Loneliness interventions across the life-course: A rapid systematic review

Acknowledgements
This report was commissioned by the Department for Culture, Media and Sport (DCMS). We would like to thank officials in the DCMS Civil Society and Youth Directorate for their guidance throughout the project. We would like to thank Dr Jinan Rabbee, Katherine Tilley and Yuncong Liu for their contribution to data screening, data extraction and study management and acquisition.

We would also like to thank Dr. Julie Christiansen, Dr. Ruth Garside, and Dr. Pamela Qualter for their advisory support.

Authors' credits
This report was authored by Margherita Musella from What Works Centre for Wellbeing and Dr. Joanna Blodgett and Dr Fran Harkness from Kohlrabi Consulting.

1. Context for the review

1.1 Department for Culture, Media and Sport (DCMS) and Tackling Loneliness Strategy

Tackling loneliness and promoting social connection are key priorities for government. In 2018, the tackling loneliness strategy set out key objectives for its work in this area:

1. Reduce stigma by building the national conversation on loneliness, so that people feel able to talk about loneliness and reach out for help.

2. Drive a lasting shift so that relationships and loneliness are considered in policy-making and delivery by organisations across society, supporting and amplifying the impact of organisations that are connecting people.

3 Play our part in improving the evidence base on loneliness, making a compelling case for action, and ensuring everyone has the information they need to make informed decisions through challenging times.

In 2018, the What Works Centre for Wellbeing (WWCW) reviewed the intervention research on loneliness by examining systematic reviews published between 2008-2018. The Review of Reviews[1] identified interventions that focused on tackling loneliness among older populations in community settings and care homes [1] and highlighted potential mechanisms to explain how successful interventions work. Nonetheless, in regards to understanding what works and for whom, authors concluded that:

[1] This is a systematic review method that searches for reviews, rather than primary studies on a research question within a given topic area. More information is available at Chapter V: Overview of Reviews, Cochrane Training.

> "more large-scale, controlled study designs are required to draw any solid conclusions about what approaches are most effective, for which groups of people, in what settings and for how long."[2]

1.2 Knowledge gaps and the growing evidence base

Understanding the findings and quality of emerging loneliness research is essential to consolidate the evidence base and inform policy and programme design. Since 2018, loneliness intervention research has grown substantially and now includes evidence on effectiveness by age group - for under 25 years [2] -, intervention theme [3], and by mode of delivery [4]. There are, however, persistent gaps in research knowledge on what works to alleviate loneliness, for whom, how, in what contexts, and at what cost.

Loneliness measurement is increasingly used by government and the voluntary sector, giving rise to a growing and more diversified evidence base. In regard to loneliness evaluation, charities in particular need support to capture robust and consistent data so that beneficiary needs can be better understood, services can be evaluated and targeted effectively, and the case can be made for investment.

The DCMS Tackling Loneliness Evidence Group published an Evidence Review (2022) that recommended new research is guided by eight priority areas, including improving the effectiveness of interventions. In January 2023, DCMS commissioned WWCW and the Campaign to End Loneliness to map the landscape and evaluation practices of interventions aimed at alleviating loneliness, and to review recent findings published on their effectiveness. As part of this programme of work, WWCW and Kohlrabi Consulting conducted a rapid systematic review between January and May 2023.

The review aims to update our understanding, given the recent growth of the evidence base on what works to alleviate loneliness. Unlike the previous Review of Reviews, this research focuses on individual studies that report the effectiveness of interventions targeting individuals beyond old age. It therefore includes literature published between 2018 and 2023, to include and expand on the timeframe adopted by the 2018 review.

1.3 The rapid systematic review: key phases

The rapid systematic review method was used to identify, collate and synthesise evidence on the effectiveness of loneliness interventions.[3] This method is a simplified version of a systematic review and uses explicit, systematic methods to bring together evidence using pre-specified eligibility criteria to answer a specific research question.[4]

---

[2] A summary of findings is available in the WWCW Briefing of the loneliness Review of Reviews

[3] Reviewers followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines and Cochrane collaboration guidance to ensure consistency and transparency in their approach and reporting of findings.

[4] More information on the systematic review methodology can be found in the Cochrane Handbook.

In evidence-based practice, full systematic reviews cannot always be implemented due to evidence needs and resource constraints. Rapid reviews have emerged as a practical yet rigorous alternative and can be used to streamline traditional systematic review procedures to satisfy the needs and timelines of users such as government policymakers, healthcare institutions, and civil society funders. Further details of the search strategy, synthesis and reporting process are provided in Appendix 1.

The rapid systematic review had four key stages. In stage 1, the review team finalised the research question protocol and search strategy, with input from DCMS and a small group of independent experts. Consultation focused on the following issues/areas:

- Definitions and concepts to guide the literature search
- Approach for interventions where loneliness is a secondary aim or one of multiple aims
- Inclusion criteria for connector and system-level interventions
- Approach when dealing with loneliness intervention contexts, core themes and populations
- Approach to increase the sensitivity of grey literature searches and studies of UK interventions
- Approach when dealing with COVID-19 as a central setting or context for intervention

Table 1 below presents the final inclusion criteria for studies using the PICO approach. PICO is a tool used that helps researchers develop a search strategy by identifying the criteria for four key elements that each study must meet in order to be included: Population, Intervention, Comparator and Outcomes.

Table 1 Study inclusion criteria using PICO framework

Population	**No exclusions**
Intervention	Any intervention that is delivered directly to people where the primary aim is to alleviate loneliness (delivered in any OECD country)
Comparator	Must present comparison data from a control group (i.e. no intervention or usual care), or historical time-based comparators (i.e. pre-post test data).
Outcome	Must report loneliness outcomes using a standardised/valid quantitative measure.

Compared to the 2018 WWCW Review of Reviews, this rapid systematic review examined primary studies that measure loneliness pre-intervention (before they receive an intervention) and post-intervention (after they receive an intervention). Evidence published between 2008 and 2023 was included.

Research questions

1. “What is the effectiveness of interventions aimed at alleviating loneliness and/or social isolation in people of all ages across the life-course?”

2. “Is there an association between core intervention theme/setting/population and the direction and size of effect?”

In stage 2, a two-arm search strategy was used to identify studies from traditional academic databases and grey literature. The data extracted in stage 3 focused on study characteristics, including: study sample, intervention, results and the quality of evidence rating. Studies were grouped by four core themes – these are high-level groupings based on intervention aims, core components and mechanisms that lead to loneliness improvements.

Reviewers used the ‘What Works Centre for Wellbeing (WWCW) Quality Checklist’ to assess the quality of all included studies (see Appendix 2). Since the focus of this review was on quantitative evidence of effectiveness, qualitative data were not included in the quality assessment. Finally, in stage 4, the characteristics of all interventions were analysed by study type, design, theme, subtheme, target population, and loneliness measure used. Results were synthesised by core theme and subtheme the effectiveness of interventions was assessed through meta-analyses. These present data on the statistical significance and effect size of any changes in loneliness from pre to post intervention.

For studies that used a control group, a secondary meta-analysis was conducted by theme. Here, overall effect sizes show the difference in loneliness changes over time between the intervention and control groups. These generally represent the most robust estimates of loneliness impacts identified in the review.

Definitions and measures used in this review

Government defines Loneliness as “a subjective, unwelcome feeling of lack or loss of companionship. It happens when we have a mismatch between the quantity and quality of social relationships that we have, and those that we want.” [5, 6]

This definition is based on the subjective emotional experience of loneliness and is seen as distinct from social isolation which concerns the objective experience of how often we are alone.

Standardised loneliness measure – A measure of loneliness that is validated and widely accepted. In the UK, this includes harmonised ONS loneliness measures below.

Measures	Items	Response Categories
The three-item UCLA Loneliness scale	1. How often do you feel that you lack companionship?	Hardly ever or never, Some of the time, Often
	2. How often do you feel left out?	Hardly ever or never, Some of the time, Often
	3. How often do you feel isolated from others?	Hardly ever or never, Some of the time, Often
The direct measure of loneliness	How often do you feel lonely?	Often/always, Some of the time, Occasionally, Hardly ever, Never

2. Overall findings

2.1 Search results

Academic literature – returned a total of 6,512 records, with 341 selected for full text screening. Of the 341 full text records screened, 77 met the full review inclusion criteria. The most common reason for exclusion was loneliness not being a primary intervention aim.

Grey literature – returned a total of 1,517 records from electronic database searches and 364 records from websites and targeted domains. Of the 75 full-text records screened, 24 met full criteria and were included in the review. The most common reasons for exclusion were lack of validated measure of loneliness and loneliness not being a primary intervention aim.[5]

A full record of the search results can be found in Appendix 3.

2.2 Overview of studies

2.2.1 Study type and publication details

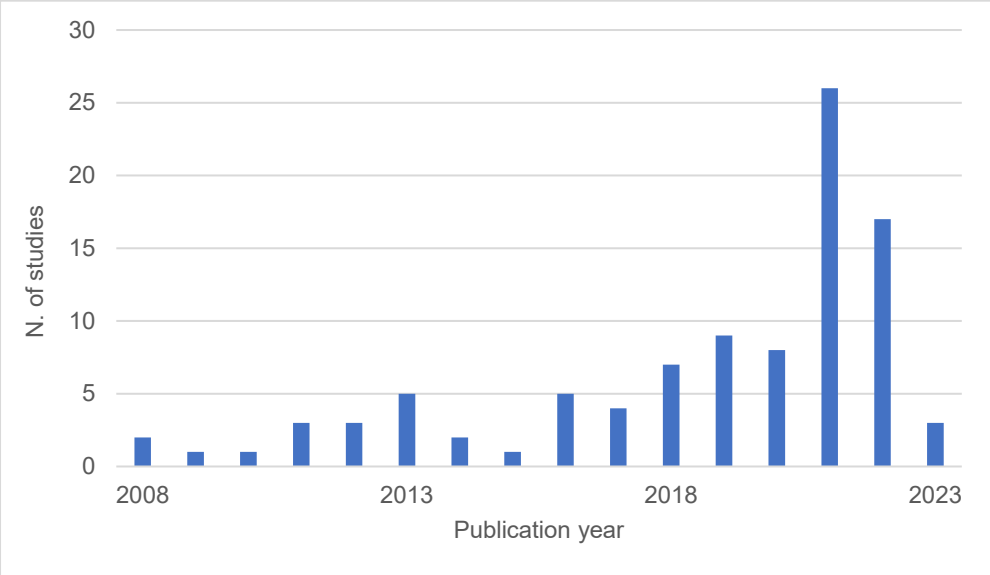
The review identified a total of 95 unique studies covering 101 different interventions aimed at alleviating loneliness across the life-course. The characteristics of all interventions are described by study type, design, theme, subtheme, target population, and loneliness measure used.

The majority were peer-reviewed studies (n=74) and published between 2019 and 2023 (n=61).[6] 21 studies were evaluation reports classed as grey literature and there was a notable increase in publications across evidence types in 2020.

[5] The total number of records included in the review was 101; six of these provided duplicate information on the same sample and intervention, leaving 95 unique studies. Five studies investigated multiple interventions arms (4 studies with 2 interventions, 1 study with 3 interventions), therefore a total of 101 interventions were included in synthesis.

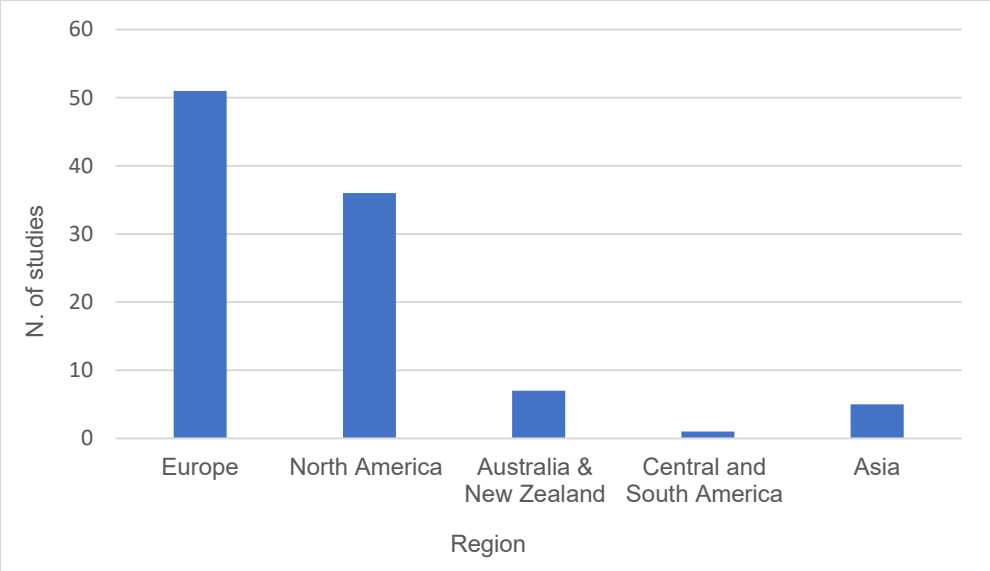
[6] In this report the number of studies is reported as (n=). When we say (n=74) this means 74 studies.

Figure 1: Studies published - by year



The interventions evaluated were delivered across 19 OECD countries, largely in Europe (n=49) and North America (n=34). Around one third of studies were of UK interventions (n=25) published between 2013 and 2020, the vast majority of which were grey literature studies (n=20).

*Figure 2: Interventions evaluated - by region**

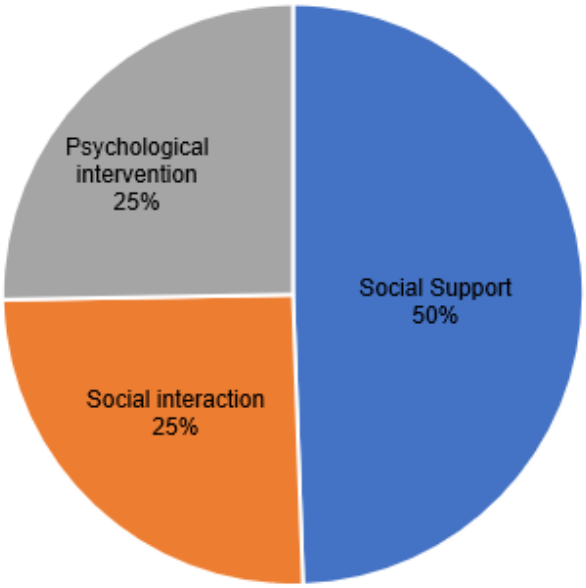


* OECD countries

2.2.2 Core intervention theme and target population

Figure 3 below provides a breakdown of interventions by core theme, based on intervention aims, core components and mechanisms that lead to loneliness improvements. The overall summary of study characteristics can be found in Appendix 4.

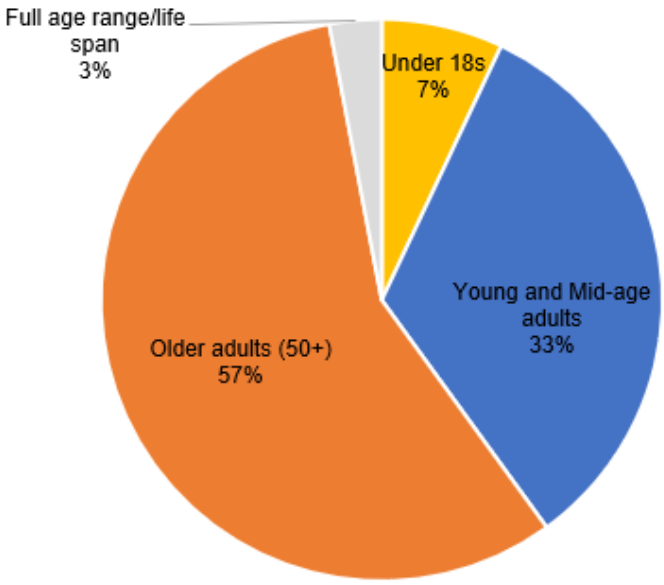
Figure 3: Interventions evaluated - by theme



2.2.3 Study population

The large majority of interventions were aimed at specific population groups, primarily, older people (50+) (n=56), followed by young and middle-aged adults (18-50 years) (n=32). Only two studies had samples of children (0-10 years), five of adolescents (11-18 years) and three were made up of individuals across the life course (e.g. age 8+ years).

*Figure 4: Interventions evaluated - by population group**



Approximately one third of studies explicitly mentioned vulnerable and traditionally 'at risk' groups, including: adults with a physical and/or mental health diagnosis or

concern (n=16), adults with a disability or learning difficulty (n=4), older adults living in residential care settings (n=7) and carers (n=3).

More than half of the interventions included targeted groups that were perceived as vulnerable to loneliness because they were at transition points in their lives, more commonly, transitions to old age (n=40), into education (n=14) and as refugees and/or migrants (n=2). The specific breakdown of sample characteristics by study are provided in Appendix 5. For four interventions, the COVID-19 pandemic was a central context and targeted populations included those most vulnerable to loneliness following social distancing regulations.

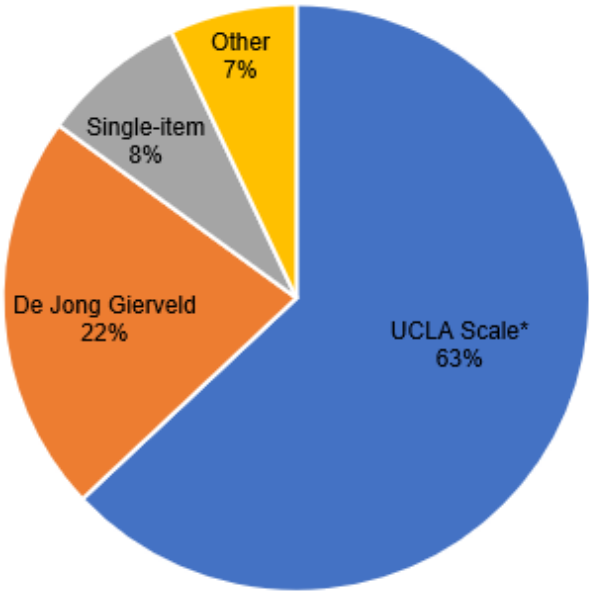
2.2.4 Evaluation designs and loneliness measures

Just under half of the studies used a control group (n=46), comparing an intervention to 'no intervention'. These studies primarily used randomisation at the individual level (n=23), followed by wait-list control designs (n=14). When assessing effectiveness, the inclusion of a control group is the gold standard for evaluating an intervention and is needed to assess if any changes in loneliness are due specifically to the intervention and not external factors.

Sample size varied widely across all studies, ranging from 5 to 4421 (median: 59). However, more than half of studies had a sample size of less than 100, with just 7 studies having more than 1000.

The most common measure of loneliness (n=69) was the UCLA loneliness scale, including versions that range from 3 to 20-items. This includes the UCLA 3-item measure which is one of the recommended national indicators of loneliness in the UK and measures subjective feelings of loneliness and social isolation.

Figure 5: Interventions evaluated - by loneliness scale



*Includes UCLA-3;4;6;8;10;20 versions of the scale

The De Jong Gierveld scale was used for approximately one quarter of study samples (n=25) to capture change in emotional and social loneliness pre-post intervention. This was followed by the single-item self-report loneliness measure (n=9) used primarily in evaluations of large-scale UK-based programmes and published as grey literature.

The large majority of studies reported reductions in loneliness reported as mean changes in point scores over time (n=81). Twelve studies presented findings by sub-group, and of these, the majority assessed if the impact of the intervention on loneliness differed by background characteristics (gender, age and ethnicity), personal circumstances (caring status, area of residence) and service use/profile (attendance and knowledge of intervention). Only two studies looked at findings by baseline loneliness status (improvements for individuals who were chronically lonely or 'very lonely' at the start of support).

In addition to loneliness scores for participants collected before and after intervention, nine studies reported loneliness sub scores; this included the emotional and social loneliness components of the De Jong Gierveld scale (n=7) and the social, familial and romantic components of the Social and Emotional Loneliness Scale for Adults (n=2). Changes in loneliness sub scores were consistent with overall loneliness change; for example, where overall loneliness decreased from pre to post intervention, both sub scores decreased.

Approximately one quarter of studies (n=25) used a qualitative method or technique within a mixed-method design to address set evaluation questions. The majority of these studies embeded qualitative methods within a largely quantitative design and the in-depth interview was the most common technique used.

3. Overview of findings

Findings from this rapid systematic review suggest that a range of intervention types and activities are effective to alleviate loneliness in the short-term across age groups and settings. Overall, a large part of the evidence base is for older age groups (50+), although adolescents and young adults are well-represented in robust studies showing large impacts on loneliness, published from 2013 onwards.

The thematic breadth of research is unsurprising given the complex and multi-layered nature of loneliness as a phenomenon. As a result, findings are best discussed by intervention theme where there is greater comparability based on intervention aims and core components.

3.1 Findings by core intervention theme

Study results were synthesised by core intervention theme and subtheme. Where available, information on the intervention settings, activities, and mode of delivery, is presented alongside findings on effectiveness. Table 2 below provides a description of each core theme.

Table 2 Description of core intervention themes

Theme	Description
Social support	Interventions that provide medium to longer-term and semi-structured and structured social support, or equip individuals with the necessary skills to facilitate social connection.
Social interaction	Interventions where the aim is to reduce loneliness by increasing opportunities for social contact and growing an individual's social relationships / network.
Psychological intervention	Interventions where the emphasis is on targeted non-pharmacological therapeutic support/treatment, often based on a psychological theory.
Multiple themes	Interventions with multiple components that span two or more core themes.

The effectiveness of interventions can be reported and explored in different ways and establishing 'what works' to alleviate loneliness is not straightforward. In order to describe themes and establish the effectiveness of interventions, reviewers conducted meta-analyses to summarise:

1. The pooled effect of interventions by overall theme
2. The pooled effect of interventions by subtheme
3. The pooled effect of interventions that used a control group (by overall theme).

A full description of results can be found in Appendix 5 and details of the methodology used are reported in Appendix 1.

Since nearly all studies reported mean loneliness scores pre- and post-intervention, reviewers reported the statistical significance and effect size of any changes in loneliness from pre- to post-intervention, typically between one to two months after the intervention. In this section, Tables 3-5 summarise information on effectiveness by subtheme in three ways:

1. Overall effect – This tells readers whether the pooled interventions improved loneliness, made it worse or had no effect. This is measured using '0' to indicate no change in loneliness, '<0' to indicate a decrease in loneliness and '>0' to indicate an increase in loneliness.

2. Effect size – This helps readers understand how big of an impact the intervention has on loneliness – was the effect of an intervention small, medium or large?

3. Statistical significance – This tells readers whether the effect on loneliness for pooled interventions is due to chance alone or other factors. It should always be interpreted alongside other findings, including effect size, confidence interval[7] and heterogeneity.

[7] For all effect sizes, reviewers reported 95% confidence intervals. This is always provided in brackets after the effect size, for example: -0.55 (95% confidence interval: -0.45, -0.65). This indicates that we are 95% confident that the true effect size falls within this range. Often a confidence interval is smaller when we have more studies, larger sample sizes and a similar effect size across studies. When the 95% confidence interval does not cross 0, we can say that there is a statistically significant impact on loneliness

Interpreting effect size [a]

In 1988, the psychologist and statistician Jacob Cohen suggested a way to interpret the size of the effects that is still widely used today:

0.2: small effect (although the intervention significantly improved loneliness, the improvement was quite small)

0.5: medium effect ("noticeable to the naked eye of a careful observer")

0.8: large effect (substantial improvement in loneliness scores, suggesting the interventions are working extremely well).

[a] See Cohen J. (1988). Statistical Power Analysis for the Behavioral Sciences. New York, NY: Routledge Academic

3.1 Social Support interventions

The review found 46 social support interventions spanning 45 individual studies [8-52][8]. Interventions within this theme provide medium to longer-term and semi- to structured social support or equip individuals with the necessary skills to facilitate social connection.

There is consistent evidence that social support interventions improve loneliness in the short-term. Overall, a small statistically significant effect was found for this theme, including from studies that used control groups which make up approximately one third of the overall evidence within this theme (n=17).[a]

[a] The overall effect for social support interventions was -0.34 (95% Confidence interval: -0.45, -0.22). It is based on 41 studies that provided mean loneliness scores before and after the intervention. Full results can be found in Appendix 5. There was high statistical heterogeneity (I^2 94%) which suggests that the differences in estimates between intervention are due to different effects of each study intervention rather than sampling error (i.e. chance).

Interventions were further grouped into five main subthemes. Table 3 below shows the statistical significance and effect size for each subtheme. Full results can be found in Appendix 5 (Figures 1-3).

[8] These study numbers correspond to references 8 to 52 in the 'References' section of this report.

Table 3 Social support interventions, results by subtheme

Subtheme	Number of interventions	Overall effect (95% CI)	Statistically significant?	Effect size
Befriending, mentoring and peer-support	20	-0.28 (-0.42, -0.14)	Significant	Small
Educational/ Social skills development	6	-0.57 (-1.09, -0.05)	Significant	Medium
Social prescribing	6	-0.49 (-1.07, 0.09)	Non-significant	n/a
ICT training	5	-0.37 (-1.02, 0.27)	Non-significant	n/a
Other	9	-0.16 (-0.34, 0.02)	Non-significant	n/a

Almost half of the studies reported statistically significant improvements (n=20) and eight found a significant improvement against a control group. These are discussed further in the sections below.

3.1.1 Befriending, mentoring and peer-support

Twenty interventions examined the effectiveness of 'Befriending, mentoring and peer-support' schemes [8-26]. Programmes ranged from targeted mentoring schemes lasting 1-3 months, to more informal befriending and peer-support made available for up to 12 months. All interventions were aimed at building supportive and purposeful relationships. They were primarily delivered in one-to-one formats and took place across community, healthcare and educational settings.

Eight studies found statistically significant reductions in loneliness post-intervention, the majority of which involved weekly peer-support and befriending sessions delivered through a weekly structure and included online, face-to-face and mixed delivery modes [10-17]. Of these, two demonstrated positive impacts on loneliness compared to a control group: a 4-week empathy-based listening programme targeting housebound adults [16] and an 8-week peer support intervention providing structured emotional problem-solving support aimed at over 60s [11].

Three studies examined loneliness scores by sub-group: an 8-month training programme for student peer mentors reported no intervention differences between boys and girls [18]; a 12-week telephone befriending intervention reported larger improvements in loneliness for participants with higher self-reported loneliness at baseline [19]; and a study of a peer-support service aimed at Somali and Sudanese refugees found larger improvements in loneliness for individuals who were Somali, female and single [17].

Two studies presented loneliness data from both mentor and mentee groups who participated in the intervention. Interestingly, Theurer et al. [15] reported that loneliness decreased in both mentors and mentees (both groups were older adults

living in a care home) following the intervention, whereas Juris et al., 2022 [20] reported no significant change in either group (university student mentors and older adult mentees).

3.1.2 Educational/Social skills development

Six interventions were classed as 'Educational/Social skills development' [27-32] and included group-based sessions to improve relationship-building skills and interpersonal skills [27-30] as well as interventions with a group discussion component [31].

Statistically significant improvements in loneliness from pre to post intervention were reported in three studies [27, 29, 31].

A further three found significant differences between intervention and control groups. They included two interventions targeting under 25s: a 9-week intervention to develop supportive relationships targeting young adults [28, 32] and a discussion-based intervention targeting adolescents [32]; and a social skills support intervention for adults with symptoms of depression [29]. The latter intervention demonstrated the biggest improvement in loneliness with scores decreasing from a mean of 25.13 (SD: 3.11) to 21.51 (1.82)[9] over the 4-week intervention (max score: 32). The former, which aimed to increase a sense of belonging through supportive relationships, reported stronger intervention effects in students from marginalised ethnic backgrounds, students from lower socioeconomic status households, and transfer students [28].

Evidence from a brief social skills group intervention targeting children (0-10) [27] and a 15-week community-focused intervention aimed at older people (60+) [31] both showed statistically significant improvements in loneliness with large effects, albeit there was no control group which limits the interpretability of results.

3.1.3 Social prescribing

Evidence on 'Social prescribing' was found in six studies, all of which were evaluations of UK-based interventions [33-38]. Social prescribing forms part of the UK's Universal Generalised care approach and is often referred to as a 'connector scheme' which includes personalised care and support planning to connect individuals to activities, groups, and services in their community in support of their health and wellbeing. The social prescribing models used in included interventions are primarily link worker models targeting adults with clinical needs [33, 35-37] or experiencing/at risk of experiencing loneliness [34, 38].

Although the pooled effect of social prescribing interventions was found to be small and non-significant, four individual studies found statistically significant improvements in loneliness post-intervention. One intensive personalised support programme targeting over 50s found significant differences between intervention and control groups [38]. The programme was delivered over 6-9 months and aimed to rebuild confidence and support connections within the community.

[9] The SD or standard deviation is measure of the amount of variation or dispersion of a set of values relative to its mean.

The remaining three studies involved link worker social prescribing schemes lasting between 8 to 12 weeks [33-35]. Of these, a study of a social prescribing link worker programme targeting older adults found a higher percentage of under 50s experienced loneliness improvements (76.2%) compared to over 50s (70.2%); white British participants experienced larger improvements than individuals of 'other' ethnic groups (74.3% compared to 70.5%) [34].

3.1.4 ICT training

Five studies examined the effectiveness of Information and Communication Technology (ICT training) interventions targeting older people (50+) [39-43]. Programmes involved classes dedicated to developing IT skills, social media skills, and online safety for up to 10 weeks. Only two studies reported statistically significant improvements in loneliness after the intervention: a 4-week computer class programme that introduced older adults to ICT via digital games [39] and a 4-week series of social media group training sessions [43]. Neither study that examined both control and intervention groups found a difference between groups in loneliness change overtime [43].

3.1.5 Other interventions

For the nine interventions classed as 'Other', five were delivered at the community-level [44-48] and four were delivered in healthcare settings [49-52]. Only three studies reported statistically significant improvements in loneliness post-intervention, including a structured social support intervention to help intellectually disabled adults increase their social networks [49] and a 4-week intervention that used an Amazon Echo personal voice assistant with older adults [44] that also had a medium effect size. Although evidence from a 4-month multi-tier intervention consisting of group and one-to-one goal-orientated social internet-based activities [46] found a decrease in loneliness in those who participated in the intervention, there was no statistically significant difference between intervention and control groups.

One controlled study used a single-item loneliness measure to assess an out-patient case management intervention that provided older people with information on recovery and linked to local activities [50]. The percentage of individuals reporting they felt "rather or very lonely" decreased by 10.1% after 6-months (26.1 to 15.9%), although returned to similar levels as baseline after 12-months (27.3%).[10] While the control group demonstrated larger increases in loneliness (baseline: 22.7%, 6-months: 31.6%, 12-months: 30.6%), there was only a statistical difference at the 6-month follow-up point.

3.2 Social interaction

Social interaction interventions aim to reduce loneliness by growing an individual's social relationships or network. The review found 23 interventions for this theme, reported in 19 studies [53-71]. Three studies presented multiple intervention arms; this included two versions of a meal delivery service for older community-dwelling adults and the other used weekly frozen meal deliveries [65], two digital interactions in the

[10] The single-item measure used was "Do you feel lonely nowadays?" Yes, I feel rather/very lonely; No, I don't feel lonely.

form of a social gaming app or a 'Push to Talk' device [66] and three different activities-based community interventions (fitness/arts, forums/buddy system, volunteer information) [68].

There is consistent evidence that social interaction interventions improve loneliness in the short-term. Overall, a medium-sized statistically significant effect was found for this theme, including from studies that used control groups which make up approximately one quarter of the overall evidence within this theme (n=6). [a]

[a] The overall effect for social interaction interventions was of -0.50 (Confidence interval -0.78, -0.23). This represents a medium-sized effect. It is based on 18 studies that provided mean loneliness scores before and after the intervention. Full results can be found in Appendix 5. There was substantial statistical heterogeneity (I^2 82%); this suggests that the differences in estimates between intervention are due to different effects of each study intervention rather than sampling error (i.e. chance).

Social interaction interventions were separated into three main subthemes. Table 4 below shows the statistical significance and effect size for each subtheme. Full results can be found in Appendix 5 (Figures 4-6).

Table 4 Social support interventions, results by subtheme

Subtheme	Number of interventions	Overall effect (95% CI)	Statistically Significant?	Effect size
Art/Music/Culture	8	-0.87 (-1.64, -0.09)	Significant	Large
Other Single Activities	8	-0.01 (-0.16, 0.14)	Not significar	No evidence of an effect
Multiple Activities	7	-0.54 (-0.91, -0.17)	Significant	Medium

Nine of these reported statistically significant improvements and six studies showed statistically significant differences between intervention and control groups. These are discussed further in the sections below.

3.2.1 Art/Music/Culture

Evidence on the effectiveness of 'Art/Music/Culture'-based activities was found for eight different interventions aimed primarily at older adults (60+) and all of which were delivered in face-to-face group settings. They included: Art [53, 54], Dance and participatory arts [55, 56], Music and singing [57, 58], Crafts [59] and Heritage [60] interventions.

Of these, four studies provided evidence of statistically significant improvements in loneliness post intervention [53, 54, 57, 59]: an 8-week singing programme [57]); a weekly art therapy group aimed at older people living alone [53] which also reported significant improvements between intervention and control groups; an arts intervention delivered in a community centre [54] and a project providing community spaces to encourage men to pursue leisure and practical activities [59]. There were no changes in loneliness from pre to post intervention for the heritage intervention [60], the choreography-based dance programme [56], or a series of brief participatory arts interactions with a social robot [55].

The final intervention – a group-based music making programme aimed at female carers of all ages - used the single-item direct loneliness measure [58]. There were larger improvements in older carers (aged 16+: 38% vs aged <16 years old: 22%) and those who had not received support before (no previous support: 41% vs previous support: 25%).

3.2.2 Other single-themed

Eight interventions had 'other'-themed activities which included: a Spiritual/religious focus [61] Physical activity [62], Animal/robot interaction [63, 64], Food delivery [65] (one intervention delivered to two separate groups) and Online social groups [66] (one intervention delivered to two separate groups).

Five interventions did not formally test for differences from pre to post interventions. Two found statistically significant reductions in loneliness, although neither study used a control group. These were: a 12-week programme of virtual church sessions aimed at older adults [61] and a 2-month intervention using an animatronic pet (choice of cat or dog) where participants received automated weekly phone-calls reminding them to interact with their pet [64]. The physical activity intervention, 3-months of twice weekly tai chi qigong classes, did not have a significant effect on loneliness [62].

Finally, a 12-week programme involving interactions with an advanced robot [63] and a traditional daily meal delivery service for older people living alone [65] both reported statistically significant improvements in loneliness between groups compared to control.

Evidence from two interventions used the single-item direct loneliness measure to report findings. Of these, two projects aimed to test the effectiveness of a large-scale infrastructure programme that brought 5G technology to a deprived neighbourhood in northern England: the first was a social gaming app that used high bandwidth to increase online video communication and reported a reduction in participants feeling lonely 'often/always' and 'some of the time' by the end of the programme; the second was a Push to Talk device that grouped users into online 'communities' of people in similar situations [66] and reported an increase in participants feeling lonely 'often/always' and 'some of the time', although nearly half the sample was lost to follow-up.

3.2.3 Multiple activities

Of the seven interventions involving multiple activities [67-71] - including one study with three distinct community-level interventions [68]- three found statistically significant improvements: a programme of health promotion and social activities that found significant improvements for older adult participants compared to a control group [67], and two uncontrolled studies that included a community-level intervention connecting senior migrants to leisure activities and library services [68] and a 12-week programme of recreational activities aimed at female prisoners [69]. However, all studies demonstrated a positive trend, producing a medium overall effect size.

3.3 Psychological interventions

Psychological interventions provide targeted non-pharmacological therapeutic support/treatment, often based on a psychological theory. There were 23 psychological interventions consisting of 14 Therapy interventions [72-84] and 9 'Other' approaches [85-93].

There is strong evidence that psychological interventions improve loneliness in the short-term. Overall, a **large statistically significant effect** was found for this theme, including from studies that used control groups which make up over two thirds of the overall evidence for these interventions (n=16).[a]

[a] The overall effect for psychological interventions was of -0.79 (Confidence interval -1.19, -0.38). This represents a large effect. It is based on 22 studies that provided mean loneliness scores before and after the intervention. Full results can be found in Appendix 5. There was substantial statistical heterogeneity (I^2 79%); this suggests that the differences in estimates between intervention are due to different effects of each study intervention rather than sampling error (i.e. chance).

Psychological interventions were separated into two main subthemes. Table 5 below shows the statistical significance and effect size for each subtheme. Full results can be found in Appendix 5 (Tables 7-8).

Table 5 Psychological interventions, results by subtheme

Subtheme	Number of interventions in subtheme	Overall effect (95% CI)	Statistically Significant?	Effect size
Therapy	14	-1.05 (-1.80, -0.29)	Significant	Large
Other	9	-0.51 (-0.79, -0.23)	Significant	Medium

There was a large effect size for therapy-based intervention and a medium effect size for 'Other' approaches. Nine studies reported statistically significant improvements compared to a control group, nearly all of which reported large effect sizes [72-77, 81, 83, 93].

3.3.1 Therapy

The majority of studies focused on the impacts of therapeutic approaches, specifically: two group therapy programmes targeting young adults [73], a Mindfulness intervention targeting older adults [72], seven Cognitive Behavioural Therapy interventions targeting older adults [84], university students [81], adults experiencing loneliness and distress [76, 77] and adults with health-related conditions [82]. Other group therapy approaches included sandplay and interpersonal therapy targeting migrant adult women [75], group counselling [74], narrative therapy [79], laughter [78] and attachment-based therapy [80].

3.3.2 Other approaches

Four studies involved psychological interventions to develop emotional and social skills among older adults in a community setting [87], adults with social anxiety disorder [89] and in an education-based setting with adolescents (11-18 years) [93] and university students [85]. One study assessed the effects of a pet therapy intervention with university students [90].

Finally, a stress reduction intervention targeting adolescents (11-18 years) involved a 28-day Self-Care programme including guided exercises, stress management education and goal setting activities [88]. This intervention also examined sub-group differences by United States Region and found larger statistically significant improvements for adolescents in the Western region of the USA, compared to the Southwest, Midwest, Southeast and Northeast regions.

Three interventions found statistically significant improvements for participants post-intervention but did not use control groups. These included the use of a 'Theory of Mind' approach with school children [86], and a meditation intervention delivered to medical professionals [91].

3.4 Multiple-themed interventions

The review found nine interventions involving activities that spanned two or more core themes [94-102]. Studies within this group present evidence on group and one-to-one interventions aimed largely at older people (50+). The majority were grey literature evaluation reports of national and city-wide programmes, delivered following England's national strategy to tackle loneliness and social isolation in 2018.

Five studies reported mean loneliness scores pre- and post-intervention, with four demonstrating improvements in loneliness over time (Appendix 5, Figure 9[11]) [94-97]. These four studies present evidence from the Ageing Better programme and are discussed in further detail below.

3.4.1 Ageing Better Programme

The Ageing Better programme was a National Lottery Community Fund programme funded between 2015 and 2022 and delivered by 14 Voluntary, Community and Social Enterprise (VCSE) sector-led partnerships across England. The programme aimed to promote the active involvement of over 50s in their communities to combat social isolation and loneliness. It involved a range of programmes and projects providing intensive one-to-one support, social prescribing/connector interventions and social activities to promote social interaction. This review examined the quantitative evidence on loneliness alleviation presented from five Ageing Better evaluations identified in our searches [94-98].

Four studies were evaluations of city-wide Ageing Better programmes [94-96, 98]. One programme included 19 separate projects delivered to and with the local community,

[11] Note that due to substantial heterogeneity between the complex interventions - all of which had multiple components - only individual effect sizes are reported in Appendix 5.

and the evaluation cohort activities included data from projects delivering meal-sharing activities; cultural appropriate group activities; walking/outdoor interventions and arts/theatre/dance activities [94].

A second programme provided group and one-to-one support on: Intergenerational Activity, Creativity and Arts, Peer Support, Food and Nutrition and Talking therapies [96]. It also reported statistically significant effects disaggregated by socio-demographic characteristics (age, gender, ethnicity, area of residence) and background circumstances (caring status); greater improvements in loneliness were observed in those aged 70 and below, females, individuals from white ethnic background, those living in less deprived areas and carers.

A third city-wide programme targeted geographic areas with a higher risk of isolation and specific at-risk groups (older LGBT people and older carers) [95]. The evaluation data captured the effects of skills development activities, physical activities and social activities on loneliness and found that loneliness decreased for almost one third of participants (32%) from by the end of the programme.

The fourth city-wide programme provided both group and 1-to-1 therapeutic and befriending activities based on the 'Five Ways to Wellbeing' [98]. The evaluation reported that loneliness levels decreased for around 40% of participants.

Finally, the end of programme Ageing Better evaluation examined data on loneliness alleviation for beneficiaries across the 14 partnerships and specifically, for the following intervention types: IT interventions, Asset-based community development (ABCD), Creative activities, Social interventions, Culture change, Knowledge sharing/building, Social prescribing, Mental health, Physical health and Transport [97].

Evidence from the Ageing Better evaluations have consistently suggested that loneliness improved over time in those participating in activities. For example, the final programme evaluation summarised that Ageing Better participants were less lonely 6 months (44% to 37%) and 12 months (45% to 36%) after starting the programme [97]. However, the control group (older adults who did not take part in any activities) demonstrated a similar – albeit unexpected – decline in loneliness over the same time period (43% to 38% for 6-months; 47% to 36% for twelve months); the effectiveness of the programme must be interpreted with caution.

3.4.2 Other interventions

Three interventions within this subtheme used the direct loneliness self-report measure ('How often do you feel lonely?') which defines individuals reporting they feel lonely 'always or often' as chronic loneliness.

The Building Connections fund was the first ever government fund dedicated to reducing loneliness in England, with 126 VCSE sector organisations delivering community-based individual and group interventions. The most common activities were face-to-face befriending, mentoring and peer-to-peer support and aimed to increase social connections and foster a sense of community and belonging [102]. Limited quantitative data suggested that half of participants improved their loneliness after engaging in the programme, although 'Trust in staff and volunteers', 'Feeling safe'

and ‘Feeling that change was possible’ were identified as key pathways of change for loneliness improvements.

The GoodMood project aimed to alleviate loneliness in older adults by providing a social intervention chosen by the individual (i.e. weekly group supervised exercise, weekly group social activity, or personal counselling every 3rd week) [100]. Chronic loneliness decreased over a 6-month period, with 50.9% of participants reported they ‘very rarely or never’ felt lonely compared to 31% pre-intervention.

The final intervention aimed to help voluntary sector organisations adapt services that addressed loneliness during COVID-19 restrictions [101], including befriending services and provision of ICT support. Those reported that they felt lonely ‘often’ decreased from 27% to 17% after engaging in these services.

3.5 Insights from qualitative data

Qualitative data were extracted from 25 studies, the majority of which were social support-themed interventions (n=18), followed by social interaction (n=4) and multiple themed interventions (n=3). Below are some of the insights on enabling factors, key ingredients and causal pathways in the context of loneliness alleviation. Further details are available in Appendix 5.

For structured social support interventions, qualitative data provide insight into some of the enablers and pathways to improvements in loneliness.

There appear to be key barriers to sustained engagement for interventions that use befrienders, mentors and link workers. In the case of social prescribing schemes in particular, the lack of local infrastructure, health and mobility issues faced by participants, and other personal circumstances for specific groups such as carers, can act as important barriers to face-to-face participation.

The use of technology or remote settings appears to have positive effects overall, with the potential to make participants feel connected to the outside world, although there are concerns about ongoing internet costs after support ends and of individuals losing interest.

Overall, the emotional bond and caring/trusting relationship at the heart of one-to-one social support interventions appear to act as catalysts for larger changes in loneliness. Mentors, befrienders, link workers and home-sharers all act as connectors to the wider world, providing a first step towards increasing the confidence and social connectedness of participants.

For group activities, qualitative data suggest that participants value tailored approaches to deliver group activities

Specific factors that enable participation include: the opportunity to connect with ‘people like you’, a safe place to meet, ‘locally situated’ activities, as well as skilled facilitation.

Community-focused connections and the experience of positive emotions/mood may be a precursor to reduced loneliness. Group settings also appear to offer a pretext for social

contact and meaningful interaction, and acting as catalysts for larger individual-level changes.

4. Quality of evidence

Quality assessment was carried out to examine the reliability of evidence included in the review. The validated WWCW quality checklist was used to examine the level of confidence for each study against 10 quality criteria (Appendix 2).

This checklist offers a pragmatic alternative to a full risk of bias assessment and helps readers understand the credibility of results presented in quantitative studies and the level of confidence when using them in decision-making. For each quality criterion studies were scored either 1 (yes) or 0 (no, can't tell or N/A). These scores were pooled and each study was assigned an overall as low (0-2), moderate (3-6) or high (7-10).

The majority of studies were assigned a 'high' quality score based on their design, conduct and reporting (n=60), followed by 'moderate' (n=35). No study received a 'low' confidence rating. Overall, studies described intervention designs and activities in sufficient detail and almost all conducted statistical tests on loneliness scores.

Grey literature reports scored substantially lower than peer-reviewed papers (11% vs 76% scored 'high'). The most common reason for lower scores was the lack of a meaningful counterfactual and, for studies without a control group, the failure to report on the representativeness of study samples and attrition rates. These quality ratings only apply to quantitative evidence as qualitative data were not assessed for quality.

One of the main methodological issues affecting quality scores was the lack of a control group in 49 studies. Without a control group, any changes in loneliness observed cannot be attributed to the loneliness interventions themselves and may be due to other factors. Another issue was bias from potentially high attrition rates. Almost half the studies did not describe differences between their baseline samples and the participants lost to follow-up and many researchers chose to only include individuals who had completed both pre- and post-measurements.

While the WWCW quality checklist provides a tested and comprehensive assessment of the design, conduct and reporting of quantitative data within studies, its use of binary responses for appraisal criteria (yes; no/can't tell) may have led reviewers to overestimate the quality scores where criteria were easily met. These include the 'sample size' criteria, where complete pre-post data is required for a minimum of 20 participants, and the use of validated measures as the sole criteria for a high 'measurement' criteria score. (See Appendix 2 for a description of criteria).

There is additional information that is not captured by the critical appraisal tool, for example, certain inconsistencies in the description of evaluation designs and data collection, as well as transparency on how missing data was dealt with. Often studies only included information on participants with data on both baseline and endline loneliness scores, and did not describe those who dropped out of the intervention. Data from studies that did describe these individuals suggests that they had higher loneliness scores at baseline than those who completed the intervention, therefore, any findings reported by studies on pre-post changes in loneliness should be treated with caution.

5. Strengths & limitations

This review adhered to rigorous systematic guidance from the Cochrane collaboration [7], including registering a protocol, conducting a comprehensive search of multiple academic databases, and 19 grey literature sources. Multiple reviewers were used to screen records for eligibility and appraise the quality of included records, and careful consideration was used to minimise missing data for meta-analyses. Review inclusion criteria were broad in terms of study sample, loneliness measure and intervention, enabling a wide range of evidence to be included, increasing the generalisability of the findings.

The focus was on studies where the alleviation of loneliness was a key aim. This is a major strength as it limits search results to interventions that intentionally target loneliness and can provide a more accurate depiction of what works to improve loneliness. Finally, the extraction of qualitative data alongside quantitative estimates of effectiveness provides insight into potential enablers and mechanisms of success which is distinct from previous reviews in the field.

Nonetheless, there are several limitations. Firstly, only English-language studies were included, which may introduce bias due to missing evidence from non-English-speaking OECD-based countries. Due to the rapid nature of the review, only three academic databases were screened, and secondary screening of reference lists from included studies was not conducted. In addition, studies where loneliness was one of more than three outcomes were excluded, increasing the risk that potential evidence on loneliness effectiveness was missed. The quality of evaluations is relatively high when scored against broad quality criteria. Furthermore, several appraisal items were included in the inclusion criteria (i.e. standardised measure of loneliness, pre and post measure of loneliness); quality scores are likely to be lower if a more comprehensive risk of bias tool is used, for example, as part of a full systematic review.

As a review that focused on the quantitative evidence of effectiveness, findings on changes in loneliness were measured using commonly-used loneliness scales. Although these scales are reliable and well-validated, they largely capture information on the frequency of loneliness at a given timepoint. As a result, they may not be providing a full and nuanced picture of the duration and intensity of loneliness within a specific timeframe or be appropriate for specific populations.

Due to the rapid nature of the review and its focus on quantitative evidence of effectiveness, reviewers did not search for qualitative data and process evaluations were excluded. In cases where included studies were mixed-method and published qualitative data separately, the records were not retrieved or extracted. As a result, the qualitative data presented in the discussion does not portray a comprehensive picture of the contextual factors that are likely to play an important role in how interventions are delivered and the circumstances that allow them to work effectively.

Finally, while meta-analyses allow readers to understand the effects of interventions by theme, subtheme and study design, the breadth of interventions across studies introduced substantial heterogeneity in the review results. Further investigation of intervention design and delivery (e.g. individual vs group, frequency, duration, setting) is required to better understand the ingredients of a successful intervention.

6. Conclusions

6.1 Loneliness evaluation research from 2008-2023

This rapid systematic review found 95 individual studies, published between 2008 and 2023, which present evidence on the effectiveness of 101 loneliness interventions.

Loneliness evaluation research has grown exponentially since 2020 and to date, the field is largely composed of peer-reviewed studies published in Europe and North America. For UK-based interventions, the majority of evidence is from grey literature reports.

The UCLA loneliness scale – the UK's national indicator of indirect loneliness – is by far the most commonly used measure in included studies, followed by the De Jong Gierveld scale. The vast majority of studies report effectiveness using results from statistical tests conducted on mean scores for participants pre- and post-intervention and nearly half of the studies identified use a control group.

Overall, the quality of included studies is moderate to high, although the lack of a control group and potentially high attrition rates affect the reliability of findings. A more thorough risk of bias assessment as part of a full systematic review would likely generate lower overall quality scores across the included set of studies.

6.2 Core intervention themes and subthemes

The most common core intervention theme was social support for approximately half of studies. This includes medium to longer-term and semi-structured to structured social support interventions, or projects that equip individuals with the necessary skills to facilitate social connection. Befriending/mentoring/peer-support programmes, followed by social and emotional skills development were the most common intervention types.

Social interaction-themed interventions reduce loneliness by growing an individual's social relationships or network, while psychological interventions provide targeted non-pharmacological therapeutic support/treatment, often based on a psychological theory. The review found the same proportion of studies for each of these themes. Arts/music/culture and social activities with multiple-themes were the most common social interaction-based programmes, while structured therapy-based approaches made up the vast majority of psychological interventions.

6.3 Findings on effectiveness

Effectiveness was assessed by calculating the overall effect and the effect size on loneliness for interventions, which were pooled by theme and subtheme. Meta-analyses were conducted to calculate the statistical significance, and estimate the importance of effects on loneliness - as small, medium or large. These estimates provide an indication of 'what works' to alleviate loneliness in the short-term; however, they should be interpreted with caution given the variability of data between studies, including participants, interventions and settings. They should continue to be tested in future research using robust quantitative evaluation designs, where appropriate, and explored alongside more nuanced findings at the individual study-level.

The more reliable evidence of effectiveness was from controlled studies and found medium to strong statistically significant effects for a range of intervention types spanning

three core themes. Overall, it suggests that there are multiple approaches to alleviating loneliness in the short-term, almost all of which target specific age groups or vulnerable populations. More specifically, these include:

- Structured therapeutic support and approaches that develop emotional and social skills. These include interventions targeting adolescents and young adults in education-based settings and Cognitive Behavioural Therapy delivered to individuals over 18 years of age.

- Social support interventions that develop social skills through targeted relationship-building skills and discussion-based activities.

- Interventions involving art and dance activities in community-based settings as a medium to facilitate social inclusion.

- Social interaction interventions involving facilitated animal/robot interactions, food delivery and social and health promotion activities within a single programme have moderate to strong effects on loneliness across different age groups.

In studies that did not use control groups, consistent evidence of loneliness improvements was found for a range of targeted approaches. This includes evidence for:

- Interventions that combine social and psychological support, 8-12 week social prescribing link worker schemes and government-funded programmes providing social activities and support through voluntary sector organisations.

- The UK Ageing Better programme (2017-2022) which consistently suggest that community-focused active participation in a wide range of group and one-to-one activities can generate loneliness improvements for over-50s.

Given the targeted nature of programmes included in the review, it is likely that context/s play an important role in shaping the success of loneliness interventions. While qualitative data were not systematically searched for in this review, evidence from approximately one quarter of studies sheds light on potential enabling factors, key ingredients and causal pathways that may lead to improvements in loneliness.

- For social prescribing schemes, the lack of local infrastructure, health and mobility issues faced by participants, alongside other personal circumstances, can act as important barriers to face-to-face participation.

- The emotional bond and caring/trusting relationship built with mentors, befrienders, link workers and homesharers all act as connectors to the wider world, providing a first step towards increasing the confidence and social connectedness of participants.

- For group activities, specific factors that enable participation include: the opportunity to connect with ‘people like you’, a safe place to meet, ‘locally situated’ activities, as well as skilled facilitation.

- Community-focused connections and the experience of positive emotions/mood may be a precursor to reduced loneliness. Group settings also appear to offer a pretext for social contact and meaningful interaction, acting as catalysts for larger individual-level changes.

7. Recommendations for future research and practice

For policy-makers and commissioners, systematic reviews provide a comprehensive picture of loneliness interventions and detailed information on the value and reliability of their findings.

Overall, improving the quality of evaluations is likely to generate more solid conclusions about 'what works' to tackle loneliness. Using a broader range of evaluation designs may also improve the transferability of evidence across contexts. Below are some specific recommendations to build on the findings of this rapid systematic review, to develop the loneliness evidence base in a comprehensive, relevant, and consistent way:

For evaluation practice:

7.1 Adopt rigorous quantitative designs to evaluate loneliness interventions across populations

Where possible, organisations should aim to use control groups to assess whether changes in loneliness are due specifically to the intervention and not external factors. Wait-list control designs and the use of Propensity Score Matching (PSM) may offer a practical and ethical viable alternative to Randomised Controlled Trials (RCT) to evaluate the effectiveness of social support and psychological interventions.

7.2 Adopt theory-based evaluation to explore the contexts, mechanisms and causal pathways that lead to loneliness improvements

Given the importance of context in the design and effectiveness of loneliness interventions, theory-based and process evaluations provide evidence on how interventions work and in what circumstances. Evaluators should be supported to use qualitative methodologies that build solid hypotheses about the context and implementation of interventions, and assess potential mechanisms and pathways of action that underlie successful interventions. The data collected should also include service-led perspectives to shed light on the potential usefulness of interventions and identify causal claims to test in quantitative designs.

For funders and commissioners:

7.3 Ensure there is adequate funding to support the use of robust and appropriate evaluation methodologies

Commissioners should ensure that policy and programme design build in time and funding for organisations to adopt robust qualitative and quantitative evaluations. Providing chosen evaluation designs are feasible and appropriate, adequate funding will help ensure the integrity and quality of any data collected and strengthen evaluation results and recommendations.

7.4 Commission timely and relevant reviews of the evidence base

Given the rapid growth of loneliness intervention research, reviewers should explore the feasibility of living reviews to allow emerging findings to be rapidly identified and disseminated to decision-makers. The timing of reviews should ideally be aligned with policy development and funding, for example, the government's Know Your Neighbourhood Fund which will pilot approaches to loneliness alleviation through 'test and learn'.

7.5 Commission primary research to address knowledge gaps for specific intervention types and populations

There are some notable gaps in the evidence identified in this review, including for areas where the evidence base may still be at an early stage, for example, evaluations on connectivity, including digital skills programmes and workplace interventions. In addition, there continues to be a knowledge gap in relation to loneliness alleviation for specific groups, including individuals at different life stages, ethnic minorities, and LGBTQ+ individuals.

More evidence is needed on the nature, prevalence and severity of loneliness among recipients of loneliness interventions. In particular, the high prevalence of physical and mental health issues among target populations needs further exploration and can improve our understanding of the specific risk factors for loneliness across age groups.

8. References

1. Victor C, Mansfield L, Kay T, Daykin N, Lane J, Duffy LG, et al. An overview of reviews: the effectiveness of interventions to address loneliness at all stages of the life-course. 2018.
2. Eccles AMQ, Pamela. Review: Alleviating loneliness in young people – a meta-analysis of interventions. Child and adolescent mental health. 2021.
3. Lasgaard M, Løvschall C, Qualter P, Laustsen L, Lim M, Maindal H, et al. Are loneliness interventions effective in reducing loneliness? A meta-analytic review of 128 studies. European journal of public health. 2022;32.
4. Elisabeth Boulton DK, Claire Stansfield, Paul Heron, Katy Sutcliffe BH, Alex Hall, Peter Bower, Dympna Casey LJ, Dawn Craig, Simon Gilbody, Barbara Hanratty DM, James Thomas, Chris Todd. Rapid review of reviews: what remotely delivered interventions can reduce social isolation and loneliness among older adults? ; 2020.
5. Perlman D, Peplau LA. Toward a Social Psychology of Loneliness Personal Relationships in Disorder. 1981:31-56.
6. ONS. Measuring loneliness: guidance for use of the national indicators on surveys. 2018.
7. Garritty C, Gartlehner G, Nussbaumer-Streit B, King VJ, Hamel C, Kamel C, et al. Cochrane Rapid Reviews Methods Group offers evidence-informed guidance to conduct rapid reviews. J Clin Epidemiol. 2021;130:13-22.
8. Hernandez-Ascanio J, Perula-de Torres LA, Rich-Ruiz M, Gonzalez-Santos J, Mielgo-Ayuso J, Gonzalez-Bernal J, et al. Effectiveness of a multicomponent intervention to reduce social isolation and loneliness in community-dwelling elders: A randomized clinical trial. Nursing open. 2023;10(1):48-60.
9. Sandu S, Sreedhar S, Chang L, Cohen L, Cruz A, Olson HR, et al. 21st Century Good Neighbor Program: An Easily Generalizable Program to Reduce Social Isolation in Older Adults. Frontiers in public health. 2021;9:766706.
10. Bouwman TE, Aartsen MJ, van Tilburg TG, Stevens NL. Does stimulating various coping strategies alleviate loneliness? Results from an online friendship enrichment program. Journal of social and personal relationships. 2017;34(6):793-811.
11. Lai DWL, Li J, Ou X, Li CYP. Effectiveness of a peer-based intervention on loneliness and social isolation of older Chinese immigrants in Canada: a randomized controlled trial. BMC geriatrics. 2020;20(1):356.
12. Lowthian JA, Lennox A, Curtis A, Wilson G, Rosewarne C, Smit DV, et al. HOspitals and patients WoRking in Unity (HOW R U?): telephone peer support to improve older patients' quality of life after emergency department discharge in Melbourne, Australia-a multicentre prospective feasibility study. BMJ open. 2018;8(6):e020321.
13. Ramamonjiarivelo Z, Osborne R, all, Renick O, Sen K. Assessing the Effectiveness of Intergenerational Virtual Service-Learning Intervention on Loneliness and Ageism: A Pre-Post Study. Healthcare (Basel, Switzerland). 2022;10(5).
14. Roberts JR, Windle G. Evaluation of an intervention targeting loneliness and isolation for older people in North Wales. Perspectives in public health. 2020;140(3):153-61.
15. Theurer KA, Stone RI, Suto MJ, Timonen V, Brown SG, Mortenson WB. The Impact of Peer Mentoring on Loneliness, Depression, and Social Engagement

in Long-Term Care. Journal of applied gerontology : the official journal of the Southern Gerontological Society. 2021;40(9):1144-52.
16. Kahlon MK, Aksan N, Aubrey R, Clark N, Cowley-Morillo M, Jacobs EA, et al. Effect of Layperson-Delivered, Empathy-Focused Program of Telephone Calls on Loneliness, Depression, and Anxiety Among Adults During the COVID-19 Pandemic: A Randomized Clinical Trial. JAMA psychiatry. 2021;78(6):616-22.
17. Stewart M, Simich L, Beiser M, Makumbe K, Makwarimba E, Shizha E. Impacts of a social support intervention for Somali and Sudanese refugees in Canada. Ethnicity and Inequalities in Health and Social Care. 2011;4(4):186-99.
18. Larsen TB, Urke H, Tobro M, Ardal E, Waldahl RH, Djupedal I, et al. Promoting mental health and preventing loneliness in upper secondary school in Norway: Effects of a randomized controlled trial. Scandinavian Journal of Educational Research. 2021;65(2):181-94.
19. Moonen G, Perrier L, Meiyappan S, Akhtar S, Crampton N. COVID-19 pandemic partnership between medical students and isolated elders improves student understanding of older adults' lived experience. BMC geriatrics. 2022;22(1):636.
20. Juris JJ, Bouldin ED, Uva K, Cardwell CD, Schulhoff A, Hiegl N. Virtual Intergenerational Reverse-Mentoring Program Reduces Loneliness among Older Adults: Results from a Pilot Evaluation. International journal of environmental research and public health. 2022;19(12).
21. Burchett N, Elford R, Robinson E. Standing Together Cymru. 2022.
22. Lorente-Martinez R, Brotons-Rodes P, Sitges-Macia E. Benefits of a psychosocial intervention programme using volunteers for the prevention of loneliness among older women living alone in Spain. Health & social care in the community. 2022;30(5):2000-12.
23. Simpson A, Flood C, Rowe J, Quigley J, Henry S, Hall C, et al. Results of a pilot randomised controlled trial to measure the clinical and cost effectiveness of peer support in increasing hope and quality of life in mental health patients discharged from hospital in the UK. BMC psychiatry. 2014;14:30.
24. Moore S, Preston C. The Silver Line: Tackling Loneliness in Older People. 2015.
25. Renaisi. North and South London Cares: Evaluation and Development through the Centre for Social Action Innovation Fund. 2016.
26. Theurer KA, Stone RI, Suto MJ, Timonen V, Brown SG, Mortenson WB. 'It makes life worthwhile!' Peer mentoring in long-term care-a feasibility study. Aging & mental health. 2021;25(10):1887-96.
27. Bostick D, Anderson R. Evaluating a small-group counseling program-A model for program planning and improvement in the elementary setting. Special Issue: Action research in school counseling. 2009;12(6):428-33.
28. Costello MA, Nagel AG, Hunt GL, Rivens AJ, Hazelwood OA, Pettit C, et al. Facilitating connection to enhance college student well-being: Evaluation of an experiential group program. American journal of community psychology. 2022;70(3):314-26.
29. Haslam C, Cruwys T, Chang MXL, Bentley SV, Haslam SA, er, et al. GROUPS 4 HEALTH reduces loneliness and social anxiety in adults with psychological distress: Findings from a randomized controlled trial. Journal of consulting and clinical psychology. 2019;87(9):787-801.

30. Lim MH, Gleeson JFM, Rodebaugh TL, Eres R, Long KM, Casey K, et al. A pilot digital intervention targeting loneliness in young people with psychosis. Social psychiatry and psychiatric epidemiology. 2020;55(7):877-89.
31. Coll-Planas L, Del Valle Gomez G, Bonilla P, Masat T, Puig T, Monteserin R. Promoting social capital to alleviate loneliness and improve health among older people in Spain. Health & social care in the community. 2017;25(1):145-57.
32. Mattanah JF, Ayers JF, Br, BL, Brooks LJ, Quimby JL, et al. A social support intervention to ease the college transition: Exploring main effects and moderators. Journal of College Student Development. 2010;51(1):93-108.
33. Kellezi B, Wakefield JRH, Stevenson C, McNamara N, Mair E, Bowe M, et al. The social cure of social prescribing: a mixed-methods study on the benefits of social connectedness on quality and effectiveness of care provision. BMJ open. 2019;9(11):e033137.
34. Foster A, Thompson J, Holding E, Ariss S, Mukuria C, Jacques R, et al. Impact of social prescribing to address loneliness: A mixed methods evaluation of a national social prescribing programme. Health & social care in the community. 2021;29(5):1439-49.
35. Massie R, Ahmad N. An evaluation of Wolverhampton's Social Prescribing Service: A New Route to Wellbeing. Institute for Community Research and Development; February 2019
36. Llewellyn M, Wallace S, Wallace C, Elliott M, Williams M, Ganesh S. Evaluation of the pilot mental health social prescribing programme, Final Report for Mind Cymru. December 2020.
37. Red Cross & The Coop Foundation. Tackling Loneliness and Isolation: Findings from the evaluation of our Connecting Communities service. The Co-op Foundation, British Red Cross May 2019
38. McDaid D, Park A-L, Fernandez J-L. Reconnections: Impact evaluation report Care Policy and Evaluation Centre, London School of Economics; June 2021.
39. Antunes TPC, de Mello Monteiro CB, eira, Crocetta TB, de Lima Antao JYF, Leitao FNC, et al. Digital games in the computer classes to reduce loneliness of individuals during aging. Current Psychology: A Journal for Diverse Perspectives on Diverse Psychological Issues. 2022:No-Specified.
40. Fields J, Cemballi AG, Michalec C, Uchida D, Griffiths K, Cardes H, et al. In-Home Technology Training Among Socially Isolated Older Adults: Findings From the Tech Allies Program. Journal of applied gerontology : the official journal of the Southern Gerontological Society. 2021;40(5):489-99.
41. Gadbois EA, Jimenez F, Brazier JF, Davoodi NM, Nunn AS, Mills WL, et al. Findings From Talking Tech: A Technology Training Pilot Intervention to Reduce Loneliness and Social Isolation Among Homebound Older Adults. Innovation in aging. 2022;6(5):igac040.
42. Mullins LB, Skemp L, Reed D, Emerson M. Internet Programming to Reduce Loneliness and Social Isolation in Aging. Research in gerontological nursing. 2020;13(5):233-42.
43. Quinn K. Social media and social wellbeing in later life. Special Issue: New frontiers in international retirement migration. 2021;41(6):1349-70.
44. Jones VK, Hanus M, Yan C, Shade MY, Blaskewicz Boron J, Maschieri Bicudo R. Reducing Loneliness Among Aging Adults: The Roles of Personal Voice Assistants and Anthropomorphic Interactions. Frontiers in public health. 2021;9:750736.

45. Kramer LL, van Velsen L, Clark JL, Mulder BC, de Vet E. Use and Effect of Embodied Conversational Agents for Improving Eating Behavior and Decreasing Loneliness Among Community-Dwelling Older Adults: Randomized Controlled Trial. JMIR formative research. 2022;6(4):e33974.
46. Larsson E, Padyab M, Larsson-Lund M, Nilsson I. Effects of a social internet-based intervention programme for older adults: An explorative randomised crossover study. The British Journal of Occupational Therapy. 2016;79(10):629-36.
47. Nguyen LT, Prophater LE, Fazio S, Hulur G, Tate R, Sherwin K, et al. Project VITAL at Home: Impact of Technology on Loneliness and Well-Being of Family Caregivers of People with Dementia. Clinical gerontologist. 2022:1-12.
48. Ohta R, Maiguma K, Yata A, Sano C. A Solution for Loneliness in Rural Populations: The Effects of Osekkai Conferences during the COVID-19 Pandemic. International journal of environmental research and public health. 2022;19(9).
49. Broer T, Nieboer AP, Strating MMH, Michon HWC, Bal RA. Constructing the social: An evaluation study of the outcomes and processes of a 'social participation' improvement project. Journal of Psychiatric and Mental Health Nursing. 2011;18(4):323-32.
50. Taube E, Kristensson J, Midlov P, Jakobsson U. The use of case management for community-dwelling older people: the effects on loneliness, symptoms of depression and life satisfaction in a randomised controlled trial. Scandinavian journal of caring sciences. 2018;32(2):889-901.
51. Macmillan T, Ronca M, Bidey T, Rembiszewsk P. Evaluation of the Homeshare pilots, Final report. Traverse March 2018
52. The Mental Health Foundation. An Evaluation of the Standing Together project 2018.
53. Aydin M, Kutlu FY. The Effect of Group Art Therapy on Loneliness and Hopelessness Levels of Older Adults Living Alone: A Randomized Controlled Study. Florence Nightingale journal of nursing. 2021;29(3):271-84.
54. Richmond-Cullen C. The effect of an artist in residence program on self-reported loneliness in senior citizens. Educational Gerontology. 2018;44(7):425-32.
55. Fields N, Xu L, Greer J, Murphy E. Shall I compare thee...to a robot? An exploratory pilot study using participatory arts and social robotics to improve psychological well-being in later life. Aging & mental health. 2021;25(3):575-84.
56. Hansen P, Main C, Hartling L. Dance Intervention Affects Social Connections and Body Appreciation Among Older Adults in the Long Term Despite COVID-19 Social Isolation: A Mixed Methods Pilot Study. Frontiers in psychology. 2021;12:635938.
57. Adery LH, Park S. A pilot choral intervention in individuals with schizophrenia-spectrum conditions; Singing away loneliness. PsyCh journal. 2022;11(2):227-31.
58. Apteligen. Evaluation of the Carers' Music Fund: Final report 2021
59. Starks L. Researching the benefits and impact of Men's Sheds on their members 2023.
60. Brown J, Brown K, Clayton D, Mcgill G, Padley W, KD V. Local History Cafes: An Evaluation of the Initial Programme. Museum Development East Midlands 2019.

61. Blevins. A Faith-Based Intervention to Address Social Isolation and Loneliness in Older Adults. Journal of Christian nursing : a quarterly publication of Nurses Christian Fellowship. 2023;40(1):28-35.
62. Chan AW, Yu DS, Choi KC. Effects of tai chi qigong on psychosocial well-being among hidden elderly, using elderly neighborhood volunteer approach: a pilot randomized controlled trial. Clinical interventions in aging. 2017;12:85-96.
63. Robinson H, Macdonald B, Kerse N, Broadbent E. The psychosocial effects of a companion robot: a randomized controlled trial. Journal of the American Medical Directors Association. 2013;14(9):661-7.
64. Tkatch R, Wu L, MacLeod S, Ungar R, Albright L, Russell D, et al. Reducing loneliness and improving well-being among older adults with animatronic pets. Aging & mental health. 2021;25(7):1239-45.
65. Thomas KS, Akobundu U, Dosa D. More Than A Meal? A Randomized Control Trial Comparing the Effects of Home-Delivered Meals Programs on Participants' Feelings of Loneliness. The journals of gerontology Series B, Psychological sciences and social sciences. 2016;71(6):1049-58.
66. DCMS, Consortium Lg. Liverpool 5G Health and Social Care Testbed: Benefits, Outcomes and Impact. November 2019
67. Rodriguez-Romero R, Herranz-Rodriguez C, Kostov B, Gene-Badia J, Siso-Almirall A. Intervention to reduce perceived loneliness in community-dwelling older people. Scandinavian journal of caring sciences. 2021;35(2):366-74.
68. Bartlett H, Warburton J, Lui C-W, Peach L, Carroll M. Preventing social isolation in later life: Findings and insights from a pilot Queensland intervention study. Ageing & Society. 2013;33(7):1167-89.
69. Basaran Z. The Effect of Recreational Activities on the Self-Esteem and Loneliness Level of the Prisoners as an Alternative Education. Universal Journal of Educational Research. 2016;4(5):1080-8.
70. Roland H, Ilin Shpilkerman Y, Schaub J, Comeau A-C. Connection Through Calls: The Impact of a Seniors Center Without Walls on Older Adults' Social Isolation and Loneliness. Gerontology & geriatric medicine. 2021;7:23337214211063102.
71. Routasalo PE, Tilvis RS, Kautiainen H, Pitkala KH. Effects of psychosocial group rehabilitation on social functioning, loneliness and well-being of lonely, older people: randomized controlled trial. Journal of advanced nursing. 2009;65(2):297-305.
72. Creswell JD, Irwin MR, Burklund LJ, Lieberman MD, Arevalo JMG, Ma J, et al. Mindfulness-Based Stress Reduction training reduces loneliness and pro-inflammatory gene expression in older adults: a small randomized controlled trial. Brain, behavior, and immunity. 2012;26(7):1095-101.
73. Cruwys T, Haslam C, Rathbone JA, Williams E, Haslam SA, er, et al. Groups 4 Health versus cognitive-behavioural therapy for depression and loneliness in young people: randomised phase 3 non-inferiority trial with 12-month follow-up. The British journal of psychiatry : the journal of mental science. 2022;220(3):140-7.
74. Gurgan U. The Effect of Psychological Counselling in Group on Life Orientation and Loneliness Levels of the University Students. Educational Research and Reviews. 2013;8(24):2303-12.
75. Jang M, Kim Y-h. The effect of group sandplay therapy on the social anxiety, loneliness and self-expression of migrant women in international marriages in South Korea. The Arts in Psychotherapy. 2012;39(1):38-41.

76. Kall A, Back M, Welin C, Aman H, Bjerk, er R, et al. Therapist-Guided Internet-Based Treatments for Loneliness: A Randomized Controlled Three-Arm Trial Comparing Cognitive Behavioral Therapy and Interpersonal Psychotherapy. Psychotherapy and psychosomatics. 2021;90(5):351-8.
77. Kall A, Jagholm S, Hesser H, Andersson F, Mathaldi A, Norkvist BT, et al. Internet-Based Cognitive Behavior Therapy for Loneliness: A Pilot Randomized Controlled Trial. Behavior therapy. 2020;51(1):54-68.
78. Ozturk FO, Tekkas-Kerman K. The effect of online laughter therapy on depression, anxiety, stress, and loneliness among nursing students during the Covid-19 pandemic. Archives of psychiatric nursing. 2022;41:271-6.
79. Stacey J, Edwards A. Resisting loneliness' dark pit: a narrative therapy approach. Tizard Learning Disability Review. 2013;18(1):20-7.
80. Yarnoz S, Plazaola M, Etxeberria J. Adaptation to divorce: An attachment-based intervention with long-term divorced parents. Journal of Divorce & Remarriage. 2008;49(3):291-307.
81. Tatlilioglu K. The Effect of Cognitive Behavioral Oriented Psycho Education Program on Dealing with Loneliness: An Online Psychological Counseling Approach. Education. 2013;134(1):101-9.
82. Theeke LA, Mallow JA, Moore J, McBurney A, Rellick S, VanGilder R. Effectiveness of LISTEN on loneliness, neuroimmunological stress response, psychosocial functioning, quality of life, and physical health measures of chronic illness. International journal of nursing sciences. 2016;3(3):242-51.
83. Theeke LA, Mallow JA, Theeke E. A Pilot One Group Feasibility, Acceptability, and Initial Efficacy Trial of LISTEN for Loneliness in Lonely Stroke Survivors. SAGE open nursing. 2021;7:23779608211015154.
84. Shapira S, Cohn-Schwartz E, Yeshua-Katz D, Aharonson-Daniel L, Clarfield AM, Sarid O. Teaching and Practicing Cognitive-Behavioral and Mindfulness Skills in a Web-Based Platform among Older Adults through the COVID-19 Pandemic: A Pilot Randomized Controlled Trial. International journal of environmental research and public health. 2021;18(20).
85. Bruehlman-Senecal E, Hook CJ, Pfeifer JH, FitzGerald C, Davis B, Delucchi KL, et al. Smartphone App to Address Loneliness Among College Students: Pilot Randomized Controlled Trial. JMIR mental health. 2020;7(10):e21496.
86. Caputi M, Cugnata F, Brombin C. Theory of mind and loneliness: Effects of a conversation-based training at school. International journal of psychology : Journal international de psychologie. 2021;56(2):257-65.
87. Cohen-Mansfield J, Hazan H, Lerman Y, Shalom V, Birkenfeld S, Cohen R. Efficacy of the I-SOCIAL intervention for loneliness in old age: Lessons from a randomized controlled trial. Journal of psychiatric research. 2018;99:69-75.
88. Iyer RB, Vadlapudi S, Iyer L, Kumar V, Iyer L, Sriram P, et al. Impact of the Heartfulness program on loneliness in high schoolers: Randomized survey study. Applied psychology Health and well-being. 2022.
89. Mueller NE, Cougle JR. Building Closer Friendships in social anxiety disorder: A randomized control trial of an internet-based intervention. Journal of behavior therapy and experimental psychiatry. 2023;78:101799.
90. Stewart LA, Dispenza F, Parker L, Chang CY, Cunnien T. A pilot study assessing the effectiveness of an animal-assisted outreach program. Journal of Creativity in Mental Health. 2014;9(3):332-45.
91. Thimmapuram J, Pargament R, Bell T, Schurk H, Madhusudhan DK. Heartfulness meditation improves loneliness and sleep in physicians and

advance practice providers during COVID-19 pandemic. Hospital practice (1995). 2021;49(3):194-202.
92. Travers C, Bartlett HP. Silver Memories: implementation and evaluation of a unique radio program for older people. Aging & mental health. 2011;15(2):169-77.
93. Vassilopoulos SP, Diakogiorgi K, Brouzos A, Moberly NJ, Chasioti M. A problem-oriented group approach to reduce children's fears and concerns about the secondary school transition. Journal of Psychologists and Counsellors in Schools. 2018;28(1):84-101.
94. Leyland A, Naughton-Doe R, Wigfield A, Martin C. Time to Shine local evaluation, Report 6: participation, engagement and outcomes for older people Leeds Older People's Forum, Centre for Loneliness Studies (University of Sheffield) 2022.
95. Moreton R, Stutz A, Richards S, Choudhoury A, Daly G. Evaluation of Ageing Better in Birmingham - Year 2 report CFE research 2019.
96. Jones M, Beardmore A, White J. Effects of Bristol Ageing Better Projects for Older People: Evaluation of the impacts of the programme on loneliness, isolation and a range of associated outcomes. University of the West of England March 2021.
97. Ecorys, Campbell-Jack D, Humphreys A, Whitley J, Williams J, K. C. Ageing Better: Impact Evaluation Report. . 2021.
98. Dayson C, Harris C, Bashir N, Bennett E, Woodward A. Evaluation of Age Better in Sheffield; The Impact on Social Isolation and Loneliness (2015-21). 2022.
99. Honigh-de Vlaming R, Haveman-Nies A, Heinrich J, van't Veer P, de Groot LCPGM. Effect evaluation of a two-year complex intervention to reduce loneliness in non-institutionalised elderly Dutch people. BMC public health. 2013;13:984.
100. Pynnonen K, Rantanen T, Kokko K, Tiikkainen P, Kallinen M, Tormakangas T. Associations between the dimensions of perceived togetherness, loneliness, and depressive symptoms among older Finnish people. Aging & mental health. 2018;22(10):1329-37.
101. Martin A, Crowley J, Pinto C, Shipsey F, Martin I, Windle K, et al. Covid-19 Loneliness Fund: A process evaluation. NatCen Social Research; 2021.
102. Rose A, Abrams T, Parker E, Todres G. The Building Connections Fund Part one: Evaluation of the Building Connections Fund prior to the Covid-19 pandemic. NPC; 2021