Interventions targeting social determinants of mental disorders and the Sustainable Development Goals: a systematic review of reviews

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Abstract

Globally, mental disorders account for almost 20% of disease burden and there is growing evidence that mental disorders are socially determined. Tackling the United Nations Sustainable Development Goals (UN SDGs), which address social determinants of mental disorders, may be an effective way to reduce the global burden of mental disorders. We conducted a systematic review of reviews to examine the evidence base for interventions that map onto the UN SDGs and seek to improve mental health through targeting known social determinants of mental disorders. We included 101 reviews in the final review, covering demographic, economic, environmental events, neighborhood, and sociocultural domains. This review presents interventions with the strongest evidence base for the prevention of mental disorders and highlights synergies where addressing the UN SDGs can be beneficial for mental health.

Introduction

Globally, mental disorders account for almost 20% of disease burden, with associated annual costs projected to be US$6 trillion by 2030 (Campion et al., 2022). Accordingly, the United Nations (UN) has put forth the ambitious goal of achieving universal mental health care coverage by 2030 as a part of the Sustainable Development Goals (SDGs) (Lund et al., 2018; United Nations, 2015). However, in 2020, which marked the halfway point to the 2030 goal, only 2% of global government health expenditure was allocated to mental health, with significantly less in low-income countries (Campion et al., 2022; WHO, 2021). This suggests that goals to increase access to mental health treatments alone are insufficient to reduce the burden of poor mental health globally (Lund et al., 2018; Rose-Clarke et al., 2020).

The World Health Organization (WHO) argues that 'the twin aims of improving mental health and lowering the personal and social costs of mental ill-health can only be achieved through a public health approach' (Mehta, Croudace, & Davies, 2015; WHO, 2005). Public mental health has become progressively prominent in international health policy. For example, prevention of mental disorders, promotion of mental wellbeing, and treatment of disorders are central to the WHO's Mental Health Action Plan (WHO, 2013). Similarly, the World Psychiatric Association made public mental health and intervention implementation a central part of its 2020–2023 action plan (World Psychiatric Association, 2020). However, for most nations, the majority of mental health investment still lay in psychiatric hospital care in 2020, with less than 20% of expenditure going towards primary care, mental disorder prevention, or well-being promotion (Campion et al., 2022; WHO, 2021). In 2019, the UK's National Institute for Health and Care Research announced that one of their priorities was to identify the most effective interventions, outside of the National Health Service (NHS), aimed at enabling populations to achieve good mental health and to prevent mental health problems (National Institute for Health and Care Research, 2022).

Mental disorders are strongly socially determined (Blas & Kurup, 2010; Lund et al., 2018; WHO, 2014), suggesting that approaches tackling social determinants may be effective

(Rose-Clarke et al., 2020). Addressing the social determinants of mental disorders also aligns with the UN SDGs (Campion et al., 2022; Lund et al., 2018). In 2018, Lund et al., developed a novel conceptual framework that summarized the major social determinants of mental disorders and linked them with the UN SDGs (see Fig. 1). This framework was applied through a large umbrella review, which primarily described observational data of mental health outcomes linked to social determinants (Lund et al., 2018). The review highlighted the synergy between many social determinants of mental disorders and the SDGs. For example, across the literature, female gender was associated with increased risk of depression and anxiety, demonstrating the importance of SDG 5 – to 'achieve gender equality and empower all women and girls' – for population-level mental health.

There is now a need establish an evidence-base to determine the effectiveness of interventions which target the social

determinants of mental health and the SDGs. In their review, Lund et al. (2018) put forth a number of intervention candidates, and, following publication of the review, the UK *Academy of Medical Sciences* and the *Inter-Academy Partnership for Health* convened an international workshop in London to identify intervention priorities for each framework domain moving forward (Rose-Clarke et al., 2020). However, the effectiveness of these proposed interventions was not considered, and the evidence had not been synthesized.

While Lund's framework was previously used in a review of national-level interventions, evidence presented was mostly observational and from higher or upper-middle income countries (Shah et al., 2021). Using the same conceptual framework, we aimed to strengthen the evidence base by conducting a systematic review of reviews including Lund et al. (2018) and Rose-Clarke et al. (2020) et al.'s proposed intervention priorities, with evidence

Figure 1. Social determinants of mental disorders and the Sustainable Development Goals: a conceptual framework by Lund et al. (2018).

from community-level interventions, low-, middle-, and high-income country settings, and study designs with comparison groups.

Methods

A systematic review of reviews was conducted, in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses Checklist (see Supplementary File 1). A protocol was pre-registered on PROSPERO (CRD42022361534).

Search strategy and selection criteria

PubMed, PsycInfo, and Scopus were searched from 01 January 2012 until 05 October 2022, to identify the most recent evidence. The search strategies (Supplementary File 2) were developed with input of an academic librarian. Citation follow-up and expert consultation were conducted. We contacted all authors of the Lund et al. review (2018), and the corresponding author for each included review, to request additional studies.

Study designs

Reviews which utilized a systematic methodology, published in any language, were eligible for inclusion. Non-systematic reviews and primary data studies were excluded. Reviews from the grey literature were excluded as we aimed to gather peer-reviewed evidence only.

Participants

Participants of all ages from the general population were eligible, including participants with mental disorders/symptoms. Given the broader public mental health focus of the research, participant groups with little generalizability to wider populations (e.g. students at a specific College only), were excluded.

Interventions

Only the interventions suggested by Lund et al. (2018), and the intervention priorities identified in the international workshop (Rose-Clarke et al., 2020), were eligible for inclusion. We reviewed these specified interventions (see Table 1) as they mapped onto the conceptual framework, aligned with the SDGs, and the evidence base for these recommended interventions had not been previously synthesized. Interventions focusing on direct treatment of mental disorders were excluded, except for psychosocial interventions aiming to support vulnerable people in response to environmental events.

Comparisons

Reviews were included if more than half of the studies had a comparator/control group (active or inactive).

Outcomes

Reviews had to report on relevant mental health outcome data at baseline and post-intervention. Outcomes of interest were changes in the severity, course, or prevalence of mental disorders, and incidence of mental disorder onset. Mental disorders included depression, anxiety, substance use disorders, psychosis, child/adolescent behavioral/developmental disorders, childhood internalizing/externalizing disorders, suicide/suicidal behaviors, post-traumatic stress disorder (PTSD), and dementia. Mental health outcome measures needed to be obtained using valid and reliable scales suitable for the population under study, standardized interviews, or more direct measures of the mental disorder such as a clinician diagnosis or health records. Indicators of these

Table 1. Eligible interventions by framework domain

Framework domain	Domain definition	Relevant UN SDGs	Eligible interventions[a]
Demographic	The specific demographic characteristics of populations that convey risk for, or protection from, mental illness.	5	Interventions focusing on determinants of men's mental health, LGBTQIA+ mental health (e.g. homophobia, transphobia), gender norms, reducing gender-based violence, child maltreatment, and racial discrimination and xenophobia.
Economic	Factors relating to the production, consumption, and transfer of wealth that convey risk for, or protection from, mental illness.	1, 2, 8, 9, 10	Interventions focusing on social protection systems, cash transfers or basic income grants, reductions in income inequality, and improved employment.
Environmental events	Serious disruptions of the functioning of a community that exceed its ability to cope by use of its own resources and convey risk for mental illness. Disasters and environmental events can be related to ecological hazards (e.g. natural disasters), industrial hazards (e.g. chemical accidents), armed conflict (e.g. warfare), and displacement.	13, 16	Interventions focusing on disaster preparedness through building resilience in individuals and communities, early response to environmental events by supporting people with vulnerabilities (defined as within the humanitarian context for armed conflict), and action on protecting vulnerable ecosystems.
Neighbourhood	Characteristics of an area or community that convey risk for, or protection from, mental illness, over and above what is attributable to the individual characteristics of community members.	6, 7, 11, 12	Interventions focusing on improved housing, safe neighborhoods, reduced violence in neighborhoods, and improving infrastructure (water and sanitation, waste management and recycling, open spaces).
Sociocultural	Ways in which the organisation of society, social interactions, and relationships affect risk of, and protection from, mental illness.	4	Interventions focusing on improving education, strengthened social capital, Indigenous knowledge and healing systems, improving social support and networks for older adults, and school-based interventions focusing on anti-bullying and social and emotional learning.

UN SDGs, United Nations Sustainable Development Goals.
[a]Eligible interventions based on Lund et al. (2018) and Rose-Clarke et al. (2020).

mental disorders, such as psychological distress or cognitive functioning, were included. Aspects of general mental well-being were excluded (e.g. quality of life).

Study screening and selection

Study screening was conducted independently by two authors (TKO and MTN) using *Covidence*. Applying the selection criteria, the articles were included or excluded based on the title and abstract, or a consequent full-text review. *Google Translate* was used to assess the eligibility of articles not published in English (Jackson et al., 2019).

One author (TKO) screened the titles and abstracts of new references identified through reference lists of included reviews, as well as new articles provided by contacted experts. Two authors (TKO and MTN) then screened the full-text of these new articles.

The authors (TKO and MTN) resolved any eligibility discrepancies through discussion, only proceeding to next stages once 100% agreement was reached. A third author (JDM) was consulted where consensus could not be reached.

Data extraction

Data extraction was conducted in Excel, using a form designed and tested by the authors. Six authors (TKO, LM, MTN, GC, HGJ, and DA) independently extracted data from a sub-sample of the included studies ($n = 5$ reviews) ensuring agreement was achieved through checks and discussions. The remainder of the data extraction was divided and conducted independently by the six authors.

Quality assessments

The AMSTAR-2 checklist was used for quality assessments of included reviews. The 16-item checklist allows a rating of overall confidence in the results of the review to be made (high, moderate, low, or critically low). Assessments were conducted independently by five authors (TKO, LM, MTN, GC, and HGJ) on a sample of the included reviews ($n = 5$ reviews), ensuring agreement was achieved through checks and discussion. The remainder of the assessments were divided and conducted independently by the five authors. The seven critical items on the checklist were also independently rated for each review by a second author (TKO or LM), and the inter-rater reliability was 92%. A third author (JDM) was consulted to achieve consensus where there were discrepancies.

Synthesis

The populations, interventions, and outcome measures were heterogeneous across studies; therefore, we reported results in the form of a qualitative synthesis. We extracted magnitude of effect data and meta-analyses as provided by original authors in the studies reviewed.

Results

Database searches identified 20 864 articles; 5477 duplicates were removed and 14 751 did not meet the inclusion criteria based on information in the title or abstract. The full-text of 636 articles were assessed for eligibility; 82 met the inclusion criteria. Articles which were excluded by full-text ($n = 554$) are provided

in Supplementary File 3. Seven eligible reviews were identified in the reference lists of the included reviews. After contacting experts and corresponding authors of included studies, 12 new suggestions were eligible for inclusion. A total of 101 reviews were included in the review (PRISMA flow diagram in Supplementary File 4). Table 2 presents a summary of the included reviews and detailed descriptions are provided in Supplementary File 5.

Confidence in the review results

Of the 101 included reviews, 23 were rated as having high confidence, 14 as moderate, 24 as low, and 40 as critically low confidence, on the AMSTAR-2. The full AMSTAR-2 ratings are presented in Supplementary File 6.

Findings from the moderate and high confidence reviews ($n = 37$) are the focus of the results section and are presented in Table 3. Key gaps, challenges, and methodological issues identified are outlined in Table 4.

Demographic domain

Fifteen reviews with Demographic domain interventions were identified (Asgary, Emery, & Wong, 2013; Branco, Altafim, & Linhares, 2021; Chen & Chan, 2016; Drew, Morgan, Pollock, & Young, 2020; Efevbera, McCoy, Wuermli, & Betancourt, 2018; Emezue, Chase, Udmuangpia, & Bloom, 2022; Fang, Barlow, & Zhang, 2022; Goldstein, Rosen, Howlett, Anderson, & Herman, 2020; Linde et al., 2020; Rivas et al., 2015; Spencer, Stith, & King, 2021; Stephens-Lewis et al., 2021; Van Parys, Verhamme, Temmerman, & Verstraelen, 2014; Waid, Cho, & Marsalis, 2022; Walsh, Zwi, Woolfenden, & Shlonsky, 2015). Examples of demographic determinants of mental health include age and gender. SDG 5 (achieving gender equality) is particularly relevant to this domain. Four reviews were given a moderate or high confidence rating.

Reducing intimate partner violence

Three reviews focused on reducing intimate partner violence (IPV). An earlier review (Linde et al., 2020) reported no evidence that eHealth interventions reduced depression or PTSD in women exposed to IPV, compared with use of control websites or standard care. A more recent review (Emezue et al., 2022), including digital interventions for female IPV victims, reported small but statistically significant reductions in depression and anxiety symptoms, but not PTSD, at 3-month follow-up. A final review looking at one-on-one advocacy support interventions for women who have experienced IPV reported inconsistent evidence that advocacy has a beneficial impact on mental health outcomes for this population (Rivas et al., 2015). While no advocacy intervention effects were detected when measuring depression and physical abuse as continuous outcomes, studies which measured these as dichotomous outcomes reported that significantly fewer women developed depression, and were less likely to experience physical abuse, at the end of a brief advocacy intervention period. There was significant evidence that brief advocacy interventions reduced psychological distress at three-to-four months follow-up, but intensive advocacy interventions showed no statistically significant effect.

Prevention of child abuse

A review (Walsh et al., 2015) of school-based sexual abuse education programs reported no evidence of changes in anxiety in intervention participants compared to control participants.

Table 2. Summary of included reviews (*N* = 101)

Domain	Reviews included	AMSTAR-2 confidence ratings	Interventions covered
Demographic	*n* = 15	High (*n* = 2) Moderate (*n* = 2) Low (*n* = 7) Critically low (*n* = 4)	• Reducing/preventing child maltreatment/abuse (*n* = 6) • Reducing/preventing gender-based and intimate partner violence (*n* = 7) • Addressing men's/paternal mental health (*n* = 2)
Economic	*n* = 24	High (*n* = 10) Moderate (*n* = 3) Low (*n* = 3) Critically low (*n* = 8)	• Increasing/maintaining employment (*n* = 11) • Poverty alleviation (*n* = 8) • Improving employment conditions (*n* = 4) • Reducing impact of job loss, debt, and financial difficulties (*n* = 1)
Environmental events	*n* = 19	High (*n* = 3) Moderate (*n* = 3) Low (*n* = 3) Critically low (*n* = 10)	• Alleviation of trauma/distress and supporting vulnerable people after disasters (*n* = 18) • Parenting programs for displaced families (*n* = 1)
Neighbourhood	*n* = 8	High (*n* = 2) Moderate (*n* = 1) Low (*n* = 2) Critically low (*n* = 3)	• Access to housing (*n* = 6) • Improved housing (*n* = 1) • Improved urban infrastructure (*n* = 1)
Sociocultural	*n* = 31	High (*n* = 4) Moderate (*n* = 5) Low (*n* = 8) Critically low (*n* = 14)	• Social and emotional learning (*n* = 16) • Increasing social support, networks, and social capital (*n* = 11) • Anti-bullying (*n* = 3) • Indigenous culture and knowledge in mental health (*n* = 2) • Improving education (*n* = 2)
Multiple	*n* = 4	High (*n* = 2) Moderate (*n* = 0) Low (*n* = 1) Critically low (*n* = 1)	Reviews including interventions which cross the framework domains for the following population groups: • People with mental health conditions (*n* = 1) • People with lived experience of homelessness (*n* = 1) • Families with young children (*n* = 1) • Women experiencing intimate partner violence (*n* = 1)

n, number of reviews.

Longer-term intervention effects on the prevention of sexual abuse and mental health outcomes could not be determined due to the collection of immediate program outcomes only.

Economic domain

Twenty-four reviews with Economic domain interventions were identified (Audhoe, Hoving, Sluiter, & Frings-Dresen, 2010; Bond, Drake, & Pogue, 2019; Charzyńska, Kucharska, & Mortimer, 2015; Evans, Lund, Massazza, Weir, & Fuhr, 2022; Frederick & VanderWeele, 2019; Gayed et al., 2018; Little et al., 2021; Lund et al., 2011; Marshall et al., 2014; McGuire, Kaiser, & Bach-Mortensen, 2022; Moore et al., 2017; Nieuwenhuijsen et al., 2020; Pachito et al., 2018; Pega et al., 2022; Puig-Barrachina et al., 2020; Ridley, Rao, Schilbach, & Patel, 2020; Ruotsalainen, Verbeek, Mariné, & Serra, 2014; Suijkerbuijk et al., 2017; Suto, Balogun, Dhungel, Kato, & Takehara, 2022; van Rijn, Carlier, Schuring, & Burdorf, 2016; Walton & Hall, 2016; Wollburg, Steinert, Reeves, & Nye, 2023; Zaneva, Guzman-Holst, Reeves, & Bowes, 2022; Zimmerman et al., 2021). Examples of economic determinants of mental health include financial strain, unemployment, and relative deprivation. SDG 1 (no poverty) and 8 (decent work and economic growth) are examples of relevant SDGs for this domain. Thirteen reviews were given a moderate- or high-confidence rating.

Cash transfer programs

Six reviews assessed cash transfer interventions (CTs); three focused on children and young people (Little et al., 2021; Zaneva et al., 2022; Zimmerman et al., 2021), and three on participants of all ages (McGuire et al., 2022; Pega et al., 2022; Wollburg et al., 2023), in low- and middle-income countries. Overall, CTs were associated with improved mental health outcomes, and unconditional CTs were reported to have a larger effect than conditional CTs which require participants to comply with certain conditions such as school attendance or healthcare visits (McGuire et al., 2022; Wollburg et al., 2023; Zaneva et al., 2022). One review noted that conditional CTs may be harmful for adolescent girls in low- and middle-income countries, as they can increase responsibilities and create stress (Zaneva et al., 2022). The effect of CTs were reported to be moderated by their absolute size and their size relative to previous income, with larger amounts of money associated with more positive effects (McGuire et al., 2022; Zimmerman et al., 2021). One review reported that mental health improvements did not appear to be sustained at 2–9 years follow-up (Wollburg et al., 2023).

Increasing or maintaining employment

Three reviews focused on interventions which aimed to increase or maintain employment. One review included adults who were unemployed due to severe mental illness (Suijkerbuijk et al., 2017) and reported reductions in negative symptoms and general psychopathology for people in prevocational training and supported employment compared to receiving psychiatric care only. Another review (Nieuwenhuijsen et al., 2020) assessed work-directed interventions which aim to ameliorate the consequences of depressive disorders on the ability to work, by modifying the job tasks or temporarily reducing working hours. Overall, the effectiveness of work-directed interventions on mental health outcomes was inconsistent. Another review assessing

Table 3. Key characteristics and findings from moderate and high confidence reviews

			Outcome(s) reported		Quality of the studies/ evidence[b]
Review details[a]	Participants and setting	Interventions	Mental health	Social determinant(s)	
Reducing intimate partner violence (IPV)					
Linde et al. (2020) 5/14 RCTs	Women exposed to any type of IPV by a current or former partner at any point in life. High-income countries.	e-Health interventions, including online safety decision aids, telephone support, or an email module with telephone support.	No evidence that these eHealth interventions reduced depression or PTSD in women exposed to IPV, compared with use of control websites or standard care.	There was no evidence that eHealth interventions reduced physical, sexual, or psychological violence for this group.	Two RCTs had low risk of bias. Other studies were not given overall ratings but had issues with random sequence generation, allocation concealment, blinding of participants, blinding of outcome assessments, and selective reporting.
Emezue et al. (2022) 17/17 RCTs	Female participants who were experiencing or had experienced IPV. Mostly high-income countries.	Digital interventions delivered across a range of modalities and used for safety planning, digital consultation, referral-to-care, psychoeducation, and decision support. A number of these interventions were based on the *myPlan* app, and most were theoretically grounded in Dutton's empowerment model for assessment and intervention.	Between 0- and 3-months post-intervention, IPV survivors who received digital interventions exhibited a small but significant reduction in depression. However, this effect faded after 3 months and was highest immediately post-intervention. Nine RCTs provided data for a pooled effect size for depression, demonstrating a small, but statistically significant reduction in depression (SMD = − 0.10, 95% CI −0.18 to −0.01; I^2 = 58%). Heterogeneity was significant. Digital interventions reduced anxiety among survivors. This effect size was small and significant up to 3 months post-intervention. Four RCTs provided data for a pooled effect size of anxiety, demonstrating a small significant reduction in anxiety between 0 and 3 months (SMD = − 0.27, 95% CI −0.42 to −0.13; survivors = 714; studies = 4; I^2 = 25%). No significant heterogeneity was noted. Digital interventions reduced PTSD among IPV survivors, but reductions were small and not statistically significant. Four RCTs provided data to calculate a pooled effect for PTSD for 3–6 months post-intervention, demonstrating interventions had a small but non-significant negative effect (reduction in) PTSD (SMD = − 0.04, 95% CI −0.14 to 0.06; survivors = 1428; studies = 4; I^2 = 0%). No significant heterogeneity was observed.	Digital interventions reduced survivors' physical violence victimization. Treatment effect sizes were small but significant from 0 to 6 months post-intervention.	RCTs were rated as having high risk of bias (4 studies), unclear risk of bias (11 studies), and low risk of bias (2 studies).
Rivas et al. (2015) 8/13 RCTs	Women who have experienced IPV. Middle- and high-income countries.	One-on-one advocacy support interventions, defined as either brief (<12 h) or intensive (⩾12 h). Most interventions involved an element of counseling support and were underpinned by empowerment theories to enhance women's independence and control.	Overall, there is inconsistent evidence that advocacy has a beneficial impact on mental health outcomes in women. The type of outcome measure used (e.g. continuous v. dichotomous data) also appears to impact findings. For example, pooled continuous data from two studies looking at depression found there was no evidence that women receiving brief advocacy reported lower levels of depression than women in the control group (SMD − 0.17, 95% CI −0.43 to 0.08, I^2 = 0%; n = 239). A meta-analysis of dichotomous data from 2 studies showed that significantly fewer women developed depression if they received a brief advocacy intervention (OR 0.31, 95% CI 0.15 to 0.65, I^2 = 24%; n = 149). Of three intensive advocacy interventions measuring depression as a continuous measure at 12 months follow-up, meta-analysis revealed no evidence that intensive advocacy reduces depression (SMD − 0.14, 95% CI 0.33 to 0.05, I^2 = 27%; n = 446). One study suggested that an advocacy intervention led to significantly lower levels of perceived stress compared with women in the control condition (MD − 0.56, 95% CI −1.09 to −0.03; n = 53). For a brief advocacy intervention, there was significant evidence that advocacy reduced psychological distress at three to four months follow-up (MD − 0.56, 95% CI −1.09 to −0.03; n = 53). Two intensive advocacy interventions showed no statistically significant effect on psychological distress post-intervention.	Advocacy interventions appeared to reduce physical abuse but did not lead to statistically significant reductions in sexual abuse, and findings for emotional abuse were mixed.	For the whole review, 5 studies were deemed high risk of bias, 5 moderate, and 3 low risks of bias.

DEMOGRAPHIC DOMAIN

ECONOMIC DOMAIN	**Prevention of child abuse/maltreatment**				
	Walsh et al. (2015) 5/24 RCTs, cluster-RCT	Children (aged 5–12 years) and adolescents (aged 13–8 years) attending primary (elementary) or secondary (high) schools. Middle- and high-income countries.	Interventions were school-based education programs focusing on knowledge of sexual abuse and sexual abuse prevention concepts, or skill acquisition in protective behaviors, or both.	Three studies were meta-analysed (N total = 795 (Intervention = 456; Control = 339)). The SMD for anxiety/fear was −0.08 (95% CI −0.22 to 0.07). This result reveals evidence of no increases or decreases in anxiety or fear in intervention participants. There was no heterogeneity (I^2 = 0%, p value = 0.79). Longer-term intervention effects on the prevention of sexual abuse, and associated mental health outcomes, could not be determined with the available evidence due to collection of immediate program outcomes only.	These programs were effective in increasing participants' skills in protective behaviors and knowledge of sexual abuse, and children participating in programs had greater odds of disclosing abuse than children who did not participate.	The quality of the evidence was classified as moderate.
	Cash transfer programs (CTs)				
	Little et al. (2021) 3/17 Cluster-RCTs	Infants and young children up to 5 years of age. Low-middle income countries.	Compared CTs to 'cash transfer plus' interventions, which incorporated a psychosocial stimulation component.	Meta-analysis suggests that CT plus psychosocial stimulation programs may not be more effective than CTs alone in promoting overall cognitive development (d = 0.16 [−0.25 to 0.57], p = 0.24), although there was substantial heterogeneity among the studies (I^2 = 85%).	Not reported.	The studies were rated as having low risk of bias.
	Zimmerman et al. (2021) 11/12 RCTs, cluster-RCTs, QEs	Children, adolescents, and young adults aged below 25 years. Low- and middle-income countries.	Conditional or unconditional CTs. The amount of money received ranged from $2 to $20 a month.	Mixed findings were reported for mental health outcomes. While seven studies reported improvements in at least one mental health outcome of interest (depression, psychological distress, behavioral problems, PTSD symptoms, or anxiety), seven studies reported no change in these outcomes for intervention participants. Larger amounts of money (e.g. $20 or higher per month) appeared to be associated with more positive effects on mental health, and no study found a negative intervention impact on any mental health outcome. The authors reported high heterogeneity between studies (I^2 = 95.2%).	Not reported.	The overall risk of bias was judged to be moderately high.
	McGuire et al. (2022) 31/45 RCTs, cluster-RCTs, and other study designs	Individuals in low- and middle-income countries.	Conditional and unconditional CTs. The average monthly payment was $38 adjusted for purchasing power parity. A quarter of the CTs were implemented as predominantly a lump sum, while all other CTs were paid out monthly or bi-monthly.	CTs, on average, have a consistent positive effect on mental health among recipients. An average improvement in mental health outcomes of about 0.07 s.D. was reported. Unconditional CTs (d = 0.110; df = 27; p < 0.001; 95% CI 0.086–0.134) appear to have a larger effect than conditional CTs (d = 0.069; df = 13; p = 0.005; 95% CI 0.025, 0.113), but the difference in effect sizes is only marginally statistically significant. A statistically significant intercept was obtained in almost all specifications – this suggests that CTs have an effect independent of cash transfer type, context, size, as well as the study type and outcome measure. This may be interpreted as a pure effect from being enrolled in a cash transfer program. The authors observed that the effects of CTs appear to slowly dissipate over time and that the effect size of CTs is positively moderated by both their absolute size and their size relative to previous incomes.	Not reported.	Studies were rated as having moderate to serious risk of bias.
	Pega et al. (2022) 7/34 Cluster-RCTs	Children (0–17 years) and adults (18 years or older). Low- and middle-income countries.	Unconditional CTs, providing cash of a value equivalent to 1.3% to 53.9% of the annualised gross domestic product per capita.	The evidence is very uncertain about the effect of unconditional CTs on depression. Three cluster-RCTs of individual study participants reported a decrease in level of depression, one cluster-RCT of households reported an increase in level of depression, and one cluster-RCT with an unclear population reported a decrease in level of depression.	Unconditional CTs led to a reduction in risk of being extremely poor at 2-to-3-year follow-up (risk ratio 0.92, 95% CI 0.87–to 0.97; I^2 = 63%; 6 cluster-RCTs, 3805 participants; low-certainty evidence).	Quality of the evidence for the depression outcome was graded as very low.

(Continued)

Table 3. (*Continued.*)

Review details[a]	Participants and setting	Interventions	Outcome(s) reported		Quality of the studies/ evidence[b]
			Mental health	**Social determinant(s)**	
Zaneva et al. (2022) 14/14 RCTs, cluster-RCTs, pseudo-RCTs	Children and adolescents aged 0–19 years old. Mostly low- and middle-income countries.	CTs aimed to alleviate poverty or socioeconomic inequalities. These were either unconditional CTs or conditional CTs. In conditional CTs, participants needed to comply with certain conditions such as school attendance or healthcare visits to receive their cash. Cash amounts ranged from $1 to $468, or could be a proportion of the caregivers' wage. They were paid monthly, quarterly, or as lump sums.	CTs were generally effective in improving the mental health of children and adolescents (up to 19 years of age) in mostly low- and middle-income countries. Meta-analysis suggested a small positive intervention effect, with significantly reduced internalising problems post-intervention compared to post-control (OR 0.72, 95% CI 0.59–0.88, $p < 0.01$; $I^2 = 67\%$, $p < 0.01$). However, the authors noted that conditional CTs, in which participants needed to comply with certain conditions such as school attendance or healthcare visits to receive their cash, may actually be harmful for adolescent girls in low- and middle-income countries, as they can increase responsibilities and create stress.	Not reported.	The studies were rated as having low risk of bias.
Wollburg et al. (2023) 17/17 RCTs	Adults and adolescents living in poverty. Low- and middle-income countries.	Conditional and unconditional CTs. Transfer values varied between US $144 and US$1525 over the length of the program, which is equivalent to approximately 9%–23% of participants monthly consumption. Most CTs provided payments on a monthly or bimonthly basis over a period of nine months to four years. Three programs delivered one-time lump sums.	Meta-analysis (of 11 studies and pooling data from 22 488 participants) showed that CTs significantly reduced depression and anxiety of recipients ($d$pooled = −0.10; 95% CI −0.15 to −0.05; $p < 0.01$). However, improvements may not be sustained 2–9 years after program cessation ($d$pooled = −0.05; 95%-CI −0.14 to 0.04; not significant). Meta-regression indicates that impacts were larger for unconditional CTs ($d$pooled = −0.14; 95%-CI −0.17 to 0.10; $p < 0.01$) than for conditional CTs ($d$pooled = 0.10; 95% CI 0.07–0.13; $p < 0.01$). Effects on stress were insignificant and confidence intervals include both the possibility of meaningful reductions and small increases in stress ($d$pooled = −0.10; 95% CI −0.32 to 0.12; not significant). No harmful effects were reported.	Not reported.	The overall confidence in the evidence is judged to be moderate at post-intervention and low at longer-term follow-up.
Increasing or maintaining employment					
Suijkerbuijk et al. (2017) 7/48 RCTs	Adults (aged 18–70 years) unemployed due to severe mental illness. Mostly high-income countries.	Interventions were classified as supported employment, augmented supported employment, prevocational training, transitional employment, and psychiatric care only.	Only two of the included studies showed significant benefits for mental health outcomes (reductions in negative symptoms and general psychopathology) favouring prevocational training and supported employment compared to receiving psychiatric care only.	Supported employment and augmented supported employment were more effective than the other interventions in obtaining and maintaining competitive employment for people with severe mental illness, without increasing the risk for hospital admissions.	The quality of evidence was rated as moderate-to-low.

Nieuwenhuijsen et al. (2020) 11/45 RCTs, cluster-RCT	Adult workers over 17 years of age. High-income countries.	Work-directed interventions which aim to ameliorate the consequences of depressive disorders on the ability to work by either targeting the work itself, modifying the job task, or temporarily reducing working hours. Work-directed interventions were also combined with clinical interventions.	A combination of a work-directed intervention and a clinical intervention may reduce depressive symptoms (SMD −0.25, 95% CI −0.49 to −0.01; 8 studies, low-certainty evidence). When considering work-directed interventions alone, there is probably no effect on depressive symptoms (SMD −0.10, 95% −0.30 CI to 0.10; 4 studies, moderate-certainty evidence) within the first year of follow-up and there may be no effect on depressive symptoms beyond that time (SMD 0.18, 95% CI −0.13 to 0.49; 1 study, low-certainty evidence).	Work-directed interventions combined with clinical interventions improve work-related outcomes (e.g. reduced sickness absence within the first year of follow-up).	Certainty of the evidence for depression outcomes was low and moderate.
Evans et al. (2022) 5/5 RCTs, non-RCTs, retrospective cohort	Adults with mean age ranging from 17 to 36 years. Low-, middle-, and high-income countries.	Work-based programs aiming to increase access to employment, including a variety of components, such as microcredit supplements, skills-based training, hands-on work placements, psychoeducation group sessions with matched savings, and financial literacy group sessions.	The different employment components yielded conflicting results on depression and anxiety outcomes. Two studies measuring depressive symptoms as an outcome found a significant positive effect ($\beta = -0.8$, $p < 0.001$; $d = -0.06$, $p < 0.05$) and three studies found no intervention effect. One of these studies also found a significant effect on major depressive disorder ($d = 0.49$, $p < 0.05$), favouring an individual placement support group. Within the two studies that measured anxiety, one found a positive effect ($d = 0.15$, $p < 0.05$) and one reported no effect. Of the interventions with a skill-based component, three (60%) had a significant positive effect on outcome measures, while two (40%) had no effect. Both interventions with a placement and a skills-based training component also found no effect on mental health. Studies with retrospective and non-randomized experimental designs all reported null effects.	Not reported.	The RCTs were judged to have low/unclear risk of bias, while one retrospective cohort study had high risk of bias.
Improving work environments/conditions					
Ruotsalainen et al. (2014) 21/58 RCTs, cluster-RCTs, and other study designs	Healthcare workers who had not actively sought help for conditions such as burnout, depression, or anxiety disorder. Mostly high-income countries.	Interventions aimed to change working conditions, improve support or mentoring, change content of care, improve communication skills, and improve work schedules.	There was no clear mental health benefit of any of the organisational interventions, except for improving work schedules. Shorter or interrupted work schedules (with a weekend break instead of a continuous schedule) reduced healthcare workers' stress levels in two studies (SMD [95% CI] −0.55 [−0.84 to −0.25]; test for overall effect: $Z = 3.59$ [$p = 0$], heterogeneity: $\tau^2 = 0$; $\chi^2 = 0.28$, df = 1 [$p = 0.59$]; $I^2 = 0\%$).	Not reported.	Most studies were of low methodological quality, with at least several items judged to be at a high risk of bias.
Pachito et al. (2018) 5/5 RCTs, controlled before-after studies	Daytime indoor workers in office and hospital settings. High-income countries.	Workplace lighting interventions, including use of cool-white light (known as high correlated colour temperature), different proportions of indirect and direct light, individually applied blue-enriched light, and individually applied morning bright light.	Only one lighting intervention showed positive effects on mental health outcomes; glasses with mounted light emitting diodes providing blue-enriched light may improve mood in workers compared to no treatment (MD −4.80, 95% CI −9.46 to −0.14).	Not reported.	Quality of the evidence was graded as low overall.

(*Continued*)

Table 3. (Continued.)

Review details[a]	Participants and setting	Interventions	Outcome(s) reported		Quality of the studies/ evidence[b]
			Mental health	Social determinant(s)	
Suto et al. (2022) 7/7 RCTs, QEs	Working population from various sectors including healthcare, service and welfare, and information. High-income countries.	Five types of interventions were assessed, including reduced weekly working hours, self-rostering/ flexibility, supervisory/ employee training to manage work-family conflict, workplace parenting interventions to manage work-family conflict, and individualised employee counseling.	For interventions in which weekly working hours were reduced by 25% (work reduction), intervention participants experienced decreased stress on workdays (estimate −0.243 [−0.356 to −0.130]; $p < 0.01$) and on days off (estimate −0.224 [−0.338 to −0.110]; $p < 0.01$). Specifically, men were shown to have benefitted more from worktime reduction, as compared with women, while employees with children living at home reported somewhat lower levels of perceived stress on workdays, as compared to those without children. For interventions which involved self-rostering (work flexibility) and gave participants choice over their work activities, intervention participants experienced reduced somatic symptoms (estimate −0.104 [−0.19 to −0.022]; $p = 0.013$) and reduced mental distress (estimate −0.131 [−0.23 to −0.032]; $p = 0.010$) at 12-month follow-up. For interventions focussing on supervisory/employee training designed to reduce work-family conflict, intervention participants experienced reduced negative affect ($B = −0.11$ [−0.18 to −0.03], ES = 0.24) and increased positive affect ($B = 0.43$ [0.32–0.55], ES = 0.30). Several studies looked at workplace parenting interventions, such as the *Workplace Triple P program*, which aims to reduce work-family conflict and improve family functioning. In a study of teachers, intervention participants experienced reduced work stress (Cohen's $d = 0.70$ [0.08–0.79]), depression symptoms (Cohen's $d = 0.58$ [0.21–1.06]), and anxiety symptoms (Cohen's $d = 0.57$ [0.46–1.33]), with findings maintaining at 4-month follow-up. In another study of the *Workplace Triple P program*, which included only fathers with children aged 2–9 years at home, there was no intervention effect on work stress, but intervention participants reported significantly reduced child behavior problems ($F [1, 27] = 4.25$ [$p = 0.05$]), which maintained at 4-months follow-up. In another study of the *Workplace Triple P program*, involving fathers with children aged 1–16 years living at home, intervention participants reported significantly lower parental distress (Cohen's $d = 0.64$, $p = 0.002$) but not work stress at 8-week follow-up. There did not appear to be an intervention effect on child behavior outcomes (measured by the Strengths and Difficulties Questionnaire). Employee assistance programs (offering individualized counseling to employees) did not significantly reduce workplace distress or at-risk alcohol use in intervention participants but did lead to reduced symptoms of depression (b −1.098 [s.e. 0.463], $b = −0.100$; $t = −2.37$ (−2.009 to −0.187)) and anxiety (b −0.327 [s.e. 0.158], $b = −0.092$; $t = −2.06$ [−0.638 to −0.016]).	Six studies reporting on social wellbeing, work-life balance, marital conflict, parent-child relationships, and parental satisfaction and efficacy found positive intervention effects or no statistically significant difference. Four studies assessed intervention effects on job performance, and statistically significant effects were reported for job satisfaction, workplace commitment, and self-efficacy at work post intervention.	Two studies had low risk of bias, four studies had unclear risk of bias, and one study had high risk of bias.
Reducing the impact of job loss, debt, and financial difficulties					
Moore et al. (2017) 6/11 RCTs	Unemployed adults. High-income countries.	Interventions included Job Clubs which involved job skills training seminars to improve job seeking, and a debt advice intervention which included a telephone call from a trained advisor.	There was reasonably consistent evidence from large RCTs that short, 1-to-2-week job club interventions can reduce depressive symptoms in high-risk, unemployed people up to two years. Effects were small but strongest among those at increased risk of depression at baseline (improvements of up to 0.2–0.3 s.d. in depression scores). The RCT of debt advice found no effect but had poor uptake.	There was some evidence that reduced depressive symptoms were associated with re-employment, reduction of financial strain, and job search preparedness (self-efficacy and inoculation against setbacks).	Most studies were assessed as at high or unclear risk of bias across assessment domains.

ENVIRONMENTAL EVENTS DOMAIN

Group-based psychosocial interventions for children and young people in humanitarian settings

Alzaghoul et al. (2022) 6/6 RCTs	Children and young people aged 9–18 years old who had been exposed to conflict. Low- and middle-income countries.	Three group-based psychosocial interventions were evaluated: "Teaching Recovery Techniques", "Writing for Recovery" and "Advancing Adolescents".	There were no treatment effects in studies implementing the 'Advancing Adolescents' or the 'Writing for Recovery' programs. The 'Teaching Recovery Techniques' intervention was the only program associated with statistically significant and clinically meaningful reductions in PTSD and depression scores compared to waitlist groups.	Positive experiences and improved social skills were indicated following most interventions, qualitatively and quantitatively. For example, effects were reported on school performance (d = 0.35), improved social communication, increased trust, and participants reported making more friends.	There was high risk of bias and unclear reporting across assessment domains. Four of the six RCTs were rated as having a lower risk of bias.
Purgato et al. (2018b) 11/11 RCTs	Children (up to 18 years of age) exposed to traumatic events in humanitarian settings in low- and middle-income countries. Low- and middle-income countries.	Group-based focused psychosocial support interventions, implemented by lay workers or by targeting people with psychological distress or psychosocial problems broadly. Four were classroom-based interventions, one was family-focused, one was a youth readiness intervention, one involved creative play, one was a mind-body skills program, one was a sports intervention, one involved teaching recovery techniques, and one involved a writing intervention.	Meta-analysis of PTSD symptom scores showed a small, beneficial effect of focused psychosocial support interventions *v.* waiting list at 0–4 weeks after intervention (SMD –0.33, 95% CI –0.52 to –0.14; eight RCTs with 2355 participants). This beneficial effect was reduced but still significant at follow-up at least six weeks after intervention completion (–0.21, –0.42 to –0.01; six RCTs with 1808 participants). Exploratory analyses showed a stronger improvement in PTSD symptoms in children aged 15–18 years (–0.43, –0.63 to –0.23), in non-displaced children (–0.40, –0.52 to –0.27), and in children living in smaller households (<6 members; –0.27, –0.42 to –0.11). There was a substantial level of heterogeneity between studies (I^2 between 70 and 80%). No difference in depressive and anxiety symptoms was found between treatment and control groups at the end of the interventions and at follow-up.	Not reported.	Studies were evaluated to be of good quality.

Psychosocial interventions for individuals of all ages exposed to environmental events

Li et al. (2022) 25/63 RCTs	Individuals of all ages post-disaster/post-emergency in China. Middle-income country.	A wide range of psychosocial and traditional Chinese interventions were included, such as Chinese calligraphic writing, physical exercise, Chinese qigong, herbal treatments, web- or app-based interventions, and other forms of psychotherapy and resilience interventions. These interventions were mostly implemented following the Wenchuan earthquake and the COVID-19 pandemic.	Overall, interventions led to improvement in all psychological outcomes assessed (e.g. anxiety, suicide risk, depression, PTSD). Statistical significance and the magnitude of effects was not always reported, but the authors indicate that most effect sizes were not large.	Intervention effects on social outcomes (e.g. social support, interpersonal skills) were mixed.	Eight studies were classified as having low risk of bias, seven with some risk of bias, and 10 as having high risk of bias.
Purgato et al. (2018a) 30/36 RCTs	Populations in low- and middle-income countries in humanitarian settings, affected by armed conflicts or by disasters associated with natural, technological, or industrial hazards. Low- and middle-income countries.	A range of psychological therapies were included, such as cognitive behavioral therapy, eye movement desensitization and reprocessing therapy, and counseling, each with common psychotherapeutic elements (e.g. psychoeducation, coping skills). Interventions took place following natural disasters (eight studies) and man-made disasters such as genocide, armed conflict, and war (22 studies).	Based on meta-analysis, for adults psychological therapies may substantially reduce PTSD symptoms (SMD −1.07, 95% CI −1.34 to −0.79; 1272 participants; 16 studies; low-quality evidence), depression symptoms (SMD −0.86, 95% CI −1.06 to −0.67; 1254 participants; 14 studies; low-quality evidence), and may moderately reduce anxiety (SMD −0.74, 95% CI −0.98 to −0.49; 694 participants; five studies; low-quality evidence), compared to control conditions. Effects were smaller at four and six-month follow-up points. In children and adolescents, there was very low-quality evidence for lower PTSD symptoms scores in psychotherapy conditions (cognitive behavioral therapy) compared to control conditions, although the confidence interval was wide (SMD −1.56, 95% CI −3.13 to 0.01; 130 participants; three studies).	Not reported.	The quality of evidence was rated as low and very low.

Table 3. (*Continued.*)

	Review details[a]	Participants and setting	Interventions	Outcome(s) reported		Quality of the studies/ evidence[b]
				Mental health	**Social determinant(s)**	
	Doherty et al. (2021) 22/22 RCTs	General populations exposed to mass infectious disease outbreak (COVID-19, SARS). Mostly high-income countries.	Psychological therapies varied, including therapist-guided therapy, online counseling, mobile phone apps, brief crisis interventions, behavioral interventions, cognitive behavioral therapy, progressive muscle relaxation, emotional-based directed drawing, psychoeducational debriefing, guided imagery, eye movement desensitization and reprocessing therapy, and expressive writing.	Meta-analyses conducted suggested that different psychological support interventions have potential effectiveness to reduce levels of anxiety (SMD: −0.72; 95% CI −1.03 to −0.40) and depression (SMD: −0.40; 95% CI −0.76 to −0.03) in those exposed to mass infectious disease, but not levels of stress (SMD: 0.16; 95% CI −0.19 to 0.51).	Not reported.	Twelve studies were classified as high risk of bias, eight as having some concerns, and two as low risk of bias.
	Parenting interventions to support displaced families					
	Gillespie et al. (2022) 4/24 RCTs, QEs	Displaced families and caregivers of children aged 6 months to 19 years old. Low- and middle-income countries.	Parenting program interventions were defined as those which influence parenting behaviors such as nurturing, discipline, teaching, monitoring and management. Many studies looked at selective prevention interventions, targeting parenting based on their children's age, their migration history, or ability to complete the program.	A parenting intervention in Bosnia for internally displaced Muslim families reported no intervention effect for maternal well-being but observed an intervention effect for improved child cognitive performance (ES = 0.48). A parenting intervention for internally displaced Acholi people in Uganda reported an intervention effect on improved maternal mental health (ESs: sadness = −0.62, irritability = −0.38, somatic complaints = −0.46). One parenting intervention set in a Lebanese refugee camp reported an intervention effect on improved child language development (ES = 0.53), but no intervention effect on maternal well-being or child difficulties. Another study in a Lebanese refugee camp reported an intervention effect on maternal psychological distress (ES = −0.70) but no effect on child psychological wellbeing. Findings about program effectiveness from these trials should be interpreted cautiously due to small sample sizes and some of the studies being underpowered.	Parenting programs for forcibly displaced families were not shown to have treatment effects on child maltreatment; however, a number of studies reported positive effects on outcomes such as parenting knowledge, discipline, and parent-child relationships.	The relevant studies were coded as 'preliminary evidence.'
NEIGHBOURHOOD DOMAIN	***Access to housing***					
	Baxter et al. (2019) 4/4 RCTs	Adults, aged 16 years and older, experiencing homelessness. High-income countries.	Housing First, defined as 'rapid provision of permanent, non-abstinence-contingent housing.'	For mental health and substance use, no clear differences were seen between individuals in Housing First and control conditions.	Housing First participants spent more days housed (SMD = 1.24; 95% CI 0.86–1.62) and were more likely to be housed at 18–24 months follow-up (risk ratio = 2.46; 95% CI 1.58–3.84).	The overall risk of bias was assessed as high for each outcome.
	Onapa et al. (2022) 13/24 RCTs, non-RCTs	Adults (18 years and older) who do not have suitable accommodation alternatives. Most participants had mental health or substance use problems. High-income countries.	Four types of housing interventions were assessed, including permanent supportive housing, transitional housing, social housing, and community housing.	Overall, there were no clear significant differences on mental health outcomes between housing intervention groups.	Participants in Housing First programs were more likely to remain stably housed than treatment as usual individuals.	Most studies were judged to be moderate and high risk of bias.

	Improving the physical fabric of housing				
	Thomson et al. (2013) 10/39 RCT, controlled before-after studies	Individuals were mostly social housing tenants or private householders in socioeconomically deprived areas and in receipt of welfare benefits. High-income countries.	Interventions involved rehousing or retrofitting of homes, with or without neighborhood renewal, and implementing warmth and energy efficiency improvements in homes.	Overall, few statistically significant changes in mental health outcomes were reported post-intervention. Of the studies assessing rehousing or retrofitting with or without neighborhood renewal, only one reported a statistically significant reduced level of self-reported anxiety or depression among the intervention group compared with the control group following the housing improvement (OR 0.361, 95% CI 0.152 to 0.856). Of the studies assessing warmth and energy efficiency improvements, only one reported statistically significant increased improvement in emotional role functioning relative to the control group (+10.9%, $p < 0.001$).	A wide range of housing condition measures were reported across the studies, including measures of damp, cold, mould, air quality, fuel use and fuel expenditure. Most studies reported improvements in these housing condition measures for individuals in the intervention groups over those in control groups. Changes in wider neighborhood measures, such as number of neighborhood problems, or fear or crime, were mixed.	The studies were rated as poor quality with unclear risk of bias overall.
	Social inclusion and capital for older adults				
SOCIOCULTURAL DOMAIN	Coll-Planas et al. (2017) 17/36 RCTs	Participants over the age of 60. Mostly high-income countries.	Interventions aimed to improve social capital in older people. Programs were mainly based on social support (e.g. support groups, peer support), social activities, befriending schemes, and/or engaging participants in activities.	Overall, these social capital interventions were ineffective in reducing depression and anxiety.	Overall, these social capital interventions were ineffective in reducing loneliness.	Five studies were classified as low risk of bias, three were unclear, and nine were high risk of bias.
	Ronzi et al. (2018) 14/40 RCTs, non-RCTs	Primarily healthy older people between 60 and 95 years old. Two studies included older people with dementia, and three included older people with Parkinson's Disease. High-income countries.	Social integration and inclusion interventions varied, including mentoring, intergenerational activities, dancing, music/singing, information and communication technology (ICT) activities, multi-activity programs, art and culture activities.	There was a lack of evidence for mentoring, dancing, and ICT interventions. Intergenerational, music/singing, art and culture, and multi-activity interventions showed overall positive effects on mental health outcomes. Two studies with intergenerational interventions found a significant effect on depression scores. In one study, a reduction of 26.3% was obtained in the post-treatment evaluation (MD = 3.53, $p < 0.001$) and a reduction of 18.5% at 2-year follow-up (MD = 0.94, $p < 0.001$). Another study showed a significant reduction in depression scores in older people with Parkinson's disease (MD = 0.26, $p = 0.001$) and older people without Parkinson's disease (MD = 0.52, $p = 0.001$). The two music and singing intervention studies found a positive effect on mental health. One study found a significant reduction of 36.6% in depression scores at 3-month follow-up (MD = − 1.52, $p < 0.01$) and of 12.5% at 6-month follow-up (MD = − 0.53, $p = 0.014$). The same study also noted a reduction of 31.1% in anxiety scores at 3 month follow up (MD = − 1.78, $p < 0.01$). One study found an improvement of 14.3% in mental health scores (vitality subscale: MD = 10.4, $p = 0.03$) at 8-week follow-up.	Not reported.	Five studies were rated as having low bias, two as having low-medium bias, six with medium bias, and one with medium-high bias.

(Continued)

Table 3. (Continued.)

Review details[a]	Participants and setting	Interventions	Outcome(s) reported		Quality of the studies/ evidence[b]
			Mental health	**Social determinant(s)**	
Noone et al. (2020) 3/3 Cluster-RCTs	Older adults over the age of 65 years (in nursing homes). High-income country.	Interventions involved the use of video calls (laptops or smartphones) once per week for at least five minutes to facilitate communication between nursing home residents and members of their family. These video calls were the core component of the interventions and telemedicine was not included. No further details were provided.	The evidence suggests that video calls (length of time unknown) may result in little to no difference in symptoms of depression compared to usual care at three months' follow-up (MD 0.41, 95% CI −0.90 to 1.72; 3 studies; 201 participants) or six months' follow − up (MD −0.83, 95% CI −2.43 to 0.76; 2 studies; 152 participants). The evidence suggests that video calls may have a small effect on symptoms of depression at 12-month follow-up, though this finding is imprecise (MD−2.04, 95% CI −3.98 to −0.10; 1 study, 90 participants).	The evidence was very uncertain and suggests that video calls may result in little to no difference in loneliness compared to usual care at three months (MD−0.44, 95% CI −3.28 to 2.41; 3 studies, 201 participants), at six months (MD−0.34, 95% CI −3.41 to 2.72; 2 studies, 152 participants) and at 12 months (MD −2.40, 95% CI −7.20 to 2.40; 1 study, 90 participants).	The studies were judged as high risk of bias overall.
Social capital and community participation					
Flores et al. (2018) 6/7 RCTs, cluster-RCTs, other study designs	A range of study populations, including: women who were survivors of sexual violence, socially isolated and affective disturbed adults, deprived urban communities (aged >16 years), older adults who relocated within last 2 years, Aboriginal and Islander adults with mental health condition/chronic risk factor, post-conflict survivors (aged >16 years). Low-, middle- and high-income countries.	A range of interventions aiming to improve social capital, including social relationships and participation in community networks, were included. Interventions included community engagement and educational programs, cognitive processing therapy, sociotherapy, and neighborhood projects.	The effect of social capital interventions on the mental health outcomes of interest were not entirely clear, and the magnitude of effects were not clearly articulated. One study looking at a community engagement and educational programs (G4H), reported that average depression scores reduced from 'moderate' to 'mild' (p < 0.05), and average anxiety and stress scores from 'severe' to 'moderate' (both p < 0.001), from the start of the intervention to a 2-month follow-up. The authors reported sustained improvement from the start on measures of depression, anxiety, and stress at 6-month follow-up. Another study, looking at the *Well London* program, did not report any significant findings pertaining to relevant mental health outcomes. A study looking at a community-based singing intervention conducted and coordinated through local Aboriginal groups in Australia, reported a reduction from 54.8% at baseline v. 38.3% at follow-up in the proportion of adults in the intervention group classified as depressed (p < 0.02). A study looking at a sociotherapy intervention reported a significant effect of the intervention on linear change in mental health (−0.38, p < 0.05).	Findings were mixed and inconclusive regarding intervention effects on social capital outcomes.	The studies were reported to be high to moderate quality.
Indigenous knowledge and culture in mental health					
Pollok et al. (2018) 3/4 RCTs	Indigenous populations from any setting. Pregnant young Apache American Indian adolescents, rural American Indian reservation school students, and Māori and Pacific high school students were included. High-income countries.	All interventions were culturally adapted cognitive behavioral therapy programs which were delivered by trained Indigenous people, created in consultation with Indigenous leaders and organisations, and incorporated specific Indigenous cultural values.	The evidence is currently not sufficient to conclude that culturally adapted interventions targeting depression in Indigenous people are more effective.	Culturally adapted programs scored highly on participant satisfaction, consequently improving treatment uptake and adherence.	The studies were rated to be at unclear or high risk of bias for majority of bias types assessed.

Lee et al. (2022) 11/21 RCTs, pre–post studies with comparison	Indigenous adult populations in Canada, USA, Australia, and New Zealand. High-income countries.	A range of different interventions with Indigenous populations were assessed, including psychoeducational, psychosocial, cultural, and community interventions. The interventions included Indigenous involvement in the content development and/or delivery of the interventions.	The effectiveness of these interventions was mixed; some studies reported improvements in mental health outcomes such as depressive symptoms, psychological distress, PTSD symptoms, and stress post-intervention, but some studies did not report such improvements. With the current evidence, it is not possible to comment on intervention effects by level of Indigenous involvement, as the interventions in this review were compared to no intervention or waitlist groups, rather than interventions with no Indigenous involvement.	Improvements were reported on a range of strength-based mental health outcomes, including hope, self-esteem, resilience, and motivational state.	Six studies were rated as moderate quality and five as weak quality.

School-based social and emotional learning programs

Luo et al. (2022) 24/39 QEs, experimental studies	Preschool aged children with or without disabilities. The average child age at the beginning of the study had to be between 36 and 60 months. Mostly high-income countries.	Classroom-wide social-emotional interventions for preschool children were assessed. Interventions used small group activities, large/whole group activities, individual activities, embedded instruction into daily routines, or a family component. Interventions were delivered by teachers, researchers, facilitators, and clinicians. The total length of interventions varied from 5 to 40 weeks. The number of intervention sessions delivered ranged from one to five per week. The duration of each session ranged from 5 to 180 minutes per session.	The interventions had a statistically significant and meaningful effect on the reduction of challenging behavior in preschool children ($g = -0.31$, 95% CI [-0.43 to -0.19]; $z = -5.03$, $p < 0.001$; $k = 28$), but there was substantial heterogeneity between studies ($Q[27] = 131.40$, $p < 0.001$, $I^2 = 79.45\%$). Interventions with a family component, or delivered by non-classroom teachers (e.g. researchers), had statistically significantly larger effect sizes.	Participating children gained social competencies following the intervention.	Across the whole review, most studies had issues with sequence generation and blinding of participants, personnel, and outcome assessors. Majority of studies also had a high risk of bias for procedural fidelity.
Singla et al. (2020) 19/45 RCTs, cluster-RCTs	Adolescents, aged 10–19 years, in low- and middle-income countries. Studies often focused on a subgroup of high-risk individuals meeting a particular threshold of mental health symptoms. Low- and middle-income countries.	Adolescent life skills programs in schools. Programs most commonly included communication skills, problem-solving, assessing relations, stress management, emotional regulation, identifying/eliciting affect, and self-awareness.	These interventions reported a significant reduction in individual outcomes pertaining to mental health symptoms including anxiety (SMD = 0.48, 95% CI 0.18–0.77, $p = 0.002$; $I^2 = 0\%$), depressive symptoms (SMD = 0.24, 95% CI 0.05–0.44, $p = 0.016$; $I^2 = 86.31\%$), PTSD symptoms (SMD = 0.60, 95% CI 0.32–0.88, $p = 0.00$; $I^2 = 87.36\%$), and aggression (SMD = 1.63, 95% CI 0.65–2.60, $p = 0.00$; $I^2 = 82.68\%$).	Meta-analysis demonstrated a significant improvement in life skills post-intervention (SMD = 0.48, 95% CI 0.27 to 0.69, $I^2 = 88.22\%$).	For the whole review, there was overall low risk of bias in 27 (60%) of the studies, compared to 18 (40%) studies reporting a high risk of bias.

School-based anti-bullying interventions

Guzman-Holst et al. (2022) 26/27 RCTs, cluster-RCTs, non-RCTs	Children and adolescents aged between 4 and 19 years. Mostly high-income countries.	Anti-bullying interventions were assessed. Fifty-nine percent of studies had interventions delivered by school staff or teachers. Seventy percent of studies included whole-school interventions, 26% targeted interventions, and 3.7% included both whole-school and targeted components.	Antibullying interventions had a very small effect in reducing overall internalizing symptoms (ES = 0.06; 95% CI 0.0284–0.1005), anxiety (ES = 0.08; 95% CI 0.011–0.158), and depression (ES = 0.06; 95% CI 0.014–0.107) post-intervention. Heterogeneity measures indicated that there was low heterogeneity in the data ($Q = 21.47$, df = 21, $p = 0.4304$; $I^2 = 2.2\%$, 95% CI 0–47.4%). The reduction in internalizing symptoms did not vary significantly across geographic location, grade level, program duration, and intensity. The intervention component 'working with peers' was associated with a significant reduction in internalizing symptoms, and 'using CBT techniques' was associated with a significant increase in internalizing symptoms. Whole-school approaches were significantly more effective than usual school practice and had a larger effect size than targeted interventions, which were not significantly more effective than usual practice.	Not reported.	Ten studies were rated as having low risk of bias, six as medium risk of bias, and 10 as having high risk of bias.

[a]CI = confidence interval; ES = effect size; MD = mean difference; OR = odds ratio; PTSD = post-traumatic stress disorder; QEs = quasi-experiments; RCTs = randomized controlled trials; S.D. = standard deviation; S.E. = standard error; SMD = standard mean difference.
[b]Quality of the studies/evidence according to the original review authors.
Review author and publication year; relevant number of studies/total number of studies in the review; study designs.

Table 4. Cross-cutting, domain-specific, and intervention-specific gaps, challenges, and methodological issues

Cross-cutting:
- Mental health indicators were often examined as **secondary outcomes**, therefore power calculations were not conducted for mental health outcomes, and studies may have been underpowered to detect small but meaningful effects.
- **Ethical concerns** regarding randomising vulnerable individuals to control groups that withhold interventions/services.
- **Lack of long-term follow-up** limits the ability to measure long-term benefits of interventions in terms of reducing **incidence** and prevalence of the determinants being targeted (e.g. child abuse), allow participants the time to practice newly acquired skills (e.g. work training), and associated mental health outcomes.
- **Heterogeneous** participant groups, interventions, outcome measures, and length of follow-up across studies **limits ability to pool results** and identify patterns across studies.
- **Accessing technology-based interventions** might pose a challenge in low-tech or no-tech settings; innovative approaches are warranted in these contexts.

Demographic	Economic	Environmental Events	Neighbourhood	Sociocultural
No eligible reviews focussing on interventions to reduce racism, xenophobia, homophobia, transphobia, or addressing gender norms, were identified.	No eligible reviews including interventions to address income inequality or employment precarity, were identified. Most studies failed to consider the role of gender in interventions.	No eligible reviews which focused on interventions targeting climate change, vulnerable ecosystems, disaster preparedness, or other social determinants in the context of environmental events (such as safe housing or food security in the aftermath of a disaster), were identified.	No eligible reviews focusing on neighborhood safety/violence, or various urban infrastructure (e.g. waste management), were identified.	No eligible reviews focussing on increased access to, or completion of, education, were identified.

Reducing intimate partner violence (IPV)	**Cash transfer programs (CTs)**	**Psychosocial interventions**	**Housing access and improvement**	**Social support and capital**
• Interventions focussed on women and failed to target partners. • Modest intervention effects may demonstrate the difficulty in reducing IPV, and associated mental health outcomes, by involving survivors alone. • Digital interventions are not being adapted for ethnically, culturally, and linguistically diverse IPV survivors. • Researching IPV is inherently associated with numerous ethical and safety issues, making true randomisation, complete follow-up, and the production of strong evidence difficult. **Prevention of child maltreatment/abuse** • Interventions included mothers but failed to include other caregivers or placed the onus of learning protective behaviors on children themselves. • Interventions that focus on a wider spectrum of individuals, including perpetrators and adults in institutional environments, will	• In high-risk settings, such as armed conflict or extreme deprivation, CTs may be limited in their effectiveness on their own. Integrated interventions, combining cash and social care, may be more impactful. • CTs may produce adverse mental health outcomes for those who are left out, and conditional CTs may increase family stress associated with the pressure to meet conditionalities. • Many CTs involve relatively small cash amounts, which may be insufficient to generate changes in mental health. Further research should investigate whether the impact of CTs on mental health differs with cash volume. • Future experimental studies should comprehensively assess risk of bias from contamination (e.g. using spill-over control groups). • There was a lack of evidence testing the effectiveness of CTs in high-income countries. **Work-related interventions:** • Interventions are conducted across a variety of countries with different	• All interventions were reactive and provided psychosocial supports after environmental events. • The timeframe of when psychosocial interventions commenced after environmental events varied and was not consistently reported. • Future research should consider pre-existing mental health problems in study participants, as well as migration issues if longer-term follow-up assessments are planned. • There is currently a need to strengthen research infrastructure in low- and middle-income countries, as many researchers of the described interventions were based in high-income countries where mental health care contexts and cultural viewpoints differ. • No interventions were found focusing solely on elderly populations, despite being the group most vulnerable to post-disaster psychiatric morbidity. • Overall, there is a need to bridge the gap between specialised, largely individualistic, Western psychosocial approaches to mental	• The primary issue was contamination of conditions. Participants in control conditions received various extensive housing services and some housing improvements, which may have underestimated the possible mental health effects of the interventions being evaluated. • Heterogeneity in sample participants, and the definitions and provision of attached services varying by location, made it difficult to directly compare results. • Brief follow-up periods may have impacted overall findings; the process of moving house can induce short-term stress in participants. **Improving urban infrastructure** • Authors argued that evaluation of urban infrastructure interventions likely requires going beyond traditional comparative effectiveness research, to the use of natural experiments in observational data, with suitable control groups or good quality baseline and follow-up data to	• Studies were mostly conducted in higher/upper middle-income countries. • More diverse stakeholder groups and settings are needed in future studies focusing on older populations, given the current homogeneity of studies in nursing home residents. • In some instances, participants had low scores on mental disorder measures at baseline, indicating very little room for improvement. **Indigenous culture and knowledge** • Critique of the use of culturally inappropriate measures consistently emerged from this research. • Given Indigenous mental health is conceptualised more holistically (e.g. coined social and emotional well-being in Australia), many validated psychometric measures (e.g. of depression) may not be appropriate for use in Indigenous populations. • The uniqueness of different Indigenous communities, their cultural practices, and knowledge, must be considered.

School-based programs
- Few of the school-based programs described engagement with caregivers, and many failed to report on implementation or procedural fidelity. This is a gap in the evidence, as both factors may strengthen program outcomes.
- The role of gender was not considered often; this was highlighted as important for social and emotional learning programs as gender can influence what kinds of social interactions are appropriate in low- and middle-income country settings.

assess impact of changes to the built environment.

health and population-level social determinants approaches in the environmental events domain.

national policies, labour markets, welfare systems, and mental health care systems, which could confound results.
- Recent literature emphasises that in the context of high precariousness, obtaining an insecure job will not necessarily lead to improvements in health and wellbeing. A focus on the mental health impacts of interventions which explicitly aim to support people in obtaining and maintaining secure, competitive employment is needed.
- Interventions were mostly conducted in high-income countries, restricting generalisability.

help to ease the burden of responsibility placed on children.
- Few studies considered parent/caregivers' experiences of child maltreatment.
- Prevention programs would benefit by incorporating components which move beyond the individual and interpersonal dimensions of abuse and neglect and address the systemic contributors to mental illness and child maltreatment, including socioeconomic and structural inequalities.

work-based programs in general populations (Evans et al., 2022) reported that interventions with a skill-based component showed promise for positive effect on depression and anxiety measures.

Improving working conditions

Three reviews focused on interventions which aimed to improve working conditions, mostly in high-income countries. Healthcare workers were the focus of one review (Ruotsalainen et al., 2014); only interventions improving work schedules resulted in mental health benefits, with two studies reporting reduced stress levels for workers assigned shorter or interrupted work schedules.

Another review (Suto et al., 2022) included workers from a variety of sectors. For interventions in which weekly working hours were reduced by 25%, intervention participants experienced decreased stress. For interventions which involved self-rostering and gave participants choice over their work activities, intervention participants experienced reduced somatic symptoms and mental distress at 12-month follow-up. In interventions focusing on supervisory/employee training designed to reduce work-family conflict, intervention participants experienced reduced negative affect. The *Workplace Triple p program*, which aimed to reduce work-family conflict and improve family functioning, was reported to reduce participant's work stress, parental distress, depression, and anxiety symptoms, and reduce their children's behavior problems, up to 4-months follow-up. Employee assistance programs, offering individualized counseling, did not significantly reduce workplace distress or at-risk alcohol use in participants, but led to reduced symptoms of depression and anxiety.

One review (Pachito et al., 2018) assessed workplace lighting interventions in office and hospital workers. Only one lighting intervention showed positive effects; glasses with mounted light-emitting diodes providing blue-enriched light improved mood in indoor workers compared to no treatment.

Reducing the impact of job loss, debt, and financial difficulties

One review focused on interventions which aimed to reduce the impact of job loss, debt, and financial difficulties (Moore et al., 2017). There was consistent evidence that short, 1-to-2-week *Job Club* interventions involving job skills training seminars can reduce depressive symptoms in high-risk, unemployed people, for up to two years. Effects were small but strongest among those at increased risk of depression at baseline. There was some evidence that reduced depressive symptoms were associated with re-employment, reduction of financial strain, and job search preparedness.

Environmental Events domain

Nineteen reviews with Environmental Events interventions were identified (Al-Tamimi & Leavey, 2022; Alzaghoul, McKinlay, & Archer, 2022; Brown, de Graaff, Annan, & Betancourt, 2017a; Brown et al., 2017b; Coombe et al., 2015; Doherty et al., 2021; Fu & Underwood, 2015; Gillespie et al., 2022; Gwozdziewycz & Mehl-Madrona, 2013; Kiss et al., 2020; Le Roux & Cobham, 2022; Li et al., 2022; Lipinski, Liu, & Wong, 2016; Lopes, Macedo, Coutinho, Figueira, & Ventura, 2014; Natha & Daiches, 2014; O'Sullivan, Bosqui, & Shannon, 2016; Pfefferbaum, Nitiéma, & Newman, 2019; Purgato et al., 2018a, 2018b). Examples of environmental determinants of mental health include natural disasters, industrial disasters, war or conflict, climate change, and forced migration. SDG 13 (climate action) and 16

(peace, justice, and strong institutions) are examples of relevant SDGs in this domain. Six reviews were given a moderate or high confidence rating.

Group-based psychosocial interventions for children and adolescents exposed to traumatic events in humanitarian settings

Two reviews focused on group-based psychosocial interventions for children and adolescents who had been exposed to traumatic events in humanitarian settings in low- and middle-income countries (Alzaghoul et al., 2022; Purgato et al., 2018b). In one review, a skills-based program derived from trauma-focused CBT, was associated with statistically significant and clinically meaningful reductions in PTSD and depression scores compared to waitlist groups (Alzaghoul et al., 2022). Meta-analysis of PTSD symptoms in another review showed a small, beneficial effect of focused psychosocial support interventions *v.* waiting list at four weeks post-intervention (Purgato et al., 2018b). No difference in depressive and anxiety symptoms was found between treatment and control groups at four week follow-up (Purgato et al., 2018b).

Psychosocial interventions for individuals of all ages exposed to environmental events

Two reviews focused on psychosocial interventions for individuals of all ages who had been exposed to a variety of environmental events. One of these reviews focused on events in China, including the Wenchuan earthquake and the COVID-19 pandemic, and considered a range of psychosocial and traditional Chinese interventions (Li et al., 2022). Overall, interventions led to improvement in all psychological outcomes assessed (e.g. anxiety, suicide risk, depression, and PTSD). Statistical significance and the magnitude of effects were not always reported, but the authors indicate that most effect sizes were not large.

Another review (Purgato et al., 2018a) summarized a range of psychological interventions with common elements (e.g. psychoeducation and coping skills) following natural disasters and man-made disasters such as genocide, armed conflict, and war, in low- and middle-income countries. For adults, psychological therapies substantially reduced PTSD symptoms, depression symptoms, and moderately reduced anxiety, compared to control conditions. In children and adolescents, there was very low-quality evidence for lower PTSD symptoms scores in cognitive behavioral therapy (CBT) conditions compared to control conditions.

A final review summarized various psychological therapies following infectious disease outbreaks, with all but one study focusing on the COVID-19 pandemic (Doherty et al., 2021). Meta-analyses conducted suggested that different psychological support interventions have potential to reduce levels of anxiety and depression in those exposed to mass infectious disease, but not levels of stress.

Parenting programs for displaced families in humanitarian settings

Parenting programs for displaced families (Gillespie et al., 2022) were often implemented in refugee camps with small (underpowered) samples, and there was little consistency in intervention content and mental health outcomes reported. While some studies reported improvements in maternal mental health, child cognitive functioning, and child psychological well-being post-intervention, these improvements were not always statistically significant.

Neighbourhood domain

Eight reviews with Neighborhood domain interventions were identified (Baxter, Tweed, Katikireddi, & Thomson, 2019; Benston, 2015; Groton, 2013; Krahn, Caine, Chaw-Kant, & Singh, 2018; Moore et al., 2018; Onapa et al., 2022; O'Donnell et al., 2022; Thomson, Thomas, Sellstrom, & Petticrew, 2013). Examples of neighborhood determinants of mental health include urban infrastructure, neighborhood deprivation, built environment, safety and security (violence), and housing access and quality. SDG 7 (affordable and clean energy) and 11 (sustainable cities and communities) are examples of SDGs relevant to this domain. Three reviews were given a moderate or high confidence rating.

Increasing access to housing

Two reviews focusing on access to housing for people experiencing homelessness included studies conducted in North America. One (Baxter et al., 2019) reported on four Housing First studies, defined as 'rapid provision of permanent, non-abstinence-contingent housing'. Control conditions varied considerably and often involved intensive service access. For mental health and substance use, no clear differences were seen between individuals in Housing First and control conditions. A more recent review (Onapa et al., 2022) included four types of housing interventions: permanent supportive, transitional, social, and community housing. Again, control conditions varied considerably and involved access to a range of services. Overall, there were no clear significant differences in mental health outcomes between groups.

Improving the physical fabric of housing

One review assessed interventions to improve the physical fabric of housing in high-income countries, mostly in socioeconomically deprived areas (Thomson et al., 2013). Interventions involved rehousing or retrofitting of homes, with or without neighborhood renewal, and implementing warmth and energy efficiency improvements. Overall, few statistically significant changes in mental health outcomes were reported post-intervention.

Sociocultural domain

Thirty-one reviews with Sociocultural interventions were identified (Blewitt et al., 2018, 2021; Boncu, Costea, & Minulescu, 2017; Cantone et al., 2015; Casanova, Zaccaria, Rolandi, & Guaita, 2021; Cheney, Schlosser, Nash, & Glover, 2014; Choi, Kong, & Jung, 2012; Coll-Planas et al., 2017; Cordier et al., 2021; Durlak, Weissberg, Dymnicki, Taylor, & Schellinger, 2011; Fenwick-Smith, Dahlberg, & Thompson, 2018; Flores et al., 2018; Franck, Molyneux, & Parkinson, 2016; Ghiga et al., 2020; Goldberg et al., 2019; Guzman-Holst, Zaneva, Chessell, Creswell, & Bowes, 2022; Kuosmanen, Clarke, & Barry, 2019; Lee, Brown, Salih, & Benoit, 2022; Luo, Reichow, Snyder, Harrington, & Polignano, 2022; Murano, Sawyer, & Lipnevich, 2020; Nagy & Moore, 2017; Noone et al., 2020; Pollok, van Agteren, Chong, Carson-Chahhoud, & Smith, 2018; Ronzi, Orton, Pope, Valtorta, & Bruce, 2018; Schindler et al., 2015; Siette, Cassidy, & Priebe, 2017; Singla et al., 2020; Ştefan, Dănilă, & Cristescu, 2022; Taylor, Oberle, Durlak, & Weissberg, 2017; van de Sande et al., 2019; Yang, Datu, Lin, Lau, & Li, 2019). Examples of sociocultural determinants of mental health include social capital, participation, and support, education, and Indigenous knowledge and culture. SDG 4 (quality education) is

an example of a relevant SDG in this domain. Nine reviews were given a moderate or high confidence rating.

Increasing social inclusion and capital in older adults

Three reviews assessed the mental health impacts of interventions which aimed to promote social inclusion and social capital in older adults. One review reported that social support and social activity interventions were ineffective in reducing depression or anxiety in this population (Coll-Planas et al., 2017), and another reported that the use of video calls to facilitate communication between nursing home residents and their families resulted in no difference in symptoms of depression (Noone et al., 2020). One review reported reduced depression and anxiety scores in older people participating in intergenerational, music/singing, art and culture, and multi-activity interventions, but not information and communication technology interventions (Ronzi et al., 2018).

Increasing social capital and community participation

One review (Flores et al., 2018) summarized interventions aiming to improve social capital and participation in community networks across a range of groups. Three studies reported reduced depression and anxiety following a community engagement and educative program, a community-based singing group, and a sociotherapy intervention. Overall, the magnitude of intervention effects was unclear.

Indigenous knowledge and culture in mental health

Two reviews summarized interventions which incorporated Indigenous knowledge and culture in mental health solutions. One review (Pollok et al., 2018) included culturally adapted CBT programs. The authors reported that the evidence is currently not sufficient to conclude that culturally adapted interventions targeting depression in Indigenous people are effective. They did however note that culturally adapted programs scored highly on participant satisfaction, consequently improving treatment uptake and adherence. Another review (Lee et al., 2022) assessed a range of different interventions with Indigenous populations, which included Indigenous involvement in the content development or delivery. The effectiveness of these interventions was mixed; some studies reported improvements in mental health outcomes such as depressive symptoms, psychological distress, PTSD symptoms, and stress post-intervention, but some studies did not report such improvements. The involvement of Indigenous peoples and organizations in the interventions was often unclear due to varied reporting.

School-based social and emotional learning programs

Two reviews reported on the effectiveness of social and emotional learning interventions in educational settings. A review (Luo et al., 2022) of classroom-wide social-emotional interventions for preschool children, in mostly high-income countries, reported statistically significant and meaningful effects on the reduction of challenging behavior in preschool children. Interventions with a family component or delivered by non-classroom teachers (e.g. researchers), had statistically significantly larger effect sizes. Another review (Singla et al., 2020) reported on social and emotional learning and life skills programs for adolescents aged 10-to-19-years in low- and middle-income countries. These interventions reported significant reductions in symptoms of anxiety, depression, PTSD, and aggression.

School-based anti-bullying programs

One review assessed anti-bullying interventions in schools (Guzman-Holst et al., 2022), and reported a very small effect in reducing overall internalizing symptoms, anxiety, and depression post-intervention. The intervention component 'working with peers' was associated with a significant reduction in internalizing symptoms, and using CBT techniques was associated with a significant increase. Whole-school approaches were significantly more effective than usual school practice and had a larger effect size than targeted interventions, which were not significantly more effective than usual practice.

Multiple domains

In four instances, a review could be allocated to more than one domain and was assigned to a multiple domains category (Barnett et al., 2022; Moledina et al., 2021; Sweet & Appelbaum, 2004; Yakubovich, Bartsch, Metheny, Gesink, & O'Campo, 2022). The studies within these reviews presented interventions delivered to specific populations, but the interventions did not necessarily target multiple determinants. Two of these reviews were given a moderate or high confidence rating.

One review included housing, income assistance, and social support interventions which aimed to improve the health and well-being of persons with lived experience of homelessness (Moledina et al., 2021). Most studies found no benefit of permanent supportive housing on mental health or substance use outcomes compared to control groups in this population. Mental health impacts of income assistance interventions were mixed; while rental subsidies for individuals experiencing homelessness and AIDS, and homeless families with one child, demonstrated benefits on mental-health status, the same benefits were not shown for veterans experiencing homelessness. Programs in financial empowerment and compensated work-therapy did not show significant benefits on mental health status. Peer support programs for substance use had mixed outcomes, with one study reporting harms pertaining to depression and anxiety symptoms.

Another review presented interventions for women experiencing intimate partner violence, including housing interventions and programs focusing on aspects of education, advocacy, vocational training, counseling, and financial assistance (Yakubovich et al., 2022). The majority of relevant studies reported significant intervention effects. Depressive symptoms, PTSD, psychological distress, anxiety, and substance use generally showed evidence of reductions following housing interventions, particularly in the form of shelters. The magnitude of reductions in these outcomes were not reported.

Discussion

This is the largest and most comprehensive review to date of interventions targeting the social determinants of mental disorders which align with the UN SDGs. We identified several promising interventions for the prevention of mental disorders, which had a good evidence base, and for the first time highlight synergies where acting on a range of UN SDGs can be beneficial for public mental health. This review is timely, given a recent meta-analysis of over 3000 scientific studies reported that action on the UN Sustainable Development Agenda has largely been discursive, rather than transformative, to date (Biermann et al., 2022). This review may serve as a useful resource for academics,

clinicians, policymakers, and professionals working across a variety of fields which directly and indirectly impact public mental health, making it clearer which interventions should be invested in and providing directions for future research.

Recommendations for intervention investment and future development

Based on this synthesis, recommendations for intervention investment and development can be made. In the Demographic domain, digital and brief advocacy interventions were found to be beneficial for the mental health of female IPV survivors, but future interventions should test whether targeting partners increases the effectiveness of such approaches (Emezue et al., 2022). In the Economic domain, cash transfer programs (CTs) were found to offer the greatest potential benefits for mental health in low- and middle-income countries, but some conditionalities may increase stress (McGuire et al., 2022; Wollburg et al., 2023; Zaneva et al., 2022; Zimmerman et al., 2021). Future research should look at implementing CTs in high-income countries and pay close attention to the impact of cash amounts and conditionalities on outcomes (Lund et al., 2011). In high-income countries, improved work schedules for healthcare workers (Ruotsalainen et al., 2014), the *Workplace Triple P Program* for working parents (Suto et al., 2022), and *Job Clubs* for unemployed individuals (Moore et al., 2017) offer mental health benefits, although may not generalize, given diverse national policies, labor markets, and welfare systems (Audhoe et al., 2010). Investment in psychosocial support for vulnerable individuals following environmental events results in better mental health outcomes than not providing any support (Alzaghoul et al., 2022; Doherty et al., 2021; Li et al., 2022; Purgato et al., 2018a, 2018b). There is a need to move away from reactive Western psychosocial approaches, to approaches which aim to prevent environmental events (e.g. climate action) or which address other social determinants (e.g. food security) in the context of disasters (Lund et al., 2018; Shah et al., 2021). In the Sociocultural domain, school-based social and emotional learning (SEL) programs showed the greatest promise for improved mental health (Luo et al., 2022; Singla et al., 2020). Future SEL programs should work toward ensuring home components are incorporated, procedural fidelity is monitored, and that curricula are gender sensitive (Blewitt et al., 2018; Luo et al., 2022; Murano et al., 2020; Singla et al., 2020; Ștefan et al., 2022; Yang et al., 2019). Few effective Neighborhood domain interventions were identified; this is consistent with a previous review of national-level interventions (Shah et al., 2021). Notable differences in the interventions implemented in low-, middle-, and high-income countries were observed. Interventions in high-income countries tended to be more targeted (e.g. workplace lighting interventions) compared to low- and middle-income countries where interventions were more often universal (e.g. cash transfer programs).

Challenges and potential solutions

Assessments of review quality on the AMSTAR-2 indicated most reviews were of low or critically low quality. This is possibly because the AMSTAR-2 is conceptually framed/weighted towards a hierarchy of evidence that assumes randomized controlled trials (RCTs) and meta-analytic methods should be prioritized (Shah et al., 2021). Rigidity around hierarchy of evidence presents a challenge when designing, implementing, and evaluating interventions

focused on social determinants of mental health. Although RCTs are the 'gold standard' for identifying causal effects and are commonly relied upon in evidence-based policy development (Cairney, 2019), concerns regarding the use of RCTs consistently emerged in the studies reviewed. Withholding interventions from vulnerable individuals was seen as unethical and, at times, it was not practically or operationally feasible to conduct RCTs. While smaller-scale controlled interventions have good internal validity, they can have limited generalizability to larger contexts due to implementation challenges at scale and confounding factors (Victora, Habicht, & Bryce, 2004). The assumption that internally valid RCTs can be replicated under real-world conditions may be appropriate when evaluating interventions with short and simple causal pathways (e.g. individual-level vaccine interventions), but these assumptions are often inappropriate when evaluating population-level interventions that are distal to the outcome, have complex pathways to impact, and are affected by numerous socioecological characteristics (Lund et al., 2018; Shah et al., 2021; Victora et al., 2004).

A range of study designs are required to develop evidence for social determinants interventions, and alternative quantitative methods could be utilized where social determinants are not readily amenable to randomization. For example, with the growing availability of routinely collected data (Petticrew et al., 2005), quasi-experimental/'natural experiment' designs may be especially useful to assess the effects of policies related to social determinants, as well as area-level interventions like changes to built environments (Moore et al., 2018). These types of research designs would be particularly useful for determinants of mental disorders in the Neighborhood domain, for which a dearth of evidence currently exists. Natural experiments have greater external validity, as they provide assessments of effectiveness rather than efficacy, but their generalizability across varying contexts must be considered and multisite evaluations are likely necessary (Petticrew et al., 2005). In addition to novel quantitative and practice-based methods, evidence could be triangulated with qualitative research and mixed-methods implementation science approaches to address questions of mechanisms, context, and culture, to inform the development of interventions and to assess their uptake, acceptability, and scalability (Crable, Lengnick-Hall, Stadnick, Moullin, & Aarons, 2022; Lund et al., 2018).

The interventions reviewed almost exclusively targeted singular determinants of mental disorders and did not consider the complexity of co-occurring determinants, or the intersection of adversities, which can create cumulative stress across generations (Alegría, NeMoyer, Falgàs Bagué, Wang, & Alvarez, 2018; Allen, Balfour, Bell, & Marmot, 2014). There is a need to properly account for this in intervention design and evaluation. For example, beyond addressing individual and interpersonal dimensions of child abuse, prevention programs could benefit by addressing systemic contributors, such as cultural or organizational norms, socioeconomic, and structural inequalities (Waid et al., 2022).

Despite targeting singular determinants, significant heterogeneity was noted with respect to interventions within each domain, participant groups included, outcomes measured, and duration of follow-up. While this limits the ability to comment on patterns and reflect on the strongest interventions for public mental health, it also highlights the tension between standardizing intervention designs and the importance of appropriately tailoring interventions to particular groups and contexts (Beidas et al., 2022). Co-produced, interdisciplinary approaches are required to ensure

greatest impact (Pérez Jolles et al., 2022), and special attention should be paid to 'one-size-fits-all' approaches which may widen social and mental health inequalities (Frohlich & Potvin, 2008).

Investment in research with longer follow-up periods is required to allow participants to practice and master newly acquired skills (e.g. workplace training) or adjust to new conditions (e.g. after moving house) and more accurately capture longer-term intervention impacts on mental health (Gayed et al., 2018; Thomson et al., 2013). Mental health indicators were often examined as secondary outcomes of interventions across studies, which meant that in many cases studies may have been underpowered to detect effects. Although the mental health effects of some social determinants interventions may be small, at a population-level these effects have the potential for producing a greater net benefit than large changes in smaller segments of populations (Ogilvie et al., 2020; Zaneva et al., 2022). Investment is required to enable studies with larger sample sizes to ensure adequate statistical power is achieved. Intervention effectiveness may also be improved if interventions are designed with the improvement of culturally valid mental health outcomes in mind (Lund et al., 2018). Cost-benefit or return-on-investment analyses should be a standard part of evaluations to demonstrate the economic benefits of prevention and to explore the cost-effectiveness of integrated interventions over siloed programming (Efevbera et al., 2018).

Despite the array of challenges presented in the available literature, we were able to make some recommendations for which interventions with a good evidence base currently warrant investment, and how alternative research designs may be considered to continue to improve the evidence base moving forward. Overall, improving major social determinants of mental disorders may ultimately be considered a political question rather than one of scientific evidence; however, calls for scientific evidence or expertise are a regular part of informing government strategies or policy-making, and political action is more likely to occur with the pressure of building scientific evidence. This has been seen in other public health examples, such as smoking and lung cancer (Berridge, 1999). While smoking is a public health issue which may be viewed as having a simpler causal pathway in contemporary society, the progressive generation of scientific evidence about the harmful effects of smoking eventually led to policy changes, such as the introduction of taxes on cigarettes in some countries, with major improvements in tobacco-related mortality (Nagelhout et al., 2012). In line with the precautionary principle (Kreuter, De Rosa, Howze, & Baldwin, 2004), we do not believe that we should wait for perfect evidence on interventions before demanding action to improve the social determinants of mental health but rather view the process of generating scientific evidence as a progressive agent for political action. A challenge which remains is the time it takes to build this evidence and to see the benefits of these complex, intergenerational preventive interventions, against the tension of short-term funding and political cycles, where there is pressure to demonstrate more immediate success.

Strengths and limitations of the review

A strength of the review is the robust systematic methodology which prioritized higher quality evidence. Despite the broad heterogeneity of the described reviews, the synthesis of these reviews allowed us to identify key similarities and gaps across the international research, which would not be possible when considering the single reviews in isolation.

The findings from this systematic review should be interpreted with some limitations in mind. First, more recently published original research may not have been included in reviews, and a degree of overlap in the primary studies presented in the reviews is also possible. The exclusion of reviews not published in peer-reviewed journals may have omitted some evidence. This review focused on mental disorders only, but future work could explore indicators of mental wellbeing, which may be more amenable to social determinants interventions (McGuire et al., 2022).

While our systematic review of reviews provides important leads and an overview of a complex landscape, there is an inherent lack of control over the primary research conducted and the reviews of primary research presented. Further in-depth analysis in each area is required, particularly pertaining to the opportunities and feasibility of utilizing alternative research designs to explore complex interventions, to continue building useful evidence to encourage political action.

Conclusion

Addressing the UN SDGs, which align with known social determinants of mental disorders, presents an opportunity to reduce the burden of poor mental health globally. This review demonstrates opportunities for interventions that target social determinants across demographic, economic, environmental events, neighborhood, and sociocultural domains. Interdisciplinary and novel approaches to intervention design, implementation, and evaluation are required to expand the current evidence base, encourage political action, and improve the social circumstances and mental health experienced by individuals, communities, and populations.

impact of poverty (ALIVE)' study. The views expressed are those of the author and not necessarily those of the Wellcome Trust, NIHR or the DHSC. GC is supported by an NIHR funded Academic Clinical Fellowship.

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Figure 1: Reprinted from The Lancet Psychiatry, Volume 5 / Issue 4, Lund, C. et al., Social determinants of mental disorders and the Sustainable Development Goals: a systematic review of reviews, 357–369, Copyright (2018), with permission from Elsevier.

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