention	to blind	areas where	outcomes	Hackney	unclear risk	
41		deprived	regression	adjusted for	and 96%	participants	the control	were	CCG, no	in 4 of 9	
42 43		background	model used	in analysis	control	and unclear	lived	reported	competing	areas	

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	s not being offered entry	which would have corrected for baseline scores			how fol up colle				interes declare			
Mercer et al, 2019, CBA, HADS A and HADS D					High ris due to t nature o the interver not pos	the of ntion sible			Low ris			
		Low risk: significant	High risk: difference	s	to asses outcom		isk:		other ri identifi			
	Unclear risk:	-			blindly				Funded			
	practices	in baseline-				s self was n			NHS			
	randomly	explicitly	cs althoug	h Low risk				ow risk: all	Scotlan	nd, no Hi	igh or	
	assigned	corrected	these wer		ow <mark>statistic</mark>	<mark>ians</mark> areas	where o	utcomes	compet	0	nclear risk	
	but how not	for in	adjusted f	•		the co	ontrol w	/ere	interes		f bias in 4	
	stated	a malurata	the second breater	control	اممام منا اما	Li con el		anartad	declare	ad of	^f 9 areas	
Summary Ji	stated udgement nRCTS	analysis S: high risk of	in analysis bias due to dif		blinded cealing allocati			eported s in control g				n
Summary Ju ocial Conta	udgement nRCTS							·	roups, n			n
ocial Conta	udgement nRCTS			ficulty in con			differences	s in control g	roups, n		nisied desig	
ocial Conta Clarke et	udgement nRCTS							s in control g	roups, n			
ocial Conta Clarke et	udgement nRCTS cts Unclear			ficulty in con High risk-		ion, baseline	differences Low risk-	s in control g	roups, n		nisied design Low risk-	
ocial Conta Clarke et	udgement nRCTS cts Unclear risk- register of all >75s		bias due to dif	ficulty in con High risk- characteris itics such as age,		ion, baseline Unclear risk- participant	Low risk- while randomi d at	s in control g	roups, n		nisied design Low risk- while son areas unclear	ne
ocial Conta Clarke et	udgement nRCTS cts Unclear risk- register of all >75s living alone	5: high risk of	bias due to dif	ficulty in con High risk- characteris itics such as age, gender,	cealing allocati	Unclear risk- participant s would be	differences Low risk- while randomi d at patient	s in control g	roups, n	ion randon	Low risk- while sor areas unclear due to lag	ne
ocial Conta Clarke et	udgement nRCTS cts Unclear risk- register of all >75s living alone compiled	5: high risk of Unclear	bias due to dif Low risk- reported	ficulty in con High risk- characteris itics such as age, gender, education	cealing allocati	Unclear risk- participant s would be aware of	Low risk- while randomi d at patient level it	s in control g se Low ris all outcon	k-	on randon	Low risk- while son areas unclear due to lac of	ne ck
ocial Conta Clarke et	udgement nRCTS cts Unclear risk- register of all >75s living alone compiled and	5: high risk of Unclear risk-	bias due to dif Low risk- reported and no	ficulty in con High risk- characteris itics such as age, gender, education etc not	cealing allocati Low risk- similar loss	Unclear risk- participant s would be aware of their	differences Low risk- while randomi d at patient level it seems ve	s in control g s in control g - Low ris all outcon ery reporte	k- hes Lo e din p	on randon .ow risk- pulicly	Low risk- While son areas unclear due to lac of reporting	ne ck
ocial Conta Clarke et	udgement nRCTS cts Unclear risk- register of all >75s living alone compiled and arranged	S: high risk of Unclear risk- Method of	bias due to dif Low risk- reported and no signficant	ficulty in con High risk- characteris itics such as age, gender, education etc not reported,	cealing allocati Low risk- similar loss to follow	Unclear risk- participant s would be aware of their allocation,	differences Low risk- while randomi d at patient level it seems ve unlikely	s in control g s in control g - Se Low ris all outcon ery reporte baselin	k- hes Lo e din p e fu	on randon .ow risk- oulicly unded, no	Low risk- while son areas unclear due to lac of reporting unlikely t	ne ck
	cts Unclear risk- register of all >75s living alone compiled and arranged into deciles	S: high risk of Unclear risk- Method of randomisat	Low risk- reported and no signficant differences	ficulty in con High risk- characteris itics such as age, gender, education etc not reported, only	cealing allocati Low risk- similar loss to follow up in both	Unclear risk- participant s would be aware of their allocation, although	Low risk- while randomi d at patient level it seems ve unlikely control	s in control g s in control g se Low ris all outcom ery reporte baselin were	k- hes Lo e din p e fu	on randon ow risk- pulicly unded, no competing	Low risk- while son areas unclear due to lac of reporting unlikely t affect	ne ck z, co
ocial Conta Clarke et	udgement nRCTS cts Unclear risk- register of all >75s living alone compiled and arranged into deciles by social	S: high risk of Unclear risk- Method of	Low risk- reported and no signficant differences in baseline	ficulty in con High risk- characteris itics such as age, gender, education etc not reported, only baseline	cealing allocati Low risk- similar loss to follow	Unclear risk- participant s would be aware of their allocation, although interview	differences Low risk- while randomi d at patient level it seems ve unlikely control group	se Low ris all outcon ery reporte baselin were reporte	k- hes Lo e din p e fu co ed at in	on randon .ow risk- oulicly unded, no	Low risk- while son areas unclear due to lac of reporting unlikely t	ne ck 5, ;o

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1 2 3 4 5 6 7 8 9 10 11 12 13		score and randomly allocated into control and experimen tal arms- how randomise d not specified			measures referred to as characteris tics		were blinded	have recived interventio n as it was not available other than through the trial			5 of 9 areas	
14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36	Grant et al 2000, RCT, Dukes UNC score	Low risk: Sequenced numbered envelopes prepared by research team, block randomisat ion	Low risk: sealed opaque envelopes, howevere reported that there were isssues in ealr y stages and some patients excluded	Low risk: no important differences and baseline scores were adjusted for in analysis	low risk: control were slighlty more likely to be male and younger but otherwise comparabl e, this had no impact on reuslts when adjusted for in analysis	Low risk: similar amounts of missing data in both arms, at 67%, however this reduced power to detect a difference as required sample size was 161	High risk: due to the nature of the interventio n not possible to assess outcomes blindly and patients self reported	Unclear risk: randomisat ion was at the patient level within practices, unclear if the interventio n was running in the local area so possible patients could have accessed it outside the	Low risk: all outcomes were reported	Low risk: No other risks identified. Funded by Avon health autothirty, no competing interests declared.	Low risk: low risk in 7 of 9 areas	Low risk: Both RCTs mainly low risk- risks arise from poor reporting and nature of interventio n
37 38 39 40 41 42 43	Dickens et al, 2011, CBA, MOS- 6	High risk: controlled before after study	High risk: CBA and evidence of selection	Low risk: significant differences in baseline scores,	High risk: differences in basleine characteris tics	Low risk: low rates of missing data, 84% follow up	Unclear risk: due to the nature of the interventio	Low risk: the service was not available in areas	Low risk: all outcomes were reported	Low risk: No other risks identified. Funded by	High risk: high or unclear risk in 4 of 9 areas	High risk: only one CBA and it is at high risk of bias

Overall: Low risk: Evidence from ty Physical Activity	bias with those from more deprived backgroun ds not being offered entry	linear regression model	these were	interventio n and 96% control	n cannot blind participant s and not stated how outcomes were assessed	where the control lived	no con inte	S Itland, Inpeting Prests Slared.	
Clarke et al, Unclear RCT, ADLs risk- register of all >75s living alone compiled and arranged into deciles by social contact score and randomly allocated into control and experiment al arms- how randomise d not specified		Low risk- reported and no signficant differences in baseline outcomes	High risk- characterisi tics such as age, education etc not reported, only baseline outcome measures referred to as characterist ics	Low risk- similar loss to follow up in both arms, with reasons	interview assesors		reporte din baseline were reported at	Low risk- pulicly funded, no competing interests declared	

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1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20	Grant et al 2000, RCT, COOP Wonca Daily Activities	Low risk: Sequenced numbered envelopes prepared by research team, block randomisat ion	Low risk: sealed opaque envelopes	Low risk: no important differences and baseline scores were adjusted for in analysis	low risk: control were slighlty more likely to be male and younger but otherwise comparabl e, this had no impact on reuslts when adjusted for in analysis	Low risk: similar amounts of missing data in both arms, at 67%, however this reduced power to detect a difference as required sample size was 161	Unclear risk: due to the nature of the interventio n not possible to blind participant s but assessors blinded	Unclear risk: randomisat ion was at the patient level within practices, unclear if it participant s could self refer to the project which was running in the local area	Low risk: all outcomes were reported	Low risk: No other risks identified. Funded by Avon health autothirty, no competing interests declared.	Low risk: low risk in 7 of 9 areas	Overall RCTs:Low risk, most evidence comes from RCTs at low risk of bias
21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42	Carnes et al, 2017, CBA, Number regular activities	High risk: controlled before after study	High risk: CBA	low risk: significant differences in baseline scores, althouhg linear regression model used which would have corrected for baseline scores	High risk: significant differences in living arrangeme nt, education, work status, adjustment s for same did not significantl y alter results, suggesting other unknown imbalances	High risk: control follow up 43%, int 35%, no data on whether those LTFup had different baseline characterist ics	High risk: due to the nature of the interventio n not possible to assess outcomes blindly and patients self reported	Low risk: the service was not available in areas where the control lived	Low risk: all outcomes were reported	Low risk: No other risks identified. Funded by DoH, independe nt research group, no competing interests declared.	High risk: high risk in 5 of 9 areas	

al, 2019, CBA, Physical activity	High risk: controlled	Unclear risk: practices randomly assigned	Low risk: significant differences in baseline- explicitly corrected	High risk: differences in baseline characterist ics although these were adjusted	Low risk: 76% follow	High risk: due to the nature of the interventio n not possible to assess outcomes blindly and patients	Low risk: the service was not available in areas where the	Low risk: all outcomes	Low risk: No other risks identified. Funded by NHS Hackney CCG, no competing	High risk: High or unclear risk	Overall nRCTs: High Risk: One study at very high risk of bias and one at
	before	but how	for in	for in	up int, 92%	self	control	were	interests	in 4 of 9	high risk of
	after study	not stated	analysis	analysis	control	reported	lived	reported	declared.	areas	bias
er tels:											
lealth Care Lit	tilisation										
lealth Care Ui Clarke et al,	Unclear					Via					
Clarke et al, RCT,	Unclear risk-			High rick		Low risk	Low risk-				
Clarke et al, RCT, Primary	Unclear risk- register of			High risk-		Low risk-	while				
Clarke et al, RCT, Primary	Unclear risk- register of all >75s			characterisi		participants	while randomised				
Clarke et al, RCT, Primary	Unclear risk- register of all >75s living alone			characterisi tics such as		participants would be	while randomised at patient				
Clarke et al, RCT, Primary	Unclear risk- register of all >75s			characterisi		participants	while randomised at patient level it			Low risk-	
Clarke et al, RCT, Primary	Unclear risk- register of all >75s living alone compiled			characterisi tics such as age,		participants would be aware of	while randomised at patient			Low risk- while some	
Clarke et al, RCT, Primary	Unclear risk- register of all >75s living alone compiled and			characterisi tics such as age, education		participants would be aware of their	while randomised at patient level it seems very				
Clarke et al, RCT, Primary	Unclear risk- register of all >75s living alone compiled and arranged			characterisi tics such as age, education etc not reported, only		participants would be aware of their allocation,	while randomised at patient level it seems very unlikely control group			while some areas unclear due	
Clarke et al, RCT, Primary	Unclear risk- register of all >75s living alone compiled and arranged into deciles by cosial contact		Low risk-	characterisi tics such as age, education etc not reported, only baseline		participants would be aware of their allocation, although interview assesors	while randomised at patient level it seems very unlikely control group would have	Low risk- all		while some areas unclear due to lack of	
Clarke et al, RCT, Primary	Unclear risk- register of all >75s living alone compiled and arranged into deciles by cosial contact score and	Unclear	reported	characterisi tics such as age, education etc not reported, only baseline outcome	Low risk-	participants would be aware of their allocation, although interview assesors were	while randomised at patient level it seems very unlikely control group would have recived	outcomes		while some areas unclear due to lack of reporting,	
Clarke et al, RCT, Primary	Unclear risk- register of all >75s living alone compiled and arranged into deciles by cosial contact score and randomly	risk-	reported and no	characterisi tics such as age, education etc not reported, only baseline outcome measures	similar loss	participants would be aware of their allocation, although interview assesors were blinded.	while randomised at patient level it seems very unlikely control group would have recived interventio	outcomes reporte din	pulicly	while some areas unclear due to lack of reporting, unlikely to	
Clarke et al, RCT, Primary	Unclear risk- register of all >75s living alone compiled and arranged into deciles by cosial contact score and randomly allocated	risk- Method of	reported and no signficant	characterisi tics such as age, education etc not reported, only baseline outcome measures referred to	similar loss to follow	participants would be aware of their allocation, although interview assesors were blinded. HCU was	while randomised at patient level it seems very unlikely control group would have recived interventio n as it was	outcomes reporte din baseline	pulicly funded, no	while some areas unclear due to lack of reporting, unlikely to affect	
	Unclear risk- register of all >75s living alone compiled and arranged into deciles by cosial contact score and randomly allocated into control	risk- Method of randomisat	reported and no signficant differences	characterisi tics such as age, education etc not reported, only baseline outcome measures referred to as	similar loss to follow up in both	participants would be aware of their allocation, although interview assesors were blinded. HCU was self	while randomised at patient level it seems very unlikely control group would have recived interventio n as it was not	outcomes reporte din baseline were	pulicly funded, no competing	while some areas unclear due to lack of reporting, unlikely to affect outcome,	
Clarke et al, RCT, Primary	Unclear risk- register of all >75s living alone compiled and arranged into deciles by cosial contact score and randomly allocated	risk- Method of randomisat ion not	reported and no signficant	characterisi tics such as age, education etc not reported, only baseline outcome measures referred to	similar loss to follow up in both	participants would be aware of their allocation, although interview assesors were blinded. HCU was	while randomised at patient level it seems very unlikely control group would have recived interventio n as it was	outcomes reporte din baseline	pulicly funded, no	while some areas unclear due to lack of reporting, unlikely to affect	

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	al arms-						through the				
	how						trial				
	randomised										
	not										
	specified										
Grant et al				low risk:							
2000, RCT,				control							
PC visits,				were							
referrals,				slighlty							
medication				more likely							
S				to be male			Unclear				
				and		Unclear	risk:		Low risk:		
			Low risk:	younger		risk: not	randomisat		No other		
			no	but	Low risk:	reported if	ion was at		risks		
	Low risk:		important	otherwise	similar	outcome	the patient		identified.		
	Sequenced		differences	comparable	amounts of	assessors	level within		Funded by		
	numbered		and	, this had	missing	were	practices.		Avon		
	envelopes		baseline	no impact	data in	blinded or	GPs were		health		
	prepared		scores	on results	both arms,	how health	more		authority,		
	by research	Low risk:	were	when	data on	care	interested	Low risk: all	no		
	team, block	sealed	adjusted	adjusted	HCU	utilisation	in social	outcomes	competing	Low risk:	
	randomisat	opaque	for in	for in	available	data was	interventio	were	interests	low risk in 7	
	ion	envelopes	analysis	analysis	for 157	obtained	ns	reported	declared.	of 9 areas	
Kangovi et							Low risk:			Low risk:	
al, 2018,	Low risk:						randomisat			low risk of	
RCT, All	computeris						ion was at			bias in 7/9	
cause	ed					Low risk-	the patient		The	areas, and	
hospital	generated					Hospitalisat	level,		authors	other areas	
admissions	algorithm			Low risk:		ion data	however		offer	unlikely to	
9 months	with blocks,			there were		from	unlikely		commerical	have	
	performed			slightly		routine	they		consulting	significant	
	by study		Low risk:	more	Low risk:	sources	received		services on	impact on	
	team		Baseline	participants	100% data	and	controls		setting up	ROB. While	
	member	Low risk:	outcome	of hispanic	available	assessors/s	received	Low risk: all	similar	the paper is	
	not	centralised	measures	ethnicity in	for health	tatisticians	the	outcomes	CHW	at risk of	
	assocaited	randomisat	were	one arm-0	care	were	interventio	are	interventio	overly	
	with	ion scheme	similar	vs 3.7%	utilisation	blinded.	n, so not a	reporoted	ns	presenting	

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	outcomes assessment						major factor for overall ROB			positive fidnings all outcomes are reported along with statistical significance	
Kangovi et al, 2017, RCT, SF-12, all cause hospitalisat ions 1 year	Low risk: conputerise d generated algorithm with blocks, performed by study team member not assocaited with outcomes assessment	Low risk: centralised randomisat ion scheme	Low risk: Baseline outcome measures were similar	Low risk: Interventio n group were more likely to be empolyed 20% vs 8%	Low risk: 100% data available for health care utilisation	Low risk- Hospitalisat ion data from routine sources and assessors/s tatisticians were blinded.	High risk: randomisat ion was at the patient level, however unlikely they received controls received the interventio n, so not a major factor for overall ROB	Low risk: all outcomes are reporoted	The authors offer commerical consulting services on setting up similar CHW interventio ns	Low risk- low risk 7/9 areas and other domains such as allocation inherent to nature of interventio n or contaminat ion due to patient level randomisat ion	Overall RCTs: Low risk of bias
Carnes et al, 2017, CBA, PC visits	High risk: controlled before after study	High risk: CBA	High risk: significant differences in baseline scores, and controls were drawn from same practice population , but not	High risk: significant differences in living arrnageme nt, education, work status, adjustment s for same did not	Low risk: use of anonymise d GP data meant no missing data	Low risk- anonymise d data frm GP records	Low risk: the service was not available in areas where the control lived	Low risk: all outcomes were reported	Low risk: No other risks identified. Funded by DoH, independe nt research group, no competing interests declared.	High risk: high risk in 4 of 9 areas	Overall nRCTs: High risk of bias due to control mismatch in particular

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			deemed	significantly							
			suitable for								
			referral (different	results, suggesting							
			to controls	other							
			for other	unknown							
			outcomes)	imbalances							
	"Heisler et								Low risk.		
)	al, US 2022					Low risk-			No COI,		
I	RCT					HCU data from			variety of funding		
<u>)</u>						routine	Low risk-		sources,		
3 4					Low risk-	sources	patient	Low risk: all	but no		
5					use of	and	level	outcomes	input into		
6 7					routine	statisticians	randomisat	were	conduct of		
、 _		ow risk	Low risk	low risk	data	blinded	ion	reported	study	Low risk	
ð	Overall: Low risk of bias for RC	is, only 1	CBA at high risk					Y			
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Social prescribing link workers compared to usual care for people with multimorbidity

Patient or population: people with multimorbidity

Setting: Primary Care

Intervention: social prescribing link workers

Comparison: usual care

Outcomes	Impact	№ of participants (studies)	Certainty of th evidence (GRADE)
Health related quality of life (RCTs) assessed with: SF-12 HRQoL measure follow-up: range 6 months to 9 months	Two RCTs reported no difference in the physical health component of the SF-12. One of these trials showed a postive impact on the mental health component of the SF-12 ($2.3 \text{ vs} - 0.2 \text{ p} = 0.008$.), but the other showed no difference.	894 (2 RCTs)	⊕⊕⊖⊖ Low ^{a,b}
Health related quality of life (CBAs) assessed with: EQ-5D and SF-12 HRQoL measures follow-up: range 3 months to 9 months	One CBA reported no difference in the MCS or PCS of the SF-12. The same trial reported a small change in the EQ-5D-3L in favour of the control group (-0.09 (-0.14 to -0.03) p=<0.001). The second CBA found no difference in the EQ-5D-5L.	1292 (2 observational studies)	⊕⊖⊖⊖ Very low ^c
Mental Health (RCTs) assessed with: Mental Health as assessed by the hospital anxiety depression scale follow-up: mean 4 months	One RCT found an improvement in the anxiety component of the HADS (-1.9 (-3.0 to - 0.7)a p=0.002) , but not the depression component (-0.9 (-1.9 to 0.2) p=0.116)	152 (1 RCT)	⊕⊕⊖⊖ Low ^{d,e}
Mental Health (CBAs) assessed with: Mental health as assessed by a screening tool for mental illness follow-up: range 3 months to 9 months	One CBA reported no difference in the geriatric depression scale. Two CBAs found no difference in the HADS anxiety or depression scales.	1772 (3 observational studies)	⊕⊖⊖⊖ Very low ^{f,g}
Social support and contacts (RCTs) follow-up: range 4 months to 24 months	One RCT of a two year intervention for people aged over 75 found no difference in Tunstalls social cotact score. One RCT of a one month intervention found no difference in Dukes Social Support Scale.	714 (2 RCTs)	⊕⊕⊖⊖ Low ^{h,i}
Social contacts and supports (CBAs) follow-up: mean 8 months	One CBA looked at social support as measured by the Medical outcomes survey: social support scale and found no difference.	392 (1 observational study)	⊕⊖⊖⊖ Very low ^j
Self rated health (RCTs) follow-up: range 4 months to 24 months	Two RCTs examined self rated health. One using a simple scale reported a greater % improved in the intervention (20%) than control group (11%). The other used the WONCA-COOP functional health scale that includes a measure of overall health and found an improvement favouring the intervention group (-0.4 (-0.7 to -0.1) p=0.003).	734 (2 RCTs)	€⊕⊖⊖ Low ^{k,J}

Summary of findings:

Patient or population: people with multimorbidity

Social prescribing link workers compared to usual care for people with multimorbidity

parison: usual care			
Outcomes	Impact	№ of participants (studies)	Certainty of evidence (GRADE
Self rated health (CBAs) assessed with: Likert scale from 1 (poorest health) to 5 (best health) follow-up: mean 8 months	One CBA examined self rated health and found no difference between groups. (0.127 (-0.221, 0.9475) p=not reported)	480 (1 observational study)	⊕⊖⊖ Very low
Physical Activities (RCTs) assessed with: Any measurement of daily activities or exercise follow-up: range 4 months to 24 months	One RCT of 152 adults found an improvement in daily activities (Daily Activities -0.5 (- 0.6 to -0.2) p=0.001) but no effect on physical fitness (-0.3 (-0.6 to 0.05) p=0.98). The other of a 2 year intervention in adults over 75 found no difference in activities of daily living.	712 (2 RCTs)	⊕⊖⊖ Very low™
Physical activities (CBAs) assessed with: Any measure of daily activities or exercise follow-up: mean 8.5 months	One CBA found no difference in self reported exercise. The other found a decrease in daily activities in the intervention group (-0.897 (-1.729 to -0.065) p=0.035).	1380 (2 observational studies)	⊕⊖⊖ Very low
Hospitalisations (RCTs) assessed with: Number of hospital admissions and number of days hospitalised follow-up: range 9 months to 12 months	Two RCTs reported a decrease in hospitalisations in the intervention group. One found a reduction in days in hospital (300 days vs 471 days; absolute event rate reduction,65%) at nine months. The other reported a reducton in hospitalisations and hospital days in the intervention group-68 total hospitalizations (278 hospital days) versus 98 (414 hospital days) in the control group. Neither reached statistical significance. A third RCT found no difference between groups for hospitalisations (adjusted IRR 0.97 (0.77, 1.24). All trials were US based.	4053 (3 RCTs)	⊕⊕⊖ Low ^{t,u}
Primary Care Utilisation (RCTs) follow-up: range 4 months to 24 months	Two UK RCTs found no difference between groups for contacts with the primary care team and one US RCT found an increase in ambulatory care costsfor the intervention group but not attendances.	3873 (3 RCTs)	⊕⊕⊖ Low ^{v,w}
Primary Care Utilisation (CBAs) follow-up: mean 8 months	The authors reported a reduction in the number of primary care visits in the intervention group and an increase in the control group, but because of baseline imbalances in the groups it was difficult to attribute this change to the intervention.	480 (1 observational study)	⊕⊖⊂ Very low

Summary of findings:

Social prescribing link workers compared to usual care for people with mu	ultimorbidity		
Patient or population: people with multimorbidity			
Setting: Primary Care			
Intervention: social prescribing link workers			
Comparison: usual care			
Outcomes	Impact	№ of participants (studies)	Certainty of the evidence (GRADE)
*The risk in the intervention group (and its 95% confidence interval) is based on the assumed risk in the co	omparison group and the relative effect of the intervention (and its 95% CI).		
CI: confidence interval			
GRADE Working Group grades of evidence High certainty: we are very confident that the true effect lies close to that of the estimate of the effect. Moderate certainty: we are moderately confident in the effect estimate: the true effect is likely to be close to Low certainty: our confidence in the effect estimate is limited: the true effect may be substantially different fro Very low certainty: we have very little confidence in the effect estimate: the true effect is likely to be substant Explanations	rom the estimate of the effect.		
a. The two RCTs examined a similar intervention but found different results for the MCS of the SF-12			
b. The two RCTs were conducted in a single health care setting and may not transfer to other healthcare settin			
c. One RCT looked at a deprived population over nine months, the other looked at an older, less deprived popul			
d. The population was less deprived than in other studies and the usual target populations for link worker interv	ventions and the intervention was only one month long		
e. The confidence interval for anxiety included a change that was clinically insignificant.			
f. Risk of bias was high in one CBA due to missing data, baseline differences and in all due to blinding			
g. One CBA looked at an older less deprived population over three months, while the other two included a more			
h. One study looked at a two year intervention in over 75s which would not be typical of link worker intervention	ns. The other study looked at a less deprived population than usually targeted for link wor	ker interventions	
i. One study did not provide confidence intervals and the other had a small sample size.			
j. The CBA looked at a less deprived population than usually targeted for link worker interventions.			
k. One study looked at participants aged over 75 with an intervention duration of 2 years, whereas the other wa			
I. Studies used different measures, one being a subscale of the WONCA/COOP Functional Health questionnai	ire. One RCT had a small sample size of 152.		
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m. There were baseline differences between the intervention and control groups. There was a significant loss to follow up of almost 70%.

n. Studies used slightly different measures and had different findings

o. One study looked at a two year intervention and another at a one month intervention. Populations differed with one being adults over 75, older than the typical social prescribing population targeted and the other less deprived.

p. One study did not report any confidence interval so cannot assess imprecision

q. One CBA had baseline differences between the intervention and control group and significant loss to follow up of almost 70%.

r. Studies used different measures and had slightly different results.

s. One study did not provide confidence intervals so imprecision could not be assessed.

t. The three RCTs were conducted in a US healthcare setting and may not transfer to other settings. The intervention was also longer and more intense than other social prescribing interventions.

12 u. Neither study found a statistically significant reductions in hospitalisations or days in hospital but there was a trend towards significance. The third study did not find a difference.

14 v. One RCT looked at a two year intervention for the over 75s. The other looked at a younger less deprived population than usually targeted for social prescribing interventions. The third at a predominantly Black US population.

15 w. Neither UK RCT reported confidence intervals or results of statistical analysis making it difficult to comment on precision.

x. The CBA had baseline imbalances between groups and almost 70% loss to follow up

18 y. The baseline attendance rates between the two groups were very different and findings likely reflect regression to the mean.

review only

Study ID	Primary Outcomes: Results	Secondary Outcomes: Results
Clarke et al, RCT	Survival (% at 3.5 years) 73% in Intervention vs. 78% in	Activities of daily living, loneliness (Wenger scale), morale (Geriatric Morale Scale), social contact score (Tunstall): no
19	control. Reported as non- significant.	significant changes at 2 years. Information orientation score: not reported. Self-perceived health (% improved): 20% Intervention, 11% Control - reported as significant. HCU: 17% and 12% of both groups had seen GP and PHN respectively in previous month - reported as non-significant.
Grant et al	Mental Health: Anxiety (HADS- A) -1.9 (-3.0 to -0.7) ^a p=0.002, Depression (HADS-D) -0.9 (-1.9 to 0.2) p=0.116. Social Support (Dukes Social Support Scale): Confidant -0.9 (-2.4 to 0.6) p=0.221, Affective -0.3 (-1.2 to 0.7) p=0.594	Quality of life (delighted terrible faces scale): - 0.5 (-0.9 to -0.1) p=0.006. Functional health (COOP/WONCA functional health assessment scale): Pain -0.5 (-0.8 to -0.1), Physical fitness -0.3 (-0 to 0.05) p=0.98, Feelings -0.5, (-0.8 to -0.2), Daily Activities -0.5 (- 0.6 to -0.2) p=0.001, Social Activities -0.3 (-0.6 to 0.1) p=0.196, Change in health -0.3 (-0.6 to -0.03) p=0.03, Overall Health -0.4 (- 0.7 to -0.1) p=0.003. HCU: both groups had similar contacts with the PCT, but the intervention group were reported as having mor prescriptions, including mental health prescriptions and fewer referrals to general and mental health services, although no statistical analysis was performed.
Kangovi et al, 2018	Health Related Quality of Life (HRQoL), Physical Health Component (SF-12-V2 PCS) - 0.7 (-2.2 to 0.7) ^b p=0.3	HRQoL Mental Health Component (SF-12-V2 MCS) 0.8 (-1.1 to 2.6)b p=0.3 . Patient Activation (PAM score): 1.9 (-0.1 to 3.8) p= 0.06. Chronic disease control: HBA1c -0.2 (-1.3 to 0.9), BMI -0.2 (-0.7 to 0.4), CPD -0.5 (-2.2 to 1.2), SBP -6.3 (-14.3 to 1.8). Patient reported quality of primary care: Intervention group were more likely to report highest rating for quality comprehensive care and supportiveness for self-management - risk difference 0.12 p=<0.001. HCU: Intervention group had fewer repeat admissions 0.24 (-0.40 to -0.07) p=0.02 and 30d readmissions -0.17 (-0.32 to 0.02) p=0.04, fewer total hospital days (300 vs 471) and statistically non significant fewer total hospitalisations -0.3 (-0.6 0.0) p=0.07 and shorter length of stay -3.1 (-6.3 to 0.2) p=0.06.
Kangovi et al, 2017	Change in chronic disease control: HBA1C -0.2 (-1.3 to 0.9) ^c , BMI -0.2 (-0.7 to 0.4), CPD -0.5 (-2.2 to 1.2), SBP -6.3 (-14.3 to 1.8) p=0.08	Achievement of chronic disease management goals (% achieved) 18.3% vs 17.2% p=0.81 . HRQoL Physical Health Component (change in SF-12-V2 PCS): 0.9 vs 0.5 p=0.67 and HRQoL Mental Health Component (change in SF-12- V2 MCS) 2.3 vs -0.2 p= 0.000 Patient activation (change in PAM) 2.2 vs 1.5 p=0.66. Proportion people reporting high quality of patient centred care that was comprehensive (49.2% vs 39.7% p=0.01) and supportive of diseas management (62.9% vs 38% p=0.001). HCU: Intervention group had a total of 68 hospitalisations with 278 hospital days vs 98 hospitalisations and 414 hospital days in the control p=0.17.
Carnes et al	Not specified	Self rated health (scale 1 to5): $0.127 (-0.221 \text{ to } 0.9475)^d$. Mental health, anxiety (HADS-A): $-0.119 (-0.847 \text{ to } 1.609)$. Mental health depression (HADS-D): $0.857 (-0.737 \text{ to } 2.451)$ Wellbeing (Scale of 0-6 in last week): $-0.013 (-0.623 \text{ to } 0.596)$. Positive and active engagement in life (HeiQ Scale 0-20): $-0.073 (-1.278 \text{ to } 1.131)$. Number of regular activities (range 0-6): $-0.897 (-1.729 \text{ to } -0.065)$) p=0.035. HCU: A&E visits in the previous 3 months (mean (SD): Intervention 0.3 (0.68), Control 0.5 (1.15), but no baseline rate reported for the intervention group. Annual GP consultation rate before referral decreased in the intervention group and slightly increased in the control group, but there were significant baseline differences- Intervention 8.3 to 7.3, p=0.001, Control 2.9 to 3.3 p=0.014 and p=<0.001 for between group differences at baseline and follow up. The intervention group were prescribed

		significantly more medications at baseline and follow up than control p <0.001.
Dickens et al	Health Related Quality of Life, Mental Health Component (SF-12 MCS) 0.1 (-1.9, 2.1) ^e	HRQoL Physical Health Component (SF-12 PCS): 0.1 (-1.9 to 2.1 p=0.9. HRQoL (EQ-5D-3L): -0.09 (-0.14 to -0.03) p=<0.001. Depression (GDS): 0.2 (-0.2 to 0.7) p=0.29. Social Support (MOS 0.03 (-0.2 to 0.2) p=0.75. Social Activities: No significant differences were reported between groups for number of friends/family, club/group membership or frequency of get together with friends/family. The intervention group were less likely to report getting along with others (OR 0.6 (0.4 to 0.9) p<0.01). Social Participation (General Household Survey items housework, transport, childcare, advice, emotional support) w
		not different between groups.
Mercer et al	Health Related Quality of Life (EQ-5D-5L) 0.008 (-0.028 to 0.045) ^f	Well-being (ICECAP-A): -0.011 (-0.039 to 0.016) p=0.411. Mer health, anxiety (HADS-A): -0.41 (-0.99 to 0.18) p=0.172. Menta health, depression (HADS-D): 0.09 (-0.49 to 0.68) p=0.753. Wo
		and social adjustment scale: 0.05 (-1.37 to 1.48) p=0.940. Self-
		reported lifestyle activities (smoking, alcohol, exercise): no
		difference between groups. tudinal estimated difference in difference (95% CI) from 6 to 9 months adjusted for site
life that assesses =Geriatric Depress and Depression S Anxiety, where a possible caseness	5 dimensions at 5 levels of severity where 1 is ssion Scale, a screening tool for depression in c cale measured on a scale of 0-42 where a high score above 10 indicates possible caseness; H. s. Duke UNC Functional Social support scale m	the preferred state of health. EQ-5D-3L=an earlier version of EQ-5D-5L with 3 levels. GD older people with a score of 4 or more indicating possible depression. HADS = Hospital A ver score indicates worse mental health. HADS-A=Hospital Anxiety and Depression Scale ADS-D=Hospital Anxiety and Depression Scale, Depression, where a score above 10 indic easures an individual's social network, a higher score indicates stronger supports. MOS-
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PRISMA 2020 for Abstracts Checklist

Section and Topic	ltem #	Checklist item	Reported (Yes/No)
7 Title	1	Identify the report as a systematic review.	Yes
BACKGROUND			
⁹ Objectives	2	Provide an explicit statement of the main objective(s) or question(s) the review addresses.	Yes
METHODS	I		
12 Eligibility criteria	3	Specify the inclusion and exclusion criteria for the review.	Yes
¹³ Information sources	4	Specify the information sources (e.g. databases, registers) used to identify studies and the date when each was last searched.	Yes
6 Risk of bias	5	Specify the methods used to assess risk of bias in the included studies.	
Synthesis of results	6	Specify the methods used to present and synthesise results.	Yes
		·	
20 Included studies	7	Give the total number of included studies and participants and summarise relevant characteristics of studies.	Yes
22 Synthesis of results 23	8	Present results for main outcomes, preferably indicating the number of included studies and participants for each. If meta-analysis was done, report the summary estimate and confidence/credible interval. If comparing groups, indicate the direction of the effect (i.e. which group is favoured).	Yes
25 DISCUSSION	T		
²⁶ Limitations of evidence	9	Provide a brief summary of the limitations of the evidence included in the review (e.g. study risk of bias, inconsistency and imprecision).	Yes
²⁸ 29 Interpretation	10	Provide a general interpretation of the results and important implications.	Yes
្រុំ Funding	11	Specify the primary source of funding for the review.	Yes
Registration	12	Provide the register name and registration number.	Yes
34 35 36 37 <i>From:</i> Page MJ, McKenzi 38 reviews. BMJ 2021;372:n7 ⁻ 39 40 41 42 43		For more information, visit: <u>http://www.prisma-statement.org/</u>	g systematic
5		For peer review only - http://bmjopen.bmj.com/site/about/guidelines.xhtml	

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