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Interventions to reduce social isolation and loneliness amongst older people: an integrative review

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Abstract

Loneliness and social isolation are major problems for older adults. Interventions and activities aimed at reducing social isolation and loneliness are widely advocated as a solution to this growing problem. The aim of this study was to conduct an integrative review to identify the range and scope of interventions that target social isolation and loneliness amongst older people, to gain insight into why interventions are successful and to determine the effectiveness of those interventions. An integrative review of empirical literature. Six electronic databases were searched from 2003 until Jan 2016 for literature relating to interventions with a primary or secondary outcome of reducing or preventing social isolation and/or loneliness amongst older people. Data evaluation followed Evidence for Policy and Practice Information and Co-ordinating Centre (EPPI) guidelines and data analysis was conducted using a descriptive thematic method for synthesising data. The review identified 38 studies. A range of interventions were described which relied on differing mechanisms for reducing social isolation and loneliness. The majority of interventions reported some success in reducing social isolation and loneliness, but the quality of evidence was generally weak. Factors which were associated with the most effective interventions included adaptability, a community development approach, and productive engagement. A wide range of interventions have been developed to tackle social isolation and loneliness amongst older people. However the quality of the evidence base is weak and further research is required to provide more robust data on the effectiveness of interventions. Furthermore, there is an urgent need to further develop theoretical understandings of how successful interventions mediate social isolation and loneliness.

Keywords: Social isolation, loneliness, older people, interventions

What is known about this topic:

- Loneliness and social isolation are major health problems for older adults
- A growing range of interventions have been developed to tackle social isolation and loneliness
- Little is known about the range and scope of effective interventions, and what aspects of interventions contribute to their success

What this paper adds:

- A range of interventions were described which relied on differing mechanism for reducing social isolation and loneliness
- Common features of successful interventions included adaptability, a community development approach, and productive engagement
- Contrary to previous review findings, our review did not find group based activities to be more effective than one to one or solitary activities

Word count = 4704

Background

Loneliness and social isolation are major problems for older adults and are associated with adverse mental and physical health consequences (Lunaigh & Lawlor 2008). A recent review identified a wide range of health outcomes associated with loneliness and social isolation including depression, cardiovascular disease, quality of life, general health, biological markers of health, cognitive function and mortality (Courtin & Knapp 2015). Chronically lonely older people also report less exercise, more tobacco use, a greater number of chronic illnesses, higher depression scores, and greater average number of nursing home stays than those who are not lonely (Theeke 2010). The mechanisms by which social isolation and loneliness impact on health are not well understood, but are thought to include influences on health behaviours, sleep, vital exhaustion and social connectedness (Courtin & Knapp 2015). Older people are particularly vulnerable to loneliness and social isolation due to deteriorating physical health, the death of spouses and partners, being more likely to live alone, and having fewer confiding relationships (Victor & Bowling 2012).

The terms social isolation and loneliness are interrelated but describe different concepts. Social isolation refers to the objective absence or paucity of contacts and interactions between a person and a social network (Gardner et al. 1999), whereas loneliness refers to a subjective feeling state of being alone, separated or apart from others and has been conceptualised as an imbalance between desired social contacts and actual social contacts (Ernst & Cacioppa 1999, Weiss 1973). Despite these variable definitions, evidence suggests significant overlap between social isolation and loneliness (Golden et al. 2009), and the terms are often used interchangeably. Crucially, both concepts result in negative self-assessment of health and wellbeing in older people (Golden et al. 2009).

National and international health and social care policies and campaigns are increasingly recognising the importance of tackling social isolation and loneliness amongst older people. For example, in the UK *The Campaign to End Loneliness* was established in 2011 as a network of national, regional and local organisations working together to ensure that loneliness is acted upon as a public health priority at national and local levels (Campaign to End Loneliness 2011). Similarly, the New Zealand government has committed to a vision of positive ageing principles which promote community participation and prevent social isolation (MSD 2001). Interventions and activities aimed at alleviating social isolation and loneliness are central to such policies and initiatives, yet little is known about the range and scope of available interventions, their effectiveness, and factors which contribute to their success (Cattan et al. 2005).

A number of systematic reviews of quantitative outcome studies have been conducted over recent years, which have attempted to evaluate the effectiveness of social isolation and loneliness interventions for older people (Cattan & White 1998, Cattan et al. 2005, Cohen-Mansfield & Perach 2015, Dickens et al. 2011, Findlay 2003, Hagan et al. 2014). However, thus far, they have been unable to provide conclusive evidence and findings are often contradictory. For example, a 2005 systematic review reported that the majority of effective interventions were group activities, and the majority of ineffective interventions provided one-to-one social support (Cattan et al. 2005). In contradiction, in their 2015 review, Cohen-Mansfield & Perach (2015) noted that group interventions were less often evaluated as effective compared with one-on-one interventions. Important to note is that reviews to date have focused solely on quantitative outcome studies, and have failed to take account of other forms of evidence. . Concerns are increasingly being raised that

reviews of quantitative evidence fail to adequately capture depth and breadth of research activity, and varied perspectives on a phenomena (Torraco 2005, Whittemore & Knafl 2005). This concern is reflected in recent guidance which calls for greater integration of qualitative research methods in interventional designs, in order to better understand implementation, receipt, and setting of interventions and interpretation of outcomes (Lewin et al. 2009, Oakley et al. 2006). Finally, despite the existence of a number of reviews in this area there is still a widespread recognition of a need for further research into 'what works in tackling loneliness' (Campaign to End Loneliness 2011). Hence, we sought to update the evidence base by conducting an integrative review of literature drawing evidence from diverse methodologies, to provide a more complete overview of the range and scope of interventions, gain insight into why interventions are successful, and explore effectiveness where feasible.

Methods

The aim of this study is to conduct an integrative review of literature on interventions that target social isolation and/or loneliness in older people. The integrative review method is an approach that allows for the inclusion of diverse methodologies, and has the potential to allow for diverse primary research methods to inform evidence based practice (Whittemore & Knafl 2005). This method was chosen so that multiple methods could contribute to the generation of new insights. For example, quantitative research could provide insights into effectiveness and qualitative research could provide insights into the experiential impact of interventions and mechanisms of action of interventions.

A systematic search strategy was devised by the authors with input from a specialist subject librarian. The strategy included the following MeSH headings and keywords relevant to the research aim: lonel*, social isolat*, prevent*, reduc*, minimi*, less*. Whilst social isolation and loneliness are recognised as distinct concepts, the terms are interrelated and are often used interchangeably. Understanding of intervention effects can be enhanced through the inclusion of studies reporting on outcomes known to be associated with both social isolation and loneliness (Dickens 2011), therefore both terms were included as search terms. This approach is consistent with several previous reviews (Cattan & White 1998, Cattan 2005, Dickens, 2011). Six electronic databases (PubMed, Medline, CINAHL, PsychInfo, ScienceDirect, EMBASE) were searched from 2003 until Jan 2016. The earliest of the previous reviews included literature up to 2003 (Findlay 2003), therefore only literature published after this date was included in our review. Reference lists of included studies were also hand searched. Grey literature searches were undertaken drawing on a range of materials published by organisations selected on the basis of their relevance to the research topic (e.g. Age UK, HelpAge International). The journal Ageing and Society was also hand searched as the most frequently cited journal in this area.

Following removal of duplicates G.G. screened titles and abstracts of all returned publications to identify those which met the study inclusion criteria. Study inclusion criteria are listed in table 1. Whilst the review was limited to primary empirical research, in keeping with integrative review methods, all methodologies were included. As the term 'older adult' is inconsistently defined in the literature, the term was determined by the criteria set out in the identified studies. Full texts of all included articles, and any where there was disagreement, were further independently screened by

G.G and C.G. Where there was lack of agreement M.G acted as a third independent reviewer and decisions were made by consensus. Details of included studies were extracted into predefined tables.

Evaluating the quality of literature with diverse methodologies is a recognised complexity of integrative reviews. In a review with diverse empirical sources, it is recommended that sources are evaluated and scored according to key criteria relevant to the review rather than using methods specific approaches (Whittemore & Knafl 2005). In this instance Evidence for Policy and Practice Information and Co-ordinating Centre (EPPI) criteria were used to guide quality assessment (EPPI Centre 2010). This approach allows for evaluation of different study designs and provides a review specific assessment of quality (EPPI Centre 2010). Studies were assessed according to three criteria:

(1) Methodological quality and the trustworthiness of the results.

(2) Methodological relevance defined as the appropriateness of the study design for answering the review question.

(3) Topic relevance defined as the appropriateness of the topic in relation to the review question.

Methodological quality was evaluated by examining the quality of each study using the hierarchy of evidence as a guide (Evans 2003), and its execution thereof. Methodological relevance was evaluated by assessing the appropriateness of each study's design for addressing its research question. Topic relevance assessed how well matched each study was to the focus of our review in terms of topic (Gough et al. 2012). A score out of three was given for each domain (1 = poor, 2 = acceptable, 3 = good) and a combined total score out of nine was generated, any study with a score of ≤3 was excluded due to insufficient quality.

Strategies for data analysis developed for mixed method or qualitative reviews are particularly applicable to the integrative review method as they allow for iterative comparisons across data sources. As such, data analysis was conducted using a descriptive thematic method for synthesising data (Health Development Agency 2004). This method was chosen as it allows clear identification of prominent themes and provides an organised and structured way of dealing with data from diverse methodologies. Studies were classified by intervention category and a data-driven approach was used to identify other major or recurrent themes relating to the research aim; a process of constant comparison was used to compare coded categories and enhance rigour (Glaser & Strauss 1967, Health Development Agency 2004).

Table 1 about here

Results

Search results are summarised in the adapted Preferred Reporting Items for Systematic Reviews and Meta- Analyses (PRISMA) flowchart in figure one. A total of 2420 studies were identified, of which 39 met our inclusion criteria (see supporting material table 1). Of these six were randomised controlled

trials (RCT), 21 were other quantitative designs, ten were qualitative studies and two were mixed methods studies.

Quality of evidence

All studies achieved a score ≥3 on quality appraisal and therefore no studies were excluded on the basis of quality. However, overall the included studies showed inconsistent levels of quality and consistency. Only three of the 39 included studies merited the top score of nine on quality appraisal with studies assessing 'psychological therapies' generally of the highest quality (see table 1 supporting material for further details on study design and quality). The inconsistent quality of the included articles indicates the findings from this review should be accepted with caution and generalizability may not be appropriate. Quality appraisal scores are noted in table two. Included studies provided variable definitions of social isolation and loneliness. The measures used to evaluate loneliness and social isolation outcomes showed some consistency. The majority of quantitative studies used validated tools, commonly the UCLA loneliness scale (or modified version thereof) (Russell et al. 1980), the De Jong Gierveld scale (de Jong Gierveld & Kamphuis 1985), or the Lubben Social Network scale (Lubben 1998). Some studies used single item indicators which may undermine the validity of results, however research has indicated that single item measures can correlate strongly with more complex measures (Victor 2005).Inconsistencies in definition and measurement across the 39 studies means the practice and policy relevance of findings may be limited.

Figure 1 about here

Categories of intervention

There was significant heterogeneity in the interventions identified and the majority comprised multiple and interacting components. Thematic analysis identified six categories of intervention based on their purpose, their mechanisms of action, and their intended outcomes (see supporting material table 1). The categories were social facilitation interventions, psychological therapies, health and social care provision, animal interventions, befriending interventions, and leisure/skill development. Whilst many interventions utilised mechanisms from more than one category, the majority had a primary focus in one of these six areas.

1. Social facilitation interventions

This was the most prominent category which described interventions with the primary purpose of facilitating social interaction with peers, or others who may be lonely. Social facilitation interventions generally presumed a degree of reciprocity, and strived to provide mutual benefit to all participants involved. Many of these interventions involved group based activities, for example charity funded friendship clubs (Hemingway & Jack 2013), shared interest topic groups (Cohen-Mansfield et al. 2007), day care centres (Iecovich & Biderman 2012), and friendship enrichment programmes (Alviani et al. 2015, Martina & Stevens 2006, Stevens et al. 2006). One intervention focused on the specific role of Irish cultural identity in social facilitation (Cant & Taket 2005). Two

interventions proposed innovative technology based solutions to aiding socialisation using video conferencing and social networking (Ballantyne et al. 2010, Tsai et al. 2010).

All but two of the social facilitation interventions reported some success in reducing social isolation or loneliness (Alviani et al. 2015, Ballantyne et al. 2010, Cant & Taket 2005, Cohen-Mansfield et al. 2007, Hemingway & Jack 2013, Stevens et al. 2006, Tsai et al. 2010, Tse & Howie 2005). For example, Tsai et al. (2010) evaluated a videoconference program which aimed to facilitate contact between an older person and their family. They reported lower levels of loneliness (as measured by the UCLA scale) amongst those using the video-conference. Qualitative studies were useful in identifying factors which supported the success of interventions and included a supportive environment (Ballantyne et al. 2010), a sense of companionship and keeping occupied (Tse & Howie 2005), and creating a sense of belonging (Cant & Taket 2005). Two studies, evaluating day care centres for frail older people and a friendship enrichment programme, were unable to demonstrate any impact on loneliness (Iecovich & Biderman 2012, Martina & Stevens 2006).

2. Psychological Therapies

This category of intervention utilised recognised therapeutic approaches delivered by trained therapists or health professionals. The review identified this category of intervention as having the most robust evaluation to date. Humour therapy (Tse et al. 2010), mindfulness and stress reduction (Cresswell et al. 2012), reminiscence group therapy (Liu et al. 2007) and cognitive and social support interventions (Saito et al. 2012) were all successful in significantly reducing loneliness and had a positive impact on a range of other outcomes including social support, happiness and life satisfaction. A common feature of these interventions was that they all involved facilitated group based activities. However as most involved a therapeutic approach in addition to some sort of group interaction, the individual factors contributing to the success of the interventions were not always clear. Two studies failed to show a significant reduction on social isolation or loneliness. A quasi-experimental evaluation of cognitive enhancement therapy did not demonstrate a significant reduction in loneliness, but did note a significant increase in loneliness in the control group over time, perhaps indicating a maintenance effect of the intervention (Winningham & Pike 2007). An RCT of a psychological group rehabilitation intervention also failed to demonstrate a reduction in loneliness, but did show an increased number of friendships in the intervention group (Routasalo 2009)

3. Health & Social Care provision

This category described interventions involving health, allied health and/or social care professionals supporting older people. These interventions were characterised by the involvement of health and social care professionals and enrolment in a formal program of care, either in a nursing home (Bergman-Evans 2004, Loek et al. 2012) or community setting (Bartsch & Rogers 2013, Nicholson & Shellman 2012, Ollonqvist et al. 2008). A diverse range of models were identified including a community network of trained gatekeepers (Bartsch & Rogers 2009) and geriatric rehabilitation run by clinical and allied health staff (Ollonqvist et al. 2008). Nicholson and Shellman (2013) evaluated the CARELINK program, a university-community partnership where nursing students visited older people to aid socialisation. A post-test only study revealed that those receiving the intervention

were twelve times less likely to report social isolation than those in a control group. Only one study in this category failed to demonstrate a significant reduction in either loneliness or social isolation. Bergman-Evans (2004) undertook a quasi-experimental evaluation of the Eden alternative model, a residential care model aiming to create a more 'human habitat' in residential care. Whilst they were unable to demonstrate any significant reduction in loneliness as measured by the UCLA scale, they did report significantly lower levels of boredom and helplessness in the intervention group.

4. Animal interventions

Three studies described and evaluated canine or feline animal interventions, which focussed mainly on animal assisted therapy. In a cross-sectional study Krause-Parello (2012) interviewed pet owning women, and concluded that pet attachment could alleviate loneliness by acting as a coping mechanism, possibly by providing social support and companionship. An RCT by Banks & Banks (2005) attempted to determine whether it is the animal-human connection or a subsequent human-human connection that is responsible for a reduction in loneliness. They concluded that animal assisted therapy was more effective in the individual setting, and therefore the human-animal interaction is most responsible for reducing loneliness. Banks et al. (2008) compared a living dog with a robotic dog and found that while a higher level of attachment was found with the living animal, both groups showed a significant reduction in loneliness and there was no significant difference in loneliness between groups.

5. Befriending interventions

Befriending interventions are defined as a form of social facilitation with the aim of formulating *new* friendships. Befriending interventions were usually one to one and often involved volunteers. They differ from social facilitation interventions in that the primary aim is to support the lonely individual, rather than to promote a mutually beneficial relationship (although this may be an important secondary consequence). Examples included a Senior Companion Programme (Butler 2006) and the 'Call in Time' programme (Kime et al. 2012, Cattan et al. 2011), a national pilot of telephone befriending projects across the UK. A mixed methods evaluation found that telephone projects were successful in alleviating loneliness through making life worth living, generating a sense of belonging and 'knowing there's a friend out there' (Cattan et al. 2011). However qualitative findings from befriending projects also identified a range of challenges to be overcome including volunteer recruitment, local rather than national control of projects, and promotion and publicity issues (Kime et al. 2012).

6. Leisure/skill development interventions

A final category of intervention focused on leisure activities and/or skill development. Activities were varied and included gardening programmes, computer/internet use, voluntary work, holidays and sports (Brown et al. 2004, Heo et al. 2015, Pettigrew & Roberts 2008, Toepal 2013, Tse 2010,). Solitary computer based interventions appeared the most effective and well evaluated. A three week computer training course and a computer/internet loan scheme were both effective in reducing some aspects of loneliness (Fokkema & Knipscheer 2007, Blazun et al. 2012). Higher use of the Internet was also found to be a predictor of higher levels of social support and decreased loneliness (Heo et al. 2015). Two well designed studies evaluated indoor gardening programmes for nursing home residents (Brown et al. 2004, Tse 2010). However, findings were mixed, with one study

reporting a significant effect on loneliness (Tse 2010) and the other reporting no effect (Brown et al. 2004). Evidence from a qualitative study was useful for identifying how leisure activities reduced loneliness, for example by maintaining social contacts, spending time constructively and having interaction with others (Pettigrew & Roberts 2008). Toepoel (2013) distinguished between productive activities which were associated with a reduction in loneliness (for example reading or engaging in hobbies) and passive consumptive activities which were not (such as watching TV or listening to radio).

Factors contributing to the success of interventions

Most interventions were complex and many relied on more than one mechanism for reducing social isolation and loneliness, therefore it was often unclear which specific aspects of an intervention contributed most strongly to its success. For example, mindfulness based stress reduction was found to significantly decrease loneliness (Cresswell et al. 2012), but as this intervention was delivered in a group setting it was not possible to assess the unique contribution of the mindfulness element as opposed to the group interaction element. Qualitative studies were particularly useful for understanding the mechanisms underlying successful interventions due to the ability of qualitative data to provide a more nuanced understanding of the interacting elements of interventions and their contexts. Three key common characteristics of effective interventions were identified and are presented in table 2. Adaptability of an intervention to a local context was seen as key for ensuring its success, particularly where interventions have been implemented by national organisations (Cattan & Ingold 2003, Hemingway & Jack 2003, Kime et al. 2012, Wylie 2012). A community development approach, where service users are involved in the design and implementation of interventions, was often associated with more successful interventions (Bartlett et al. 2013, Cattan et al. 2005, Cattan & Ingold 2003, Findlay 2003, Hemingway & Jack 2013, Pettigrew & Roberts 2008, Wylie 2012,). Finally activities or interventions which supported productive engagement seemed to be more successful in alleviating social isolation than those involving passive activities or those with no explicit goal or purpose (Howat et al. 2004, Pettigrew & Roberts 2008, Toepal 2013). Whilst it would have been useful to explore whether differences were apparent between social isolation and loneliness in response to different interventions, unfortunately the quality of data was insufficient to support such analyses. It should also be noted that as the factors contributing to the success of interventions were largely derived from qualitative research, generalisability may not be appropriate and these findings should be accepted with caution.

Table 2 about here

Discussion

This study is the first of its kind to review empirical literature from diverse methodologies on interventions to reduce loneliness and social isolation in older people. The findings identified a wide range of interventions developed to reduce social isolation and loneliness amongst older people. Significant diversity and heterogeneity were evident in intervention design and implementation, with evidence suggesting the scope and purpose of interventions varies widely. Whilst study quality

was variable, studies reporting evaluations of interventions indicated that the majority of activities are at least moderately successful in reducing social isolation and/or loneliness. Our review extends the findings from previous reviews (Cattan et al. 2005, Dickens et al. 2011, Findlay 2003, Hagan 2014), however the use of an integrative methodology provides some interesting additional insights into this growing area of research. The inclusion of diverse methodologies has allowed us to provide a more complete picture of the range and scope of interventions available, and importantly to gain insight into the factors which influence an interventions success.

Interventions in our review were categorised according to the mechanisms by which they attempted to target social isolation and loneliness. This categorisation is important when faced with growing diversity in intervention types and is a necessary pre-requisite to identifying which elements of interventions influence their effectiveness.A number of theories have been proposed to explain the cause of loneliness (e.g. the existential, the cognitive, the psychodynamic and the interactionist) (Donaldson 1996). Whilst there is no theoretical consensus regarding cause, these different theoretical perspectives illustrate the varying ways in which the study of loneliness has been approached (Victor 2000). Similarly, the notion of social isolation is one that has been understood and defined in a number of different ways. Approaches to measuring social isolation vary but often involve recording levels of social contact, enumerating social participation and quantifying social networks. The nature of a person's social network has been identified as key to the level of social isolation that they experience (Victor 2000) Theoretical perspectives on the concepts of loneliness and social isolation continue to develop and advance. Theoretical understandings of the way in which interventions mediate social isolation and loneliness also require further research attention to better understand the processes involved in implementing a successful intervention.

Interestingly, and in contrast to findings from two previous reviews (Cattan et al. 2005, Dickens et al. 2011), our study did not report group interventions as being more effective than solitary or one to one interventions. Our review found that solitary pet interventions (Banks et al. 2008, Banks & Banks 2005, Krause-Parello et al. 2012) and solitary interventions involving technology such as video-conference and computer/internet use (Tsai et al. 2010, Blazun et al. 2012) were successful in reducing the experience of loneliness. Furthermore, one study using an RCT design to evaluate animal assisted therapy reported that the therapy was more effective in the individual rather than the group setting (Banks & Banks 2005). These findings suggest that contrary to the majority of previous research evidence, effective interventions are not restricted to those offered in group settings. Indeed, qualitative data from this review indicate that productive engagement activities, which may be solitary, are a feature of many successful interventions. These findings are significant when considering the growing number of older people who are housebound and unable to easily participate in group activities. Housebound older adults are known to be at greater risk of loneliness and social isolation and health and social care problems when compared with the general population (Wenger & Burholt 2013, Qiu et al. 2010). Innovative interventions promoting solitary activities may offer solutions for hard to reach groups of older adults such as these. Whilst solitary activities may also appear attractive from the perspective of policymakers due to their perceived low cost, it should be noted that solitary interventions in this review are well-resourced activities which require financial investment (e.g. purchase of pet, feeding costs, cost of computer hardware and internet). Many of these activities, whilst undertaken alone, also actively involve others (e.g. a pet, or an animal-visiting programme, a family to contact by Skype, or an online community) and this should be considered when planning interventions.

The use of an integrative review methodology incorporating literature with diverse methods including qualitative studies and mixed methods designs has allowed for a broader and more comprehensive understanding of social isolation and loneliness interventions (Whittemore & Knafl 2005). This has enabled some novel insights into the factors which contribute to the success of such interventions, many of which emerged through qualitative enquiry. Adaptability to a local context was seen to be important in influencing the effectiveness and success of interventions. Whilst many interventions may be developed and funded by national organisations, some local control is necessary in order to respond to local contextual factors. The need for adaptability is particularly important in the context of increasing diversity in population demographics internationally (Office for National Statistics 2011). A community development approach, where interventions are designed and implemented with input from service users, was also noted as an important feature and has previously been associated with successful social isolation and loneliness interventions (Cattan et al. 2005, Findlay 2003, Joseph Rowntree Foundation 1998). The *service user* or *public and patient involvement (PPI)* movement has gained momentum over recent years, particularly in areas such as health service development and research design. The main reasons for public involvement in research are political mandate and the pursuit of 'better' research (Oliver et al. 2008). However, our findings suggest that this approach may also have the benefit of developing interventions which better meet the needs of the people they are intended to support. Finally, productive engagement activities may be associated with better outcomes than passive activities. This finding is in line with the review by Dickens et al. (2011) which reported participatory interventions were most likely to be beneficial. This finding may be particularly useful when designing non-group or solitary activities, and may help inform the design of solitary interventions.

Limitations

Whilst care was taken to ensure the search strategy returned the most inclusive result, it is possible that some studies may not have been indexed or may for other reason be missing from the data. As the review employed an integrative review methodology it was not the intention to combine results statistically, however as a result our findings on effectiveness should be interpreted with caution.

Conclusion

A wide range of interventions have been developed to tackle social isolation and loneliness amongst older people. The majority of interventions reported some success in reducing social isolation and loneliness, but there was significant heterogeneity between interventions. Common features of successful interventions include adaptability, community participation and activities involving productive engagement. However, it is important to note that our conclusions are based on combined evidence from studies using a range of methods, and are not based on meta-analysis. Therefore conclusions regarding effectiveness cannot be confirmed statistically.. Further research is now required to enhance theoretical understandings of how successful interventions mediate social isolation and loneliness, and provide more robust data on effectiveness. Research exploring the cost-effectiveness of different approaches is also urgently required in order to further support the development of interventions which address the growing issue of social isolation and loneliness in our expanding older populations.

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Table 1: Inclusion Criteria

• Literature relating to interventions with a primary or secondary outcome of reducing or preventing social isolation and/or loneliness • Literature relating to older adults • Empirical research articles reporting primary research, published in full, including all research methodologies (but excluding reviews) • English language articles • Published since 2003

Table 2: Common characteristics of interventions which demonstrate a positive impact on social isolation and/or loneliness

Adaptability	• National interventions funded by governments or other larger organisations may have set criteria for implementation and execution of an intervention, however a frequently observed criticism was a lack of being able to adapt interventions for the specific needs of a local population (Wylie 2012). • Project co-ordinators from a national befriending service commented that more local control was need to respond to the community and to enhance the service (Kime et al. 2012). • Local control conducive to meaningful friendship, especially when attendees control the activities and the activities are relevant to their interests (Hemingway & Jack 2013). • The need for adaptability may be driven by differences in population demographics. • Flexibility can also mean services and support can meet the individual needs of older people (Cattan & Ingold 2003).
Community Development Approach	• Older people wish to have an opportunity to be involved in project development and delivery, and to be supported to contribute to such activities (Cattan & Ingold 2003). • Interventions that involved users in the design and implementation were more successful (Bartlett et al. 2013). • Interventions that aimed to preserve service user autonomy by allowing participants to decide the activities to be undertaken also seemed to be more effective (Hemingway & Jack 2013). • Activities were more likely to be effective if older people were involved in the planning, developing and execution of activities (Wylie 2012). • Older people sometimes found the activities organised by others patronising (Pettigrew & Roberts 2008). • Building partnerships may also lead to interventions still being implemented after professional services have withdrawn engagement (Cant & Taket 2005, Cohen-Mansfield et al. 2007).
Productive Engagement	• Interventions focussing on productive engagement seemed to be more effective than those which involved passive activities (Pettigrew & Roberts 2008). • Productive activities include group interventions focussed on socialisation or creating opportunities for socialisation and forming new social networks. • In addition, productive engagement may also include solitary activities. • 'Doing' things accumulates more social contacts than watching or listening to things. Doing things refers to productivity and involves action and creativeness and is often directed toward a (common) goal (Toepal 2013). • Activities that presented a challenge were suggested as being most appropriate (Howat et al. 2004). • Adult day groups supporting productive activities led to participants reporting lower levels of loneliness through keeping occupied (Tse 2005)

Supporting Material Table 1: Details of included studies (n=38). SI = Social Isolation

Authors	Aim	Setting and Sampling	Intervention	Methods/Analysis	Relevant Results	Quality Score
Social Facilitation Interventions						
Alviani et al. (2015). Iran	To determine the effect of a multi-strategy program to prevent loneliness of elderly women	Older women 60-74yrs. Intervention n=75, control n=75	**Multi-strategy program**. Group meetings aimed to empower women to improve social relations. Performed practical strategies to improve social interaction.	Quasi-experimental pre-test post-test design. Measures: UCLA scale. Baseline and post-intervention.	- Loneliness decreased significantly in the interventional group compared to the control group (P<0.00). - No details on nature of control	6
Hemingway & Jack (2013) UK	To explore the impact of a 'friendship club' for reducing SI in older people	82 attendees of friendship clubs (mean age=80) and 18 volunteers.	**Friendship Clubs.** Charity funded friendships clubs also providing transport and location. Participants meet for 2 hrs every week and decide on activities.	Qualitative study, using group & individual interviews, and participant observation	- Participants perceived benefits of improved well-being and social relation including identity, practical emotional support, friendship, inclusivity, social ties.	6
Iecovich & Biderman (2012) Israel	To examine levels of loneliness in day care centre-users vs non-users. To explore the relationship between the length & frequency of attendance and loneliness	Frail older people (>60) recruited from 13 day care centres. 417 day care users and 400 matched non users	**Day care centres** which focus on providing social and personal services. Meals and transport are mostly provided at a small additional cost	Case control study. Measures included de Jong Gierveld scale, activities of daily living, general health, economic status. Data collected using face to face structured questionnaire.	- No significant difference in level of loneliness between day care centre users and non-users, but more widowed, less educated and migrants attending day care centres. -Length of stay and frequency had no significant impact on different levels of loneliness amongst this group.	6
Tsai et al. (2010) Taiwan	Evaluate effectiveness of a video -conference in improving nursing home residents social support, loneliness and depressive status	Participants (>60) recruited from nursing homes. Residents divided into experimental (n=24) and control groups (n=33).	**Video-conference Program.** Video-conference to facilitate once per week contact with family, over 3 months. Training provided by research assistant.	Quasi experimental. Measures: depression, revised UCLA scale, Social Support. Data collected at baseline, 1 week and 3 month.	- More support, lower loneliness reported in intervention group - Depressive scores decreased at 3 months in intervention group.	6

Ballantyne et al. (2010) Australia	Does internet social networking reduce older people's experience of temporal loneliness?	Four older people (> 65) recruited from community aged care programme.	**Internet social networking intervention.** Connected to the internet and training provided by educator. Started with weekly meetings and educator gradually withdrew.	Qualitative in depth semi structured interviews at commencement and project completion (3 months). Reflective journals also kept.	- Helped reduce participants experience of loneliness. - Supportive environment for learning skills is crucial - Contact with other users increased sense of connectivity to outside world.	5
Cohen-Mansfield et al. (2007) USA	To evaluate shared interest group intervention to promote socialisation and enhance self-efficacy	276 older residents of three low income independent living buildings. No ages given.	**Shared Interest Group.** Topic specific small groups led by facilitator, to aid socialisation and friendship. Meet once a week, facilitator withdraws after 6-10 months.	Qualitative interviews and observation of group process. Data collection occurred throughout intervention	- Various range of success in groups continuing without facilitator - Content of group sessions often shifted toward more socialization and personal sharing. - Evidence that group members were forming friendships outside meetings	6
Stevens et al. (2006) Netherlands	To explore the effect of a program designed to enrich friendship and reduce loneliness in older women	Study 1: 52 older women (52-80 yrs) enrolled in FEP. Study 2: 54 intervention participants recruited from those already enrolled in FEP, 54 controls from the waiting list (53-86yrs).	**Friendship Enrichment Programme (FEP).** 12 weekly group lessons on self-esteem, relational competence, phases in friendship formation, and social skills. Follow-up meeting after 6 months to evaluate success.	Study 1 Pilot Study 2: pre-test post-test control group with follow-up. Data collected at baseline, 3 months and 9 months. Measures: De Jong Gierveld Scale	- Significant reduction of loneliness within a year after the program. - More women from intervention group reported making new friendships, compared with controls. - A combination of developing new friendships and improving existing friendships reduced loneliness	6
Martina & Stevens (2006) Netherlands	To examine the effects of participation in the friendship enrichment program for older women.	Intervention group of 60 women (>55yrs) who had completed FEP. Control group of 55 women of same age (no FEP) but were interested in the program.	**Friendship Enrichment Programme (FEP).** Details as above.	Pretest/posttest follow-up control group design. Measures: De Jong Gierveld scale. Data collected at baseline, 3 month, and 6 months after finish.	- Loneliness declined in participants, but also in control group, not significant - Significantly more new friendships reported in FEP group than in control group - Suggest multi-dimensional focus to reduce isolation which also look at environmental factors	6
Tse & Howie (2005) Australia	To examine the experience of, and the reasons why, older people attend adult day groups (ADG)	Four ADG's observed. Eight participants from the 4 ADG's volunteered to be interviewed (69-94 yrs).	**Adult day groups.** Developing social networks and a programme of activities that enhance wellbeing. Day long groups with various range of activities, staff facilitated.	Ethnographic study with observation of ADGs and in depth interviews with 8 participants	- Participants described the companionship as valuable, felt keeping occupied was good for them, felt limited by their ability to leave home. - Some dissatisfaction with activities, food and other group members.	5

Cant & Taket (2005) UK	Explores the activities of a project aiming to minimise social isolation and build networks amongst Irish pensioners in London	Purposive sampling of 8 older project members, 3 staff members, 2 trustees, 2 volunteers and 4 other staff members. No ages given.	**Irish led volunteer project.** Culturally Irish project providing lunches, recreational activities, advocacy and befriending services, in a deprived area of London.	Qualitative design. Semi-structured interviews, case file analysis and analysis of members case files over a period of 6 months.	- Provide space for network building and social interaction - Culture based (Irish) created sense of belonging - Led to the development of partnership and other services such as befriending; sense of belonging created	6
Psychological Therapies						
Routasalo et al. (2008) Finland	To explore the effects of psychosocial group nursing intervention on older people's feelings of loneliness, social activity and psychological well-being.	Home dwelling older people in Finland (75-92 yrs). 117 in intervention group, 118 in control.	**Psychological group rehabilitation.** Facilitated groups of 7–8 participants. The groups met once a week for 3 months (12 times). Aimed to empower participants and promote friendships,	RCT. Outcome measures: UCLA Scale and Lubben Social Network Scale administered at baseline and 3 and 6 months.	- No differences found in loneliness or social networks between the groups. - Significantly larger proportion of intervention group participants had found new friends during the follow-up year	9
Saito et al. (2012) Japan	Evaluate effectiveness of a social isolation prevention programme on loneliness, depression and subjective well-being.	Community based elderly (>65) who relocated to suburban Tokyo, Japan. Random sampling: 20 in intervention group; 40 in control group.	**Group based educational, cognitive and social support program** to improve community knowledge, improve networking. Four 2 hr sessions held every 2 weeks.	RCT. Outcome measures subjective wellbeing, depression and revised UCLA scale. Data collected pre-intervention, and 1 month and 6 months post	- Participants reported significant increase in effective social support, familiarity with services, reduce feelings of isolation immediately after intervention. - Decrease in loneliness maintained at 6 month follow-up.	9
Creswell et al. (2012) USA	To explore whether a mindfulness stress reduction program reduces loneliness and loneliness related pro-inflammatory genes	Healthy older adults (55-85 years) recruited via newspaper adverts. Randomisation to intervention (n=15) and waitlist groups (n=19)	**Mindfulness Based Stress Reduction**. An 8 week program with 2 hours sessions on mindfulness, 1 day long retreat and 30 minute daily home practice. Group sessions.	RCT. Outcomes: UCLA scale, mindfulness scale, blood sample to test gene expression. Data collected at baseline and post intervention (8 wks)	- Intervention participants had significant reduction in loneliness from baseline to post-treatment. - Intervention resulted in down regulation of certain genes, though functional significance not clear	9

Tse et al. (2010) Hong Kong	Examine the effectiveness of humour therapy in relieving chronic pain, enhancing happiness & life satisfaction, and reducing loneliness	Residential care homes randomly selected run by same organisation, Residents having experienced pain longer than 3 months Hong Kong, nursing home	**Humour Therapy.** 8 week humour therapy, 1 hour per week in a group. Consist of creation of humour portfolio, jokes and funny stories and lectures on humour research	Quasi experimental, Measures: Revised UCLA loneliness scale, revised Life Satisfaction Index A scale, Subjective Happiness Scale. Data collection pre/post test	- Decrease perception of loneliness - Significant improvement pain - Significant increase in happiness	6
Winningham & Pike (2007) USA	To examine effectiveness of a cognitive enhancement programme for institutionalised adults on perceived social support and loneliness	Residents (n=58) from 6 nursing homes assigned to CEP or control. Age range 61-98 years.	**Cognitive Enhancement Programme (CEP).** Three month group intervention with 3 sessions per week. Topics included: education on brain & memory; stimulating brain and cognitive activity.	Quasi experimental controlled trial. Measures: depression, social support and UCLA loneliness scale Data collected at baseline and 3 months.	- Level of loneliness for intervention group did not change over time - But significant increase in loneliness for the control group over time	8
Liu et al. (2007) Taiwan	To explore effectiveness of reminiscence group therapy on self-esteem, depression, loneliness, and life satisfaction	Community based elderly living alone (65-85 years). Convenience sampling from community and then random allocation to intervention (n=12) or control (n=14).	**Reminiscence Group Therapy (RGT).** Included retelling and sharing life experiences. Ten RGT sessions lasting 1 hour for ten weeks.	Quasi experimental pre post-test controlled design. Measures: self-esteem, depression, life satisfaction, UCLA scale. Data collected baseline and after 10 weeks.	- Significant reduction in loneliness and increase in life satisfaction with RGT compared to control. - No effect on depression	6
Health & Social Care Provision						
Nicholson & Shellman (2013) USA	To test the effects of a university student model of care intervention on social isolation in a sample of older adults	Urban community dwelling older adults >65 (n =56). Intervention participants randomly selected from CARELINK, control from those on waiting list.	**CARELINK program.** Senior nursing students visiting older adults in community with relationship building, identification of social isolation, and resource provision.	Two group post-test only design. Data collected following 16 week intervention. Measures: using Lubben Social Network Scale	- Control group on CARELINK waiting list 12 times more likely to be socially isolated	4
Bartsch et al. (2013) USA	To examine outcomes of older adults referred for care management through the senior reach gatekeeper model	Older adults (>60) enrolled in one of three centres providing a gatekeeper program (n=416).	**Senior Reach Gatekeeper Model.** Community network of trained 'gatekeepers' who make referrals for older people at risk. Refer to professionals who provide outreach services	Pre/post design collecting data at baseline and after 6 months. Measures included five indicators of isolation and Geriatric Depression Scale (GDS)	- Referral from gatekeepers can provide a novel way of identifying socially isolated individuals -2 of the 3 programmes showed a significant decrease in social isolation	5

Loek et al. (2012) Netherlands	To investigate whether care TV aids elderly in engaging in meaningful social contacts by a video connection to avoid loneliness	Clients of a home care organisation mean age = 73. All clients who received nursing care invited to participate (n=85).	**Care TV**. A video network allowing users to contact a nurse 24/7. Also allows users to interact with carers, friends, family.	Pre/post design with measurements at baseline and after 1 year. Measurements included De Jong-Gierveld loneliness scale, and feelings of safety scale.	- Significant decrease in loneliness for elderly - A range of implementation challenges addressed including technology, acceptance, finance, organisation and policy.	6
Bartsch et al. (2009) USA	To compare a 'Senior Reach Gatekeeper model' with a previously established program on isolation, depression and functioning	Older adults (>60) enrolled in the Senior Reach Gatekeeper Model, compared with older adults from the previously established gatekeeper program.	**Senior Reach Gatekeeper Model**. Community network of trained 'gatekeepers' who make referrals for older people at risk. Refer to professionals who provide outreach services through care management.	Pre/post design collecting data at baseline (program entry) and after 6 months. Measures included five indicators of isolation and Geriatric Depression Scale (GDS)	- Gatekeeper approach effective in finding and meeting needs of at risk seniors by address lack of coordination, funding and confusing, systems - Useful for the identification of isolated elderly who will otherwise be excluded from services	6
Ollonqvist et al. (2008) Finland	To determine the effects of a new rehabilitation model on loneliness among frail older people	Frail older people (>65) living at, recruited from 7 independent rehab centres. 708 randomised to intervention (n=343) and control (n=365).	**Geriatric Rehabilitation.** Run by clinical/allied health staff. One to one meetings plus group rehab during 3 inpatient periods within 8 months. Mainly exercise focused, with group discussion and lectures.	RCT. Three measures of loneliness, plus depression. Data collected at baseline and 12 months. Mail questionnaire	- Decrease in loneliness and improved changes in subjective health for intervention group	9
Bergman-Evans et al. (2004) USA	To assess the impact of the Eden Alternative model on levels of loneliness, boredom and helplessness of older adults in a long term care facility	Cognitively intact nursing home residents from 2 nursing homes. One intervention (n= 21, mean age 76.1 yrs) and one control (n=13, mean age 83.1yrs).	**Eden Alternative model.** Institutional point of view is replaced by a human habitat, which includes animals, plants and children and providing a varied &spontaneous environment, over 1 year.	Quasi experimental design. Measures include depression and UCLA loneliness scale. Data Collected at baseline and 1 year post implementation.	- Significant lower levels of boredom and helplessness, but not loneliness among Eden project participants.	6
Animal based interventions						
Krause-Parello et al. (2012) USA	To investigate relationships among loneliness, pet attachment support, human social support, and depressed mood	Convenience sampling of 159 pet owning elderly woman (55-84 years) in the community setting	**Effect of owning a pet (dog or cat)**	Cross sectional design. Data collected by questionnaire included revised UCLA scale, pet attachment, depression and social support.	- Positive relationship noted between loneliness and pet attachment. - Pet attachment support acting as coping mechanism for loneliness and depressed mood, possibly by providing social support and companionship	5

Banks et al. (2008) USA	Comparing the ability of a living and a robotic dog to treat loneliness in elderly living in long term care facilities	Residents of 3 nursing homes (no ages given) randomised to living dog (n=13), robotic dog (n=12)) or control (n=13).	**Living dog and AIBO a robotic dog.** Residents received weekly 30 min visits from AIBO or living dog for 8 weeks.	RCT with two interventions and control. Measures: UCLA scale,. Data collection at baseline and week 7.	- Significant reduction in loneliness for both ABIO and animal intervention, with no difference between living and robotic - Higher level of attachment for living dog	8
Banks & Banks (2005) USA	Determine contribution of human–human bonding and human–animal bonding as mechanisms by which animal assisted therapy reduces loneliness	37 residents of three long term care facilities (75-90 yrs). Randomised to receiving animal assisted therapy (AAT) one to one, or in a group setting with 2-4 participants.	**Animal Assisted Therapy (AAT**) with a certified therapy dog. Six weeks of animal assisted therapy, 30 minutes per week.	Randomised controlled trial, not blinded. Measures included UCLA loneliness scale and mini mental state assessment. Data collected pre-test and during week 5.	- Most effective in individual setting, therefore mechanism likely not mediated by socialisation. - Loneliest individual benefitted most - Most participants previously had dogs as pets and reminisced with animals	7
Befriending interventions						
Bartlett et al. (2013) Australia	Identify methodological and practical challenges of associated with utilising evaluation measures in community based SI interventions	Convenience sampling of existing older clients from three pilot social isolation projects in Queensland, Australia (n=63). Mean ages ranged 65-79 yrs	**'Queensland Project to Reduce SI in Older People'.** Projects included a fitness programme, community/individual capacity building, buddy system, culturally appropriate model for volunteer resource workers.	Pre/post design collecting data at baseline and completion (after 6 months). Measures: De Jong Gierveld scale and Social support scale	- No robust quantitative results to demonstrate effectiveness of projects on loneliness and social support. - A range of methodological challenges noted in relation to evaluating such interventions.	4
Kime et al. (2012) UK	Describes evaluation of a national pilot programme of telephone support services for older people	Eight project coordinators from the "Call in Time" programme, England and Scotland. No ages given.	**Call in Time Programme**. A national pilot comprising 8 telephone befriending support projects. Volunteers provide emotional support for older people, co-ordinated by charity	Mixed methods. Qualitative semi-structured interviews and Delphi questionnaire to obtain the views of project coordinators	- Co-ordinators believe service does alleviate loneliness, - More local control to respond to needs may enhance service - Issues identified including promotion and publicity, recruitment of volunteers, operational structure, referral process	7
Cattan et al. (2011) UK	Evaluate the impact of different models of telephone befriending schemes for the health and wellbeing of older people.	40 service recipients (50's to 90's) of 8 pilot telephone befriending projects. Recruited by project coordinators.	**Call in Time Programme.** A national pilot comprising 8 telephone befriending support projects. Volunteers provide emotional support for older people, co-ordinated by charity	Qualitative in depth semi structured interviews, to explore impact of telephone befriending on wellbeing.	- Decrease reported in loneliness - Other themes included: make life worth living; sense of belonging; knowing there's a friend out there. - Older people's needs: engaging in ordinary conversation; a trusted and reliable service; future development.	6

Butler et al. (2006) USA	Assessment of the Senior Companion Programme to understand the meaning to volunteers and community, and to assess effectiveness.	All SCP volunteers in one county (n=34) and a convenience sample of clients 62-99 yrs (n=32).	**Senior Companion Programme** (SCP). Provides volunteer opportunities with small stipends to low-income older adults who provide companionship and assistance to frail community elders.	Mixed methods design comprising cross-sectional survey including UCLA loneliness scale, Lubben Social Network Scale and depression.	- Low levels of loneliness and large social network reported amongst participants - SCP provided companionship and facilitated independence for older adults - For volunteers, it helped to keep them active as also provided companionship	6
Leisure/skill development interventions						
Heo et al. (2015) USA	To determine the role of Internet use on social support, loneliness, and well-being	5203 older people (65-105yrs)	**Internet Usage**	Secondary analysis of 2008 US Health & Retirement Study data. Explored associations among Internet use, social support, loneliness.	- Higher levels of Internet use was a significant predictor of higher levels of social support, and reduced loneliness.	5
Toepoel (2013) Netherlands	To investigate the relationship between social isolation and leisure activities	Representative sample from a national cohort sample. Data collected from 5910 respondents (847 were 65+).	**Leisure activities** including: voluntary work, cultural activities, holidays, sports, watching TV, listening to radio, reading, hobbies, shopping, using a computer	Cross sectional on-line questionnaire collecting data. Measures: 5 dimensions of social connectedness, including De Jong Gierveld Scale.	- Leisure is not correlated to feelings of loneliness for ages 65-74. - For the oldest group 75+, cultural activities & sports reduce loneliness - Reports of loneliness increase with age.	4
Blazun et al. (2012) Finland & Slovenia	To evaluate and discuss the self-reported levels of loneliness of older people in Finland and Slovenia before and after a computer intervention	Older people (>57) from Slovenia (n=28) and Finland (n=17). Recruited using adverts.	**Computer training Course.** Three sessions over 3 weeks, including basic IT skills, writing documents, training on Skype and internet uses.	Quasi experimental two group design. Questionnaires collect data on loneliness, quality of life, social contacts. Data collected at baseline and 3 week follow up.	- Significant reduction in loneliness - Significant reduction in loneliness for those living in towns vs non-sig for those in rural areas. - Correlation between email usage and lower reports of loneliness - No reported change in loneliness in those who use Skype	6

Tse et al. (2010) Hong Kong	To examine effectiveness of a gardening programme in enhancing socialisation. and reducing loneliness for older people living in nursing homes	Older people recruited from 4 nursing homes. divided into intervention (gardening program; n=26; mean age=85) and control (usual care; n=27; mean age = 82).	**Eight week indoor gardening group,** meeting once per week. Tasks included gardening diary, gardening skills, discussion.	Quasi experimental pre and post-test control group design. Measures: open ended questions, UCLA scale, Life Satisfaction scale, Lubben Social Scale. Data collected (baseline) and post-test (8 weeks).	- Significant reduction in loneliness for intervention grp - Increase in life satisfaction and socialisation for intervention group - No change for control group	6
Pettigrew & Roberts (2008) Australia	To investigate social and solitary pastimes with the potential to ameliorate the experience of loneliness	Recruited via elder care agency and retirement village managers. Nineteen participants 65 and over living at home or care village.	**Various social and solitary leisure activities**	Qualitative interviews to explore relevance of loneliness and how to manage loneliness.	- Older people reduced loneliness by: Emotional resource: Maintaining social contacts; Spending time constructively; arranging interaction with others; Volunteering activities	6
Fokkema & Knipscheer (2007) Netherlands	Evaluate effectiveness of an Internet communication facility for reducing loneliness in chronically ill and physically disabled older adults.	Older people (mean age =66yrs) living alone recruited to intervention group (n=12). 'Virtual' control group (mean age = 68 yrs) recruited from population survey (n=14).	**Computer/internet.** Participants given a loan of computer, internet and required equipment for 3 years. Five 2 hour one on one training sessions by volunteers prior to study.	Quasi experimental design. Measures: De Jong Gierveld Scale and qualitative information. Data Collected at baseline, 2 years, and at 3 years.	-Significant reduction in loneliness, but only for emotional loneliness and amongst highest educated - Qualitative findings concluded the reduction in loneliness was due to offering people a network of contact and providing a means to pass time	6
Brown et al. (2004) USA	Examines the effect of indoor gardening on socialisation, activities of daily living, and perceptions of loneliness in elderly nursing home residents	Participants (>60 yrs) from two nursing homes (intervention n=33 and control n=33). Control group became second intervention group after phase one (n=12).	**Indoor Gardening Project.** Once a week indoor gardening group for 5 weeks. Control group received a weekly 20 minute visit. In phase 2 of the study participants received 2 weeks of indoor gardening	Quasi experimental pre/ post-test design. Measures: UCLA loneliness scale and activities of daily living. Questionnaire at baseline and after 7 weeks.	- No difference between groups, but difference in perception of loneliness post-test for both groups in phase one - No differences in loneliness between 5 week program and 2 week program, but some socialisation sub-scales better after 5 wk program than 2 wk program.	7
Interventions spanning multiple categories						
Howat et al., (2004) Australia	To clarify factors contributing to social isolation and to identify strategies that promote social participation of older Australians	16 representatives of groups representing older people. Four focus groups with older people (> 60yrs). Interviews with 8 isolated seniors.	Study explored strategies aimed at reducing social isolation.	Qualitative design comprising senior focus groups, in depth interviews, interviews with representatives of organisations.	- Successful strategies included volunteer visits at home or hospital, and getting people involved through clubs - Barriers to attendance include, health, security, transport, being outnumbered by women (men only)	4

Cattan et al., (2003) UK	Explore practitioners and older people's views on loneliness and social isolation, and their suggestions for interventions	23 staff from volunteer projects to reduce social isolation;145 older participants from projects; 25 socially isolated older people (no ages given).	Study explored intervention suggestions from participants	Exploratory qualitative case studies with framework analysis. Focus groups and individual interviews.	- Older people are not a homogenous group and interventions should give consideration to this - Existence of "active lonely" group who engaged in activities and join groups that frail elderly might not	5
Wylie (2012) New Zealand	To identify services available in the West Canterbury area and any gaps/improvements in services.	Stakeholders from community agencies (no participants numbers given)		Literature review and stakeholder qualitative exploratory research involving interviews and focus groups with stakeholders	- Effectiveness of interventions attributed to: local focus, community development, transport, adequate resources and focussing on local needs - Lack of availability of information regarding services - Highlights the need for interagency collaboration	4