

Are Loneliness Interventions Effective for Reducing Loneliness? A Meta-Analytic Review of 280 Studies

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Loneliness is increasingly recognized as a critical public health concern, with growing evidence of the effectiveness of interventions to reduce loneliness across the lifespan. This preregistered systematic review and meta-analysis evaluated the effectiveness of interventions to reduce loneliness. The systematic review identified 312 studies. The meta-analysis included 280 studies (273 studies of short-term effects; 72 studies of long-term effects). Using random-effects models, a small to moderate short-term effect on loneliness (up to 4 weeks after the intervention) was observed (122 randomized controlled trials: standardized mean difference = -0.50 , 95% confidence interval [-0.60 , -0.39]; 33 multicohort studies: standardized mean difference = -0.51 , 95% confidence interval [-0.68 , -0.34]; 118 single-arm cohort studies: standardized mean difference = -0.38 , 95% confidence interval [-0.46 , -0.30]). Confidence in the estimates was assessed using the Grading of Recommendations, Assessment, Development, and Evaluation system and graded as low or very low. No statistically significant differences were found between age groups. Psychological interventions appeared to be the most effective intervention strategy for reducing loneliness, demonstrating a moderate effect, while social and emotional skills training, social network interventions, and social support interventions showed small to moderate effects. Further analyses demonstrated that long-term effects (1–6 months after the intervention) were comparable to short-term effects. The current meta-analysis provides overall evidence of the effectiveness of loneliness interventions. Given methodological limitations, it remains unclear whom the interventions would help the most. Overall, there is a need for rigorous and high-quality development and further evaluation of interventions for loneliness.

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continued

Public Significance Statement

The findings of this meta-analytic review indicate that interventions designed to reduce loneliness are effective. Psychological interventions are the most promising interventions for reducing loneliness, albeit the magnitude of the effects is moderate. A need exists for rigorous and high-quality evaluations of interventions for loneliness.

Keywords: loneliness, intervention, evaluation, meta-analysis

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Loneliness affects most people at some point in their lives. Experiencing loneliness is a basic part of being human and may even have an adaptive purpose, motivating the individual to reconnect with others (Qualter et al., 2015). However, when left unaddressed, loneliness has significant detrimental impacts on our health and well-being (Holt-Lunstad et al., 2015; Valtorta et al., 2016; van Dulmen & Goossens, 2013).

A common definition of loneliness was provided by the discrepancy model proposed by Peplau and Perlman (1982). There, loneliness was conceptualized as a negative, distressing emotional response to a discrepancy between one's desired and actual social relationships. Within that definition is the notion that loneliness is distinct from social isolation (i.e., being objectively socially isolated), and empirical work supports that claim (e.g., Beller & Wagner, 2018; de Jong Gierveld et al., 2006).

Loneliness is associated with an increased risk of earlier death (Holt-Lunstad et al., 2015), cardiovascular disease (Christiansen et al., 2021; Valtorta et al., 2016), and Type 2 diabetes (Christiansen et al., 2021; Hackett et al., 2020). Additionally, loneliness is an antecedent to depression (Mann et al., 2022), social anxiety (Lim et al., 2016; Mak et al., 2018), and nonclinical paranoia symptoms (Lim et al., 2016). Individuals who experience loneliness are also more likely to report suicidal ideation and behavior (McClelland et al., 2020). Beyond health, loneliness has been linked to poorer educational outcomes and job prospects (Jefferson, Barreto, Jones, et al., 2023; Jefferson, Barreto, Verity, & Qualter, 2023). Taken together, addressing loneliness may prevent poor physical and mental health and poor education and career outcomes, potentially reducing the economic burden on society (Mihalopoulos et al., 2020).

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The data reported in the article are publicly available on the Open Science Framework at <https://osf.io/fd3az/>. This study is preregistered (International prospective register of systematic reviews Registration No. CRD42020175954). The systematic review and meta-analysis of short-term effects has been presented in a scientific report in Danish, which was based on data collected before an update of the literature search.

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Mathias Lasgaard played a lead role in conceptualization, funding acquisition, methodology, project administration, supervision, writing—original draft, and writing—review and editing and an equal role in investigation. Pamela Qualter played an equal role in investigation, writing—original draft, and writing—review and editing. Claus Løvschall played a lead role in data curation, formal analysis, and visualization, a supporting role in writing—original draft, and an equal role in investigation and methodology. Lisbeth Mølgaard Laustsen played a supporting role in writing—original draft and an equal role in data curation, formal analysis, investigation, and writing—review and editing. Michelle H. Lim played an equal role in investigation, writing—original draft, and writing—review and editing. Sigrid Engelbrecht Sjø played a supporting role in investigation, visualization, and writing—review and editing. Lauren Burke played a supporting role in investigation and writing—review and editing. Emely Ek Blæhr played a supporting role in investigation and writing—review and editing. Helle Terkildsen Maindal played an equal role in investigation and writing—review and editing. Anne-Sofie Hargaard played an equal role in investigation and writing—review and editing. Robin Christensen played a supporting role in formal analysis, methodology, and writing—review and editing. Julie Christiansen played a lead role in formal analysis, investigation, and supervision, a supporting role in funding acquisition, and an equal role in methodology, writing—original draft, and writing—review and editing.

 The data are available at <https://osf.io/fd3az/>

 The preregistered design is available at https://www.crd.york.ac.uk/prospero/display_record.php?RecordID=175954

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Given the robust scientific research on the impact of loneliness on health and well-being, global attention on this issue has accelerated. In recent years, the [World Health Organization \(2021\)](#) and the European Commission ([Baarck et al., 2021](#); [Schnepf et al., 2024](#)) have released publications that examine how loneliness has affected the general population and specific communities. Such a focus is important, but a clearer understanding is needed of how effective interventions are designed.

To provide an understanding of the most promising interventions, previous reviews of loneliness interventions have examined different, broad categories of direct intervention strategies (e.g., [Eccles & Qualter, 2021](#); [Mann et al., 2017](#); [Masi et al., 2011](#)). [Mann et al. \(2017\)](#) proposed that loneliness may be addressed in individuals, in their local community, and in society, either directly (i.e., targeting loneliness and related concepts in social relationships) or indirectly (i.e., addressing poverty and inequalities, social cohesion). They distinguished between four direct intervention strategies—changing cognitions, social skills and psychoeducation, supported socialization, and wider community approaches—concluding that none of these approaches have a robust evidence base. The seminal meta-analytic review by [Masi et al. \(2011\)](#) examined 50 studies (published 1980–2009) and found that interventions aiming to improve social skills, enhance social support, increase opportunities for social interaction, and address maladaptive social cognition had a small to moderate effect on loneliness. In randomized controlled trials (RCTs), the largest effect was found in interventions targeting maladaptive social cognition, although this was supported by only four studies—a finding that has been heavily cited in the literature despite its limited empirical evidence.

Since [Masi et al.'s \(2011\)](#) review, systematic reviews have synthesized the effectiveness of loneliness interventions, focusing on specific age groups (e.g., [Cohen-Mansfield & Perach, 2015](#); [Eccles & Qualter, 2021](#)) or specific types of intervention (physical activity interventions, [Shvedko et al., 2018](#); psychological interventions, [Hickin et al., 2021](#); or digital interventions, [Sha et al., 2024](#)). Previous research indicates that interventions show some promise for reducing loneliness, but there is a need for a broad and rigorous meta-analytic review that includes recent literature to clarify whether specific types of interventions are effective in targeting loneliness across the lifespan. The present study is the first comprehensive meta-analytic review since that of [Masi et al.](#) to explore the effectiveness of loneliness interventions across all age groups and encompass a wide range of intervention strategies while including both controlled and uncontrolled studies. By including diverse populations and intervention types, our study provides a refined and thorough understanding of how loneliness has been addressed using different approaches. This broad scope highlights the evolving landscape of loneliness interventions, offering new insights into their effectiveness across the lifespan.

Examining broad categories of intervention strategies is essential because such analyses bring us closer to identifying and understanding the active ingredients of loneliness interventions. These strategies—which emerge across the literature on loneliness interventions—reflect different theoretical perspectives on the key components of loneliness and, thus, what should be addressed through intervention. For instance, social and emotional skills training aims to equip the individual to better form meaningful social relationships and to strengthen the skills to maintain them over time ([Mann et al., 2017](#)). This strategy mirrors a social deficit approach to loneliness ([Horowitz et al., 1982](#)). Likewise, proponents of the evolutionary theory of loneliness ([Cacioppo & Cacioppo, 2018](#)) posit that loneliness—driven by maladaptive cognition of social interactions and maintained by unconscious processes from implicit hypervigilance ([Cacioppo & Hawkey, 2009](#))—should be addressed by changing maladaptive social cognition, for instance, using cognitive behavioral therapy.

In recent years, a public health approach to loneliness has gained recognition as a compelling strategy for developing interventions to address loneliness ([O'Sullivan et al., 2022](#); [Prohaska et al., 2020](#)). Such an approach would include both large-scale community- and society-level actions ([National Academies of Sciences, Engineering, and Medicine, 2020](#)) and the development and implementation of targeted and tailored individual interventions. As such, [Lim et al. \(2020\)](#) argued that delivering and implementing only one type of solution (subscribing to a one-size-fits-all approach) is both problematic and limiting. That is because loneliness is associated with a multitude of correlates and risk factors, some more modifiable (e.g., socioenvironmental) than others (e.g., demographic; [Barreto et al., 2024](#); [Lim et al., 2020](#)). This makes addressing loneliness a complex endeavor, which means that interventions may need to be nuanced or targeted, highlighting that loneliness interventions may work differently across the population.

Purpose of the Present Study

The aim of the present meta-analytic review was to identify, assess, and summarize the effect of interventions aiming to alleviate loneliness. The number of studies evaluating loneliness interventions has increased steadily in recent years ([Welch et al., 2024](#)). However, meta-analytic reviews of those interventions have predominantly focused on specific age groups or intervention strategies, limiting their generalizability. Since the review by [Masi et al. \(2011\)](#), no attempt has been made to comprehensively assess the effectiveness of loneliness interventions across age groups and intervention strategies or to determine whether certain intervention types are more effective compared with others. Our meta-analytic review addresses that gap by synthesizing evidence on various intervention types and evaluations in a single, comprehensive analysis, adopting an inclusive approach that incorporates diverse study designs

(Tufanaru et al., 2015). Building on the framework established by Masi et al., we investigate the effects of interventions designed to target loneliness across (a) different age groups, (b) five distinct intervention strategies, (c) intervention modes (individual vs. group based), and (d) delivery methods (nondigital vs. digital). Additionally, the review evaluates the certainty of the evidence, offering insights into the confidence in these estimates.

Method

Eligibility Criteria

The a priori inclusion criteria were developed according to the population (P), intervention (I), comparison (C), outcome (O), and study design (S) framework (McKenzie et al., 2021). The criteria were as follows: (P) all age groups (independent of the participants' degree of loneliness), (I) direct interventions primarily aiming to alleviate loneliness, (C) studies with and without comparison groups, (O) loneliness measured as an outcome using a validated measure (e.g., the UCLA Loneliness Scale [UCLA]) or a self-labeling single item (e.g., "Do you feel lonely?"), and (S) RCTs, multicohort studies (comparing intervention and control groups with participants assigned to groups without randomization), and single-arm cohort studies (using pre- and postintervention data from the intervention group, without a control group), including pilot and feasibility studies for all study designs.

Studies were excluded if they (a) did not measure or report quantitative data, (b) had a small sample size ($n < 10$ in the intervention group), (c) were not published in English, German, or Scandinavian, or (d) were published before 1980. For the intervention to be considered a direct intervention (Mann et al., 2017)—qua our a priori inclusion criteria—its primary aim needed to be the alleviation of loneliness. This should be clear either from the program theory or be stated as a specific purpose of the intervention. If the intervention had several aims or comprised multiple modules, it was included if alleviation of loneliness was one of no more than three primary aims or if one third or more of the program was aimed at alleviating experiences of loneliness.

Search Strategy

The literature search was conducted in 2020 and updated in 2023–2024 (up to March 7, 2024). Figure 1 illustrates the search and selection process. We included journal articles, book chapters, and gray literature (including scientific reports, documents for peers, theses, dissertations, and unpublished studies). Using key terms (Supplemental Appendix S1), we systematically searched databases and trial registers (APA PsycInfo, PubMed, Embase, Web of Science, Cochrane Library, ProQuest Dissertations and Theses Global, International Clinical Trials Registry Platform, and the European Union Clinical Trials Register). We also

searched for gray literature in a wide range of databases (Open Grey, MedNar, WorldCat Library Catalog, National Institute for Health and Care Excellence, Grey Matters, and Google Scholar) and on Google (using a simple combination of keywords and by screening the websites of selected stakeholders). In addition, using hashtags based on key terms, we searched on Twitter/X for posts that might include relevant publications. Finally, 59 researchers, representing 23 countries, were identified and contacted based on their expertise and scientific work on loneliness interventions (36 of whom responded).

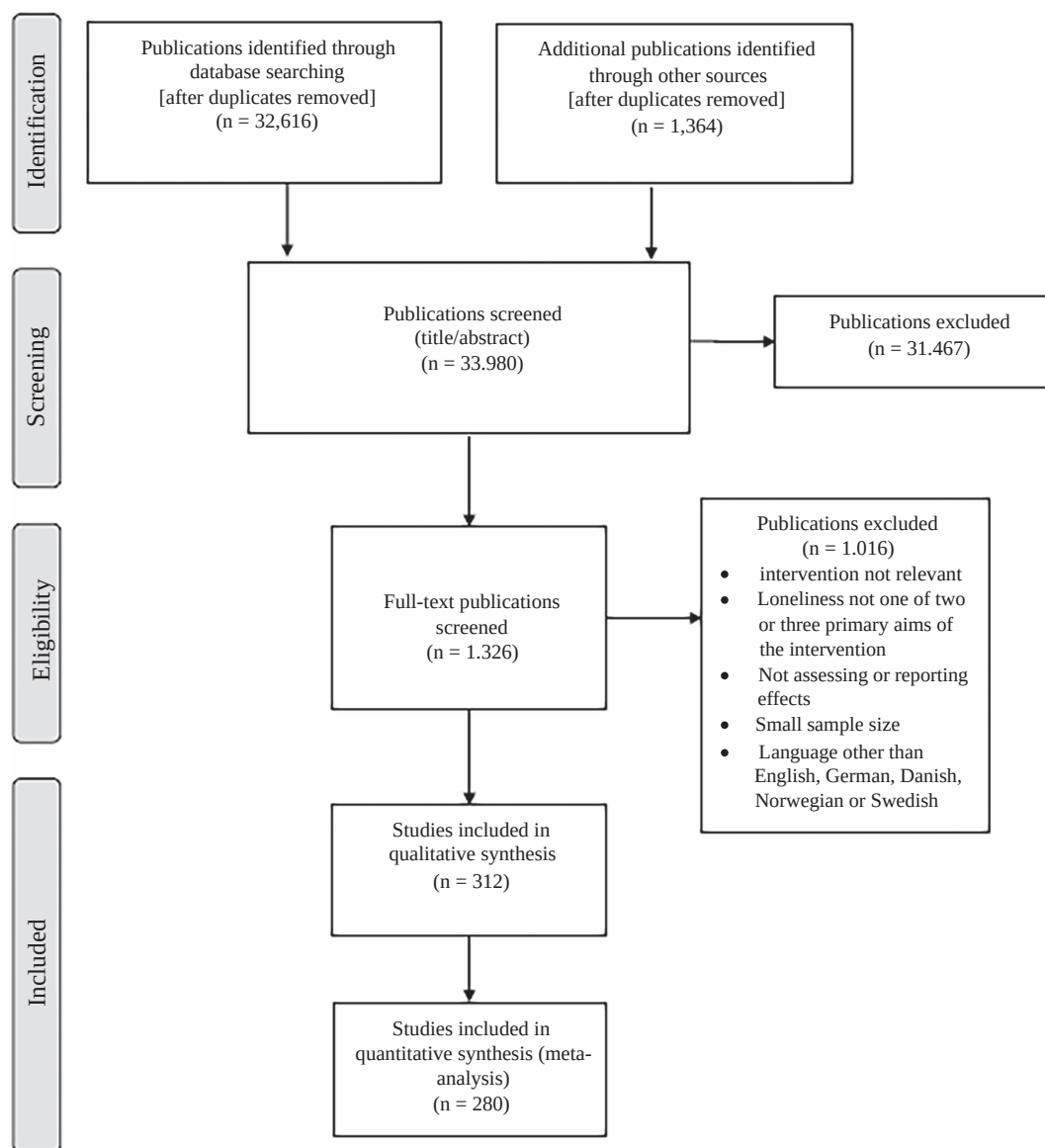
Study Selection

In total, the literature search produced 33,980 references (duplicates omitted). Following an initial screening of titles and abstracts (based on predefined eligibility criteria), additional searches were conducted for conference abstracts ($n = 145$), clinical trials ($n = 180$), systematic reviews ($n = 168$), and book chapters ($n = 11$) to identify potential relevant primary studies not included in the initial search. Studies identified through those supplementary searches were included in the gray literature search. The full text of 34 primary studies was unavailable (mainly older theses and dissertations). In total, the full text of 1,292 publications was assessed by two independent reviewers. The agreement between the two reviewers was high (86%–98%); disagreements were discussed until a consensus was reached. Among the 1,292 publications assessed in full, 312 primary studies (reported in 290 publications) met the eligibility criteria (databases: 262 studies; gray literature: 50 additional studies). The studies are presented in Supplemental Table S1 and numbered accordingly, with the references for all primary studies listed at the bottom. The three main causes for exclusion were (a) not a direct intervention, (b) lack of quantitative data, and (c) small sample size.

Data Extraction

One coder extracted relevant data following a predefined coding scheme. Another coder validated the extracted data. Discrepancies between coders were resolved by discussion, and, if needed, a third reviewer was consulted. The data extracted from the studies included author(s), year of publication, country, study design, sample size and attrition, sample characteristics, loneliness measure, number of assessments, description of intervention, intervention strategies, intervention format, and data on effects. Reflecting strategies used to differentiate loneliness interventions in previous reviews (e.g., Mann et al., 2017; Masi et al., 2011), five primary intervention strategies were coded: (a) social support interventions, (b) social network interventions, (c) social and emotional skills training, (d) psychological interventions, and (e) psychoeducation. These intervention strategies are defined as follows: *Social support interventions* are intended to provide regular

Figure 1
Preferred Reporting Items for Systematic Reviews and Meta-Analyses Flow Diagram



care and companionship while fostering a sense of connection, offering emotional and/or instrumental support (e.g., befriending services, mentorship programs). *Social network interventions* are intended to expand participants' social networks by creating opportunities for social interaction (e.g., senior meetings, activity groups, choirs, art programs, community excursions). *Social and emotional skills training interventions* are intended to improve participants' social and emotional skills (e.g., role playing, conversation-based training). *Psychological interventions* consist of therapy or counseling services aiming to address cognition, attention, behavior, or emotions (e.g., cognitive behavioral therapy, mindfulness programs). *Psychoeducation interventions* are

intended to increase knowledge about loneliness through an educational input (e.g., school-based educational programs). Following previous publications (e.g., Eccles & Qualter, 2021; Masi et al., 2011), intervention format was coded according to *mode*, distinguishing between individual- and group-based interventions, and *delivery*, distinguishing between nondigital and digital interventions.

Extraction of Effect Estimates

The effects were estimated as short-term follow-up (i.e., up to 4 weeks after the intervention) and long-term follow-up (i.e., 1–6 months after the intervention). The differentiation

between short- and long-term follow-up was conducted post hoc due to a large number of studies with multiple follow-up points, which made the investigation of sustained or delayed effects possible. In studies including data at several time points, baseline data were defined as the most recent data collection before the intervention was initiated; short-term follow-up was defined as the first data collection conducted less than 1 month after the intervention. Long-term follow-up was defined as the latest data collection within 1–6 months after the intervention as this could no longer be regarded as an immediate or “end-of-treatment” effect. Follow-up data, collected more than 6 months postintervention, were excluded from the analysis. The first data collection after baseline was regarded as short-term follow-up if the intervention had no clear endpoint.

Studies with multiple intervention or control groups were handled based on group differences (see [Supplemental Table S1](#) for details): Marginally different groups were combined, while substantially different groups (e.g., in format, content, or target group) were included independently. For studies wherein one group received the full intervention, only that group was included in the analysis. For studies with multiple active control groups, the control group most distinct from the intervention was analyzed. Studies from publications with multiple loneliness intervention studies were included independently if they met the inclusion criteria. Where data for effect size calculation were missing, we attempted to obtain those data from the authors (until December 15, 2024). In total, 32 of 312 studies were excluded from the meta-analysis due to insufficient data for an effect size calculation ([Supplemental Table S1](#)).

Risk of Bias Assessment

Two reviewers independently assessed the risk of bias for each of the included studies using the Cochrane Risk of Bias Tool for RCTs ([Higgins et al., 2011](#)) and the Scottish Intercollegiate Guidelines Network checklist for cohort studies (2021), both of which were adapted to the study designs. If needed, a third reviewer resolved disagreements. Assessments are depicted in a diagram (see [Supplemental Figure S1](#)). The assessed quality of each included study was summarized and categorized as low, moderate, or high (see [Supplemental Table S1](#)). The risk of bias assessment was included in the Grading of Recommendations, Assessment, Development, and Evaluation (GRADE) assessment (described below).

Statistical Analyses and Grading of Evidence

The standardized mean difference (SMD) was used as a summary statistic (effect size) based on the Hedges’ g adjustment. Negative SMD values express a decrease in loneliness scores (i.e., a potentially favorable outcome). An effect estimate (SMD) of ± 0.2 was interpreted as a

small effect, ± 0.5 as a moderate effect, and ± 0.8 as a large effect ([Schünemann et al., 2021](#)). Meta-analyses can derive intervention effects using either follow-up or change-from-baseline data in pooled analyses. Given the variety of study designs included in the current review, and the possible differences in baseline mean scores between intervention and control groups in small studies, it was decided, at the protocol stage, to conduct the meta-analysis based on change scores as the default option ([da Costa et al., 2013](#); [Higgins et al., 2024](#)). When available, unadjusted mean change and standard deviation (SD) were used to calculate SMD for RCTs and multicohort studies. To accurately reflect the original two-sample t test and ensure comparability, we standardized using the pooled SD of posttest scores. In the case of single-arm cohort studies, to summarize results, we used SMDs, incorporating data only from the experimental arm. This approach modifies the standard SMD calculation because the net benefit of intervention allocation cannot be directly estimated. Instead, we assumed counterfactually the existence of a virtual matched group that did not receive the intervention, imputing an average null change from baseline score ([Altman et al., 2016](#); [Haflíðadóttir et al., 2021](#)). This assumption of no intervention effect in the comparator group allowed us to compute an interpretable SMD as the mean change from baseline, using the corresponding SD , while simulating a null effect with the same dispersion (SD) for contrast ([Altman et al., 2016](#)).

When data were reported separately for different loneliness subscales, data from these subscales were combined. When several interventions from one study were included, the sample size of the control group was divided accordingly. If data were available only graphically, numerical data were approximated from figures. If SD s were missing, the SD s were estimated in accordance with recommendations from the *Cochrane Handbook* ([Higgins et al., 2021](#)). Estimates converted into SD included standard errors, interquartile range, 95% confidence interval (CI) for mean change, and p value for the null hypotheses. When necessary, assumptions were made such as SD s being equal in the intervention and control group or SD s being equal before and after attrition. When no means were reported, other estimates of effects were converted into SMD, if possible. P values for no difference between the mean change in the intervention and the control group were converted as recommended ([Normand, 1999](#)). For binary outcome measures, odds ratios (OR s) for the intervention versus control group at follow-up were converted using the approximation of SMD equaling $\ln(OR)$ divided by 1.81 ([Chinn, 2000](#)). Two independent reviewers checked the estimates.

Meta-analyses were conducted using a random-effects model by default. Conducting the meta-analysis and GRADE assessment (see below), we evaluated the comparability (between-study heterogeneity) of the included studies using the Q test quantified by the τ^2 . As recommended by

Riley et al. (2011), prediction intervals (PIs) should be reported when effect estimates are expected to vary across studies due to both true differences and sampling variability (chance). Accordingly, 95% PIs were applied to estimate the likely range of effects in an individual setting and facilitate the application of results to practice. Prespecified stratified analyses were conducted in relation to age, intervention strategy, and intervention format (group vs. individual; non-digital vs. digital). Age was analyzed in three overall groups: childhood and adolescence (6–25 years), early and middle adulthood (26–64 years), and old age (65+ years). Intervention strategy was analyzed by comparing studies using a specific intervention strategy with the remaining studies (i.e., studies not employing the specific intervention strategy) because some interventions employed several intervention strategies. As a sensitivity analysis, we pooled effects while excluding outliers, applying the widely used “nonoverlapping confidence interval” approach, in which a study is defined as an outlier when the 95% CI of the effect size does not overlap with the 95% CI of the pooled effect size (e.g., Cuijpers et al., 2023). Additionally, sensitivity analyses were conducted to examine whether (a) the quality of the included studies could explain differences in the estimates of short-term effects and (b) the type of loneliness measure (UCLA vs. other measures) could explain differences in those estimates. The two-sided significance level was tentatively set at $p < .05$ for all statistical analyses.

The certainty of the evidence (i.e., the confidence in the estimate) was assessed using the GRADE system (Guyatt et al., 2011). In this system, the certainty of evidence is determined based on the study design and possible downgrading according to five criteria (risk of bias, inconsistency, indirectness, imprecision, and other considerations). The certainty of evidence for each effect estimate was graded into four levels (very low, low, moderate, and high; Balshem et al., 2011). The certainty of the evidence was assessed separately for the three study designs and for short- and long-term effects.

Transparency and Openness

The study followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (Moher et al., 2009). The data used in the article are publicly available on the Open Science Framework at <https://osf.io/fd3az/>. Supplemental Materials include keywords for the literature search (Supplemental Appendix S1), a comprehensive table that summarizes the characteristics of all primary studies and includes a reference list of all included studies (Supplemental Table S1) and forest plots (Supplemental Figures S2a–S7a). Meta-analyses were performed using Stata, while risk of bias diagrams were generated using Review Manager (Version 5.3; The Cochrane Collaboration, 2014). The study was preregistered (Registration No. CRD42020175954).

Results

Study Characteristics

The 312 included primary studies comprised 146 RCTs, 40 multicohort studies, and 126 single-arm cohort studies (see Table 1 and Supplemental Table S1). Most interventions were conducted in North America (45%, 141/315) or in Europe (22%, 70/315), with fewer studies conducted in the Middle East (14%, 44/315) and Asia (13%, 40/315). Many interventions were targeted at older adults aged 65+ years (54%, 170/312). Most studies used the UCLA as a measure of loneliness, but the number of items and the response categories varied substantially. Most of the studies included fewer than 100 participants (75%, 233/312) and examined interventions aiming to alleviate loneliness in specific groups or settings, such as nursing home residents, individuals with chronic diseases, or school children. The intervention strategies most frequently used were social support (36%, 109/312), social network (31%, 96/312), and psychological interventions (27%, 84/312). In total, 69 of 312 studies (22%) used multiple intervention strategies. More interventions were group based (55%, 172/312) and nondigital (64%, 200/312), although the proportion of digital interventions increased over time. Furthermore, the number of studies increased substantially over time: 55% (172/312) were published from 2020 to March 7, 2024. Among the 280 studies included in the meta-analysis, 273 studies reported data on short-term effects, and 72 studies reported data on long-term effects (i.e., 208 studies reported only short-term effects, 65 studies reported short- and long-term effects, and seven studies reported only long-term effects).

Risk of Bias Assessment

The risk of bias assessment for the studies included in the meta-analysis is shown in Supplemental Figures S1 and S2b–S7b.

RCTs

Primary concerns were randomization and allocation processes, lack of blinding, and attrition. The randomization process was assessed as unclear in 71 of 127 studies (56%). Due to the nature of the interventions, it was rarely possible to blind either participants or personnel and volunteers. Other risks of bias included cluster randomization with differences between groups at baseline. Attrition was associated with a high or unclear risk of bias in more than half of the included studies (73/127).

Multicohort Studies

The primary concerns were lack of blinding, attrition, and potential confounding. Data on participation rates and the participants' comparability before and after attrition were missing or unclear for most studies (25/33 and 26/33,

Table 1
Descriptive Statistics of the Included Studies

Study characteristic	N (%)
Study design	
Randomized controlled trial	146 (47%)
Multicohort study	40 (13%)
Single-arm cohort study	126 (40%)
Publication year	
1980–1989	13 (4%)
1990–1999	7 (2%)
2000–2009	33 (11%)
2010–2019	87 (28%)
2020–2024	172 (55%)
Geography	
North America	141 (45%)
Europe	70 (22%)
Middle East	44 (14%)
Asia	40 (13%)
Other	20 (6%)
Number of participants	
N < 100	233 (75%)
N ≥ 100	79 (25%)
Age group	
Childhood and adolescence (6–25 years)	69 (22%)
Childhood (6–12 years)	13 (4%)
Adolescence (13–25 years)	56 (18%)
Early and middle adulthood (26–64 years)	72 (23%)
Old age (65+ years)	170 (54%)
Young-old age (65–79 years)	127 (41%)
Old-old age (80+ years)	43 (14%)
Loneliness measure	
The UCLA Loneliness Scale	227 (73%)
De Jong Gierveld Scale	44 (14%)
Other loneliness measures	31 (10%)
Single item	10 (3%)
Intervention strategy	
Social support interventions	109 (35%)
Social network interventions	96 (31%)
Social and emotional skills training	52 (17%)
Psychological interventions	84 (27%)
Psychoeducation	15 (5%)
2+ strategies	69 (22%)
Intervention format (mode)	
Group based	172 (55%)
Individual based	121 (39%)
Group based and individual based	18 (6%)
Intervention format (delivery)	
Nondigital	200 (64%)
Digital	104 (33%)
Both	8 (3%)
Study quality	
Low	130 (42%)
Moderate	155 (50%)
High	27 (9%)
Studies included in meta-analysis	
Short-term effects (≤4 weeks)	273 (88%)
Long-term effects (1–6 months)	72 (23%)

Note. N = 312.

respectively). Additionally, attrition was associated with a high or unclear risk of bias in most of the studies (22/33), and no studies were blinded. In 27 studies (82%), it was unclear whether knowledge of exposure status had affected the outcome measurement. Furthermore, the identification of possible confounders was also missing or unclear in most studies (29/33).

Single-Arm Cohort Studies

The primary concerns were attrition, the influence of exposure status on outcome measurement, and potential confounding. Attrition was associated with a high or unclear risk of bias in more than half of the studies (73/120). In 95 studies (79%), it was unclear whether knowledge of exposure status affected the outcome measurement. Additionally, the identification of possible confounders was missing or unclear in most of those studies (100/120).

Summary Scores

While 88% of the RCTs were assessed as being of moderate or high quality, only 48% of the multicohort studies and 25% of the single-arm cohort studies were assessed to be of moderate quality (Supplemental Table S1). By definition, single-arm cohort studies could not be assessed as high quality.

Meta-Analysis of the Short-Term Effect of Loneliness Interventions

RCTs

In total, 122 RCTs ($n = 13,971$) indicated that the short-term effect of interventions on loneliness was moderate ($SMD = -0.50$, 95% CI $[-0.60, -0.39]$, $p < .001$, Table 2; see Supplemental Figure S2a for distribution). Heterogeneity was substantial ($\tau^2 = 0.26$). The 95% PI $[-1.51, 0.52]$ indicates that, while the effect may be highly beneficial in some contexts, coming trials could also likely yield small or even inferior effects in others, reflecting considerable variations in potential net benefits. Overall, the certainty of the evidence was assessed as low (see Table 2).

Sensitivity Analysis. When outliers were excluded ($n = 32$), the effect size was reduced but remained consistent with the main findings ($SMD = -0.41$, 95% CI $[-0.48, -0.35]$, $p < .001$).

Multicohort Studies

In total, 33 multicohort studies ($n = 4,248$) indicated that the short-term effect of interventions on loneliness was moderate ($SMD = -0.51$, 95% CI $[-0.68, -0.34]$, $p < .001$, Table 2; see Supplemental Figure S3a for distribution). Heterogeneity was substantial ($\tau^2 = 0.14$). The 95% PI $[-1.30, 0.29]$ indicates considerable variability in potential effects, with the possibility of substantial benefits as well as small or even adverse effects. The certainty of the evidence from the 33 multicohort studies was assessed as very low (see Table 2).

Sensitivity Analysis. Excluding outliers ($n = 6$) resulted in a moderate reduction of the effect size ($SMD = -0.36$, 95% CI $[-0.47, -0.25]$, $p < .001$).

Table 2**Grading of Recommendations, Assessment, Development, and Evaluation Evidence Profile for the Short-Term Effect of Loneliness Interventions Compared With No Intervention**

Study design (<i>n</i>)	Certainty assessment					No. of participants		Effect		Certainty of evidence ^a
	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Loneliness intervention	No intervention	SMD [95% CI]		
RCTs (122)	Serious ^b	Serious ^c	Not serious	Not serious	None ^d	7,896	6,072	SMD 0.50 lower [−0.60, −0.39]	⊕⊕○○	Low
Multicohort studies (33)	Serious ^b	Serious ^c	Not serious	Not serious	None ^d	2,338	6,071	SMD 0.51 lower [−0.68, −0.34]	⊕○○○	Very low
Single-arm cohort studies (118)	Serious ^b	Serious ^c	Not serious	Not serious	None ^d	12,710	0	SMD 0.38 lower [−0.46, −0.30]	⊕○○○	Very low

Note. SMD = standardized mean difference; CI = confidence interval; RCTs = randomized controlled trials.

^aConfidence in the effect estimate was assessed as being low and very low due to deficiencies or problems (bias) in the studies and inconsistent results and type of study design. Confidence in the estimate illustrates that the “true” overall effect may very well be higher or lower than the reported estimate. ^bGeneral lack of information about the randomization and allocation process, high dropout rate, or lack of information about attrition in some of the studies and lack of blinding. ^cSignificant between-study heterogeneity. ^dPublication bias investigated with funnel plots.

Single-Arm Cohort Studies

In total, 118 single-arm cohort studies ($n = 12,710$) indicated that the short-term effect of interventions on loneliness was small to moderate (SMD = -0.38 , 95% CI [-0.46 , -0.30], $p < .001$, Table 2; see Supplemental Figure S4a for distribution). Heterogeneity was considerable ($\tau^2 = 0.15$). The 95% PI [-1.16 , 0.40] suggests that while the effect may be highly beneficial in some contexts, it could also be small or inferior in others, indicating considerable variability in possible intervention outcomes. The certainty of the evidence from the 118 single-arm cohort studies was assessed as very low (see Table 2).

Sensitivity Analysis. When outliers were excluded ($n = 26$), the effect size was slightly reduced but remained consistent with the main findings (SMD = -0.33 , 95% CI [-0.37 , -0.28], $p < .001$).

Stratified Analyses of the Short-Term Effect of Loneliness Interventions

Results of the stratified analysis of the short-term effects of loneliness interventions are presented in Supplemental Tables S2–S7, including τ^2 and 95% PIs.

Age Groups

RCTs

Stratified analysis of RCTs, as shown in Supplemental Table S2, indicated that the effect on loneliness was small to moderate for childhood and adolescence ($k = 34$; SMD = -0.37 , 95% CI [-0.49 , -0.25]) and early and middle adulthood ($k = 33$; SMD = -0.40 , 95% CI [-0.55 , -0.25]) and moderate to large for old age ($k = 55$; SMD = -0.62 , 95% CI [-0.84 , -0.41]). No statistically significant differences in intervention effects were found between the age groups.

Sensitivity Analysis. When outliers were excluded, the effect sizes were reduced for the older age group (Supplemental Table S5).

Multicohort Studies

Stratified analysis of multicohort studies, as shown in Supplemental Table S3, indicated that the effect on loneliness was moderate for childhood and adolescence ($k = 10$; SMD = -0.51 , 95% CI [-0.79 , -0.23]), early and middle adulthood ($k = 5$; SMD = -0.45 , 95% CI [-0.75 , -0.15]), and old age ($k = 18$; SMD = -0.51 , 95% CI [-0.74 , -0.27]). No statistically significant differences in intervention effects were found between the age groups.

Sensitivity Analysis. When outliers were excluded, the effect size was reduced for old age (Supplemental Table S6).

Single-Arm Cohort Studies

Stratified analysis of single-arm cohort studies, as shown in [Supplemental Table S4](#), indicated that the effect on loneliness was small to moderate for childhood and adolescence ($k = 17$; $SMD = -0.34$, 95% CI $[-0.48, -0.19]$), early and middle adulthood ($k = 23$; $SMD = -0.33$, 95% CI $[-0.45, -0.21]$), and old age ($k = 77$; $SMD = -0.40$, 95% CI $[-0.51, -0.28]$). No statistically significant differences in intervention effects were found between the age groups.

Sensitivity Analysis. The results remained consistent with the main findings when outliers were excluded from the analysis ([Supplemental Table S7](#)).

Intervention Strategy

RCTs

Stratified analysis of RCTs, as shown in [Supplemental Table S2](#), indicated that, when categorized by strategy, social support interventions ($k = 36$; $SMD = -0.32$, 95% CI $[-0.47, -0.16]$), social network interventions ($k = 22$; $SMD = -0.46$, 95% CI $[-0.72, -0.20]$), and social and emotional skills training ($k = 24$; $SMD = -0.42$, 95% CI $[-0.64, -0.20]$) had a small to moderate effect. Psychological interventions ($k = 48$; $SMD = -0.59$, 95% CI $[-0.77, -0.41]$) had a moderate to large effect, while psychoeducation ($k = 4$; $SMD = -0.92$, 95% CI $[-2.44, 0.59]$) demonstrated a large effect. Studies employing social support as intervention strategy exhibited a statistically significantly smaller intervention effect ($SMD = -0.32$ vs. $SMD = -0.56$, $p = .016$).

Sensitivity Analysis. The effect of psychoeducation was markedly reduced, corresponding to a small effect on loneliness, when outliers were excluded from the analysis ([Supplemental Table S5](#)).

Multicohort Studies

Stratified analysis of multicohort studies, as shown in [Supplemental Table S3](#), indicated that social support interventions ($k = 13$; $SMD = -0.11$, 95% CI $[-0.22, 0.00]$), social network interventions ($k = 13$; $SMD = -0.25$, 95% CI $[-0.42, -0.09]$), and psychoeducation ($k = 6$; $SMD = -0.11$, 95% CI $[-0.29, 0.08]$) had a small effect. Social and emotional skills training ($k = 8$; $SMD = -0.41$, 95% CI $[-0.69, -0.12]$) had a small to moderate effect, while psychological interventions had a large effect ($k = 8$; $SMD = -0.99$, 95% CI $[-1.55, -0.43]$). A statistically significantly larger effect was found in studies favoring psychological interventions compared with all nonpsychological interventions ($SMD = -0.99$ vs. $SMD = -0.40$, $p = .049$). Moreover, studies employing social support, social network, or psychoeducation as intervention strategy exhibited a statistically significantly smaller effect (social support interventions: $SMD = -0.11$ vs. $SMD = -0.75$, $p < .001$; social network interventions: $SMD = -0.25$

vs. $SMD = -0.70$, $p = .009$; psychoeducation: $SMD = -0.11$ vs. $SMD = -0.62$, $p = .001$).

Sensitivity Analysis. The effect of psychological interventions was markedly reduced, corresponding to a moderate effect on loneliness, when outliers were excluded from the analysis ([Supplemental Table S6](#)).

Single-Arm Cohort Studies

Stratified analysis of single-arm cohort studies, as shown in [Supplemental Table S4](#), indicated small to moderate effects across intervention strategies: social support interventions ($k = 56$; $SMD = -0.45$, 95% CI $[-0.58, -0.32]$), social network interventions ($k = 43$; $SMD = -0.32$, 95% CI $[-0.41, -0.23]$), social and emotional skills training ($k = 14$; $SMD = -0.31$, 95% CI $[-0.54, -0.09]$), and psychological interventions ($k = 15$; $SMD = -0.39$, 95% CI $[-0.58, -0.21]$). Investigating four different intervention strategies (excluding one study that employed psychoeducation), comparisons showed no statistically significant differences.

Sensitivity Analysis. The results remained consistent with the main findings when outliers were excluded from the analysis ([Supplemental Table S7](#)).

Mode: Individual- and Group-Based Interventions

RCTs

Stratified analysis of RCTs, as shown in [Supplemental Table S2](#), indicated that the effect on loneliness was moderate to large for group-based interventions ($k = 68$; $SMD = -0.59$, 95% CI $[-0.76, -0.43]$) and small to moderate for individual-based interventions ($k = 48$; $SMD = -0.31$, 95% CI $[-0.41, -0.20]$). A statistically significant larger effect was observed in group-based interventions compared with individual-based interventions ($p = .004$).

Sensitivity Analysis. When outliers were excluded, the effect sizes for group-based interventions on loneliness were reduced ([Supplemental Table S5](#)).

Multicohort Studies

Stratified analysis of multicohort studies, as shown in [Supplemental Table S3](#), indicated that the effect on loneliness was moderate for group-based interventions ($k = 23$; $SMD = -0.55$, 95% CI $[-0.76, -0.34]$) and small to moderate for individual-based interventions ($k = 10$; $SMD = -0.39$, 95% CI $[-0.60, -0.19]$). No statistically significant differences were found between group- and individual-based interventions.

Sensitivity Analysis. The effect sizes for group-based interventions on loneliness were reduced when outliers were excluded from the analysis ([Supplemental Table S6](#)).

Single-Arm Cohort Studies

Stratified analysis of single-arm cohort studies, as shown in [Supplemental Table S4](#), indicated that the effect on loneliness was small to moderate for group-based interventions ($k = 56$; $SMD = -0.36$, 95% CI $[-0.45, -0.27]$) and individual-based interventions ($k = 51$; $SMD = -0.42$, 95% CI $[-0.57, -0.27]$). No statistically significant differences were found between group- and individual-based interventions.

Sensitivity Analysis. The effect sizes for individual-based interventions on loneliness were reduced when outliers were excluded from the analysis ([Supplemental Table S7](#)).

Delivery: Nondigital and Digital Interventions

RCTs

Stratified analysis of RCTs, as shown in [Supplemental Table S2](#), indicated that the effect on loneliness was moderate to large for nondigital interventions ($k = 78$; $SMD = -0.60$, 95% CI $[-0.75, -0.46]$) and small to moderate for digital interventions ($k = 39$; $SMD = -0.30$, 95% CI $[-0.42, -0.18]$). A statistically significant larger effect was observed in nondigital interventions compared with digital interventions ($p = .002$).

Sensitivity Analysis. When outliers were excluded, the effect sizes for nondigital interventions on loneliness were reduced ([Supplemental Table S5](#)). In this analysis no significant difference was found between nondigital and digital interventions ($SMD = -0.42$ vs. $SMD = -0.40$).

Multicohort Studies

Stratified analysis of multicohort studies, as shown in [Supplemental Table S3](#), indicated that the effect on loneliness was moderate for nondigital interventions ($k = 27$; $SMD = -0.46$, 95% CI $[-0.64, -0.28]$) and moderate to large for digital interventions ($k = 5$; $SMD = -0.56$, 95% CI $[-0.87, -0.25]$). No statistically significant differences were found between nondigital and digital interventions.

Sensitivity Analysis. The effect sizes for nondigital interventions on loneliness were reduced when outliers were excluded from the analysis ([Supplemental Table S6](#)).

Single-Arm Cohort Studies

Stratified analysis of single-arm cohort studies, as shown in [Supplemental Table S4](#), indicated that the effect on loneliness was small to moderate for nondigital interventions ($k = 73$; $SMD = -0.40$, 95% CI $[-0.51, -0.29]$) and digital interventions ($k = 43$; $SMD = -0.34$, 95% CI $[-0.45, -0.22]$). No statistically significant differences were found between nondigital and digital interventions.

Sensitivity Analysis. The results remained consistent with the main findings when outliers were excluded ([Supplemental Table S7](#)).

Study Quality

Across all study designs, no statistically significant differences were found between studies of high, moderate, and low quality ([Supplemental Tables S5–S7](#)).

Measures

Across all study designs, no statistically significant differences were observed between studies using the UCLA and those studies employing other measures ([Supplemental Tables S5–S7](#)).

Meta-Analysis of the Long-Term Effect of Loneliness Interventions

RCTs

In total, 33 RCTs ($n = 4,023$) indicated that the long-term effect of interventions on loneliness was small to moderate ($SMD = -0.41$, 95% CI $[-0.56, -0.26]$, $p < .001$, [Supplemental Table S8](#); see [Supplemental Figure S5a](#) for distribution). The heterogeneity between studies was considerable ($\tau^2 = 0.14$). The 95% PI $[-1.17, 0.36]$ indicates considerable variations in potential intervention outcomes, highlighting the possibility for a significant decrease in loneliness in some contexts but only small or adverse effects in others. Overall, the certainty of the evidence was assessed as low (see [Supplemental Table S8](#)).

Sensitivity Analysis. The effect size was slightly reduced when outliers ($n = 5$) were excluded from the analysis; the results still remained consistent with the main findings ($SMD = -0.34$, 95% CI $[-0.45, -0.23]$, $p < .001$).

Multicohort Studies

In total, 14 multicohort studies ($n = 2,519$) indicated that the long-term effect of interventions on loneliness was moderate ($SMD = -0.53$, 95% CI $[-0.83, -0.24]$, $p < .001$, [Supplemental Table S8](#); see [Supplemental Figure S6a](#) for distribution). Heterogeneity was high ($\tau^2 = 0.23$). The 95% PI $[-1.59, 0.55]$ indicates that, while the effect may be highly beneficial in some contexts, it could also be small or adverse in others, reflecting significant variability in potential intervention outcomes. The certainty of the evidence from the 14 multicohort studies was assessed as very low (see [Supplemental Table S8](#)).

Sensitivity Analysis. The effect size was reduced ($SMD = -0.37$, 95% CI $[-0.62, -0.12]$, $p = .0034$), when outliers ($n = 3$) were excluded from the analysis.

Single-Arm Cohort Studies

In total, 25 single-arm cohort studies ($n = 1,511$) indicated that the long-term effect of interventions on loneliness was small to moderate ($SMD = -0.40$, 95% CI $[-0.61, -0.19]$,

$p < .001$, Supplemental Table S8; see Supplemental Figure S7a for distribution). Heterogeneity between the studies was considerable ($\tau^2 = 0.23$). The 95% PI $[-1.43, 0.62]$ indicates substantial variability in potential effects. This highlights the possibility of a significant decrease in loneliness in some contexts while also indicating limited or adverse effects in others. The certainty of the evidence from the 25 single-arm cohort studies was assessed as very low (see Supplemental Table S8).

Sensitivity Analysis. The effect size was substantially reduced when outliers ($n = 4$) were excluded from the analysis (SMD = -0.19 , 95% CI $[-0.29, -0.10]$, $p < .001$).

Discussion

This is the first meta-analytic review to include data from the academic and the gray literature examining the effects of loneliness interventions across different age groups, intervention types, and study designs. Our findings show that an increasing number of interventions for loneliness are now available to people across different age groups. Further, our results indicate that, regardless of whether interventions for loneliness are evaluated using an RCT, multicohort, or single-arm cohort design, they are generally effective in both the short and long term. The effect of loneliness interventions was found to be small to moderate, suggesting that, while they offer some benefit, their impact remains somewhat limited. Further, the observed heterogeneity highlights the diversity of both the included populations and the interventions indicating variations in intervention outcomes. The 95% PIs suggest substantial variations in true effects of interventions, suggesting that, while some future interventions may have high potential for effectiveness (i.e., substantial reductions in loneliness), others could have limited impact or even unintended negative consequences (i.e., small or adverse effects). The broad PIs observed in the main analysis are likely due to differences in context, target populations, or intervention implementation and the inclusion of studies with extreme results. These findings underscore the need to optimize the design and evaluation of interventions, as discussed in the following sections.

Although the vast majority of RCTs were rated as moderate or high quality, only about half of the multicohort studies and a quarter of the single-arm cohort studies achieved moderate summary scores. Given the methodological advantages of RCTs, the GRADE evidence profiles, and the summary scores, we attribute the greatest weight to estimates derived from RCTs when interpreting the study's results.

The Most Effective Interventions for Loneliness

The most effective intervention for reducing loneliness among the various strategies evaluated was psychological

interventions, generally demonstrating a moderate effect, with some evidence suggesting a large effect. Notably, this conclusion is based on analyses of 72 studies of psychological interventions, including 48 RCTs, highlighting the reliability of the findings. The results are in accordance with earlier reviews that focused on specific age groups (Eccles & Qualter, 2021), exclusively examined psychological interventions (Hickin et al., 2021) or did not include recent evidence (Masi et al., 2011). The effectiveness of psychological interventions is attributed to their ability to address maladaptive cognition, low mood, and other psychological processes associated with loneliness. Psychological interventions are underpinned by distinct theories and evidence-based approaches, yet many of the psychological processes theorized to promote loneliness are not specific to loneliness; instead, they are linked to processes or mechanisms that we see across various mental conditions and disorders, including cognitive biases or behavior such as avoidance. Thus, the success of psychological interventions for loneliness may be explained by the fact that loneliness may also implicate low mood, low self-worth, social withdrawal, and cognitive biases that are also characteristic of the mental health difficulties that psychological therapies were originally designed to treat (Qualter et al., 2015).

Moreover, social and emotional skills training proved somewhat effective for reducing loneliness. Interventions that involve skills training are thought to address loneliness by improving skills necessary to facilitate social connection (Masi et al., 2011). These interventions typically focus on developing specific skills, such as problem solving, and incorporate elements like role playing to simulate social interactions. Cultivating such competencies among children may be easier than among adults given the transformative social and emotional learning agenda (Weissberg et al., 2015). Social and emotional learning programs, used in schools across the world, aim to increase social and emotional skills.

The findings of the present meta-analytic review indicate a small to moderate effect of interventions aimed at increasing social contacts and expanding social networks (i.e., reducing social isolation). Notably, loneliness and social isolation are only moderately correlated ($r_s \sim .20$ – $.40$; Beller & Wagner, 2018; Matthews et al., 2016), indicating that many individuals experiencing loneliness in contemporary society already maintain various social connections. This implies that such interventions may be most effective for those who are lonely but also socially isolated.

Our findings indicated that interventions aiming to increase social support had a small to moderate effect on reducing loneliness. Moreover, this effect was smaller compared with that of interventions employing alternative intervention strategies. We interpret the results as indicating that, while social support interventions can reduce loneliness, they may be less effective than alternative approaches. Given that those reporting loneliness, regardless of age, report having lower quality of

relationships (Qualter et al., 2015), it is surprising that social support interventions yield only modest effects. One possible explanation is that forming and maintaining supportive social ties—whether by strengthening existing relationships or establishing a foundation for companionship—requires a substantial effort and long-term engagement, which may be difficult to achieve within the limited scope of many interventions.

Our meta-analytic review indicated that the format of the intervention may influence its effectiveness. RCTs implementing group-based interventions showed a larger effect than those using individual-based approaches, although that difference decreased after excluding outliers. Such findings suggest that group-based interventions may be more effective than individual approaches and there is no strong rationale for prioritizing individual-based interventions unless they are specifically required to address participants' needs. This allows for future opportunities to consider the use of cost-effective and accessible interventions that can be delivered in group settings.

Our analysis of RCTs showed that nondigital interventions had a larger effect than digital ones; however, no difference was observed when outliers were removed from the analysis. Although digital interventions may be less effective, and not accessible or relevant to all people, they are gaining interest due to their scalability and potential for widespread implementation across countries including those that have low resources (such as low- and middle-income countries).

Critical Limitations and Recommendations for Advancing Loneliness Intervention Research

While our findings suggest that loneliness interventions are effective, the certainty of evidence was rated as low to very low, with studies carrying critical methodological shortcomings. Therefore, we cannot rule out that the effect of interventions for reducing loneliness was over- or underestimated, for instance, due to selection biases and confounding in the included studies. For example, in 56% of the RCTs, the randomization procedure was unclear. This means that, even where the gold standard trial design was used, we cannot be certain that there were no systematic differences between groups. Further, many studies were based on small samples and suffered from attrition (high or unclear risk of bias in 57% of the RCTs), which may have biased effect-size estimates. Research on depression and anxiety shows that higher baseline distress often predicts dropout (e.g., Carpallo-González et al., 2023), so it is possible that baseline severity of loneliness also predicts attrition. Given that, we recommend that policymakers and funders of interventions prioritize robust and rigorous evaluations of interventions.

There were other important limitations of the studies included in the review. The loneliness measures used to examine change were diverse and without consensus on cutoff points for severe

or long-term loneliness (Panayiotou et al., 2023; Qualter et al., 2021). That means the extent to which the interventions are truly effective for those who are most lonely remains uncertain. Further, some studies did not systematically recruit participants who were experiencing loneliness, even though reducing loneliness was a primary aim of the intervention. The lack of targeted recruitment of people reporting loneliness is a major issue, restricting the potential to demonstrate intervention effectiveness: Measurable change is unlikely if loneliness is not a significant issue within the sample. To address those limitations, we recommend future studies to explore genuine cutoff points for loneliness and examine the impact of baseline loneliness on intervention outcomes, exploring whether explicitly targeting individuals experiencing loneliness enhances intervention effectiveness.

As part of that exploration, it is essential to explore what a small-to-moderate reduction in loneliness looks like and how it translates into meaningful improvements in lived experience for participants. Without such work, we do not know what kind of impact the small-to-moderate changes in loneliness have for people. For example, this could mean feeling more comfortable contacting others, participating in social activities, or experiencing fewer moments of distress and isolation. Such changes, while incremental, may be linked to mental health benefits, such as reduced depression and anxiety. Further, the limited empirical evidence on the mechanisms through which loneliness interventions produce change highlights another important area for future research. Logic models for loneliness, which provide a structured framework outlining how an intervention intends to reduce loneliness, are essential for moving forward: They outline the targeted mechanisms and map the pathway from activities to results. Essentially, the logic model for each intervention should make clear what it should change, how, and why, helping guide planning and evaluation.

Strengths and Limitations of the Current Review

The present meta-analytic review has several clear strengths. These strengths include a large number of included interventions (280 studies), the inclusion of gray literature, the large number of participants ($n = 30,929$), meta-analytic strategies used to explore the data, and the independent assessments of studies for inclusion and risk of bias. The investigation of short- and long-term intervention effects is also novel. Knowledge of the persistence of effects is of high importance, with our findings indicating that loneliness interventions generate lasting changes.

Our study also comes with limitations. Grouping studies for meta-analysis is essential to increase statistical power, synthesize evidence, and generalize findings, but it also introduces challenges. We acknowledge that our process of creating broad groupings may mask nuances or misclassify studies. Another limitation is that participants across the

different interventions were very heterogeneous. For example, we grouped participants into broad age categories, with our childhood and adolescence group (6–25 years) spanning multiple developmental stages. Significant social and cognitive developmental changes occur across this wide age range, which could contribute to variability in intervention design and delivery. While our analysis did not find significant variations in effects by age, we emphasize the need for further evaluation of interventions for children and adolescents. Future research should aim to make finer grained age distinctions to better capture developmental nuances while maintaining methodological rigor.

In addition, we found that the evidence base consists of mainly short-term evaluations of loneliness interventions. The long-term effect of loneliness interventions, evaluated by 72 studies 1–6 months after the intervention, was almost equivalent to the short-term effect. Future work should explore longer term maintenance effects and distal sleeper effects of loneliness interventions. Finally, the generalizability of the evidence to low- and middle-income countries remains somewhat unclear because of the limited geographical spread.

Implications for Research and Practice

Despite the small to moderate effect sizes, it is encouraging that loneliness interventions seem to reduce loneliness across diverse types of interventions and populations. Psychological interventions appear to be the most successful strategy for reducing loneliness. However, the effects were moderate, and the samples were diverse, with variations in outcomes. Interventions for depression typically achieve substantial reductions in symptoms, consistently demonstrating large effect sizes (Cuijpers et al., 2020). This comparison underscores the need for further advancements and innovation in the development of loneliness interventions.

In line with the conceptual model of loneliness (Lim et al., 2020), each person carries different risk factors and may face different barriers. Hence, there is value in assessing each person's preferences and context, as it is unlikely that one type of intervention fits all. Successful loneliness interventions are likely to be person centered and tailored to fit the needs of a targeted population (Victor et al., 2018). Given that context, it is encouraging that a substantial proportion of interventions incorporates multiple intervention strategies. This reflects, among other things, that some interventions aim to incorporate diverse active ingredients and utilize multiple components to more effectively address loneliness. In this study, we categorized interventions using a slightly modified version of the framework developed by Masi et al. (2011). Given the interventions with multiple strategies and the emergence of interventions that do not align neatly with those five existing strategies, developing a new framework is a logical next step.

Researchers also need to enhance study quality when evaluating the loneliness interventions available to different groups. The guidelines outlined by Schoenmakers et al. (2024) provide a valuable foundation for advancing practice in this field. However, researchers and third-sector organizations need to be appropriately resourced to conduct quality work. We ask that funders, organizations, the public sector, and researchers work together to provide high-quality studies that evaluate loneliness interventions in a measured and standardized manner and that dissemination of findings offers clear and logical considerations for the field.

Last, few studies address large-scale interventions for loneliness at the community level or societal level, highlighting a critical gap in the literature. Evaluating such strategies is crucial because they may offer more sustainable and impactful solutions than individual-level interventions. By embedding changes into existing systems like schools, workplaces, and public spaces, such interventions have the potential to strengthen social cohesion and reduce stigma and thereby create a culture wherein seeking connection is widely accepted. These interventions can also address systemic inequities by ensuring that marginalized or disadvantaged groups, disproportionately affected by loneliness (Barreto et al., 2024), are reached. Importantly, those efforts may enhance individual well-being but also improve population-wide mental health and align with global priorities to foster resilient, connected communities. Building on this, stakeholders are urged to consider a broad scope of interventions that include individual- and relationship-level interventions, community-level strategies, and society-level strategies (World Health Organization, 2021). Various stakeholders, including service providers, individuals with lived experience, communities, and representatives from diverse sectors (e.g., business, education, government, health care, community organizations), must be involved and act at multiple levels to ensure a population-level impact on loneliness.

Conclusions

The findings of the meta-analytic review indicate that loneliness interventions are effective for reducing loneliness across the lifespan. However, caution is warranted when interpreting the magnitude of our effects because we have concerns about the methodological quality of the existing research in the field, which reduces the certainty of the evidence. Stratified analyses indicated that psychological interventions are the most promising for reducing loneliness across all ages, but it remains unclear whom the interventions would help the most.

Addressing social needs has become a primary focus for governments and local authorities across the world. Efforts to mitigate loneliness are increasingly developed and implemented across various sectors including nongovernmental organizations, institutions, and workplaces. The present meta-analysis

revealed a need to evaluate those interventions rigorously and to report the findings systematically to clarify what works and for whom.

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