



# Universidad de Navarra

Facultad de Enfermería

## Interventions to prevent loneliness in older adults living in nursing homes

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## Abstract

*Introduction:* The number of older adults is increasing worldwide, as a result their need for institutionalized care is rising. One of the problems older adults experience when going to a nursing home is loneliness. Loneliness affects the person quality of life, so it is vital to help prevent it with appropriate interventions.

*Objective:* To explore the different kind of interventions to prevent loneliness of older adults living in nursing homes.

*Methodology:* This systematic review used three databases (PubMed, CINAHL, and PsycInfo) and searched for articles from 2010 to 2020 using search terms like “older adults”, “prevent”, “loneliness”, and “intervention”. From an initial 124 articles, 16 articles were selected at the end.

*Results:* Two main themes were found: person-to-person/group interventions and technological interventions. All interventions showed positive results in reducing the perception of loneliness. Group interventions showed high success on reduction of loneliness. For technological intervention, the use of a pet robot created an atmosphere where residents socialize. Videoconferencing and messaging showed the need of a third party implication.

*Conclusion:* Interventions found in this review are an effective way of alleviating loneliness even if interventions were vaguely described, and there was not follow up for long-term effectiveness.

### Key words

Loneliness, older adults, nursing home, intervention, prevent

## Resumen

*Introducción:* El número de personas mayores está incrementando en todo el mundo, por lo que la necesidad de cuidados para personas institucionalizadas aumentará. Uno de los problemas que las personas mayores experimentan cuando van a una residencia es la soledad. La soledad afecta a la calidad de vida de las personas, por lo que es importante prevenirla mediante intervenciones apropiadas.

*Objetivo:* Presentar diferentes tipos de intervenciones para prevenir la soledad en personas mayores institucionalizadas.

*Material y métodos:* Esta revisión utilizó tres bases de datos (PubMed, CINAHL y PsycInfo) y se buscaron artículos entre los años 2010-2020. Se utilizaron términos como “older adults”, “prevent”, “loneliness” y “intervention”. De una selección inicial de 124 artículos, se seleccionaron 16 artículos.

*Resultados:* Se encontraron dos temas principales: intervenciones entre personas o grupos de personas e intervenciones tecnológicas. Todas las intervenciones mostraron resultados positivos. Las intervenciones grupales mostraron una gran efectividad. Las intervenciones de videoconferencias y mensajes necesitaban a una tercera personas para poder llevarse a cabo. Las relacionadas con el robot Paro creaban una atmósfera donde los residentes les resultaba más fácil interactuar.

*Conclusiones:* Las intervenciones fueron efectivas para aliviar la soledad, a pesar de descripciones imprecisas de las intervenciones y la falta de seguimiento a largo plazo.

*Palabras clave*

Soledad, personas mayores, intervención, prevenir, residencia

## Introduction

The number of older adults is increasing worldwide and will continue to increase in the following years. 19.2% of the population of Europe is 65 years old or older, and it is projected to increase to 32% by 2050 (Eurostat, 2019). As people live longer, their needs of institutionalised care increases and will increase further as the population ages (Durán, 2018).

Loneliness is a subjective sentiment that a person experiences when there is an inconsistency between a person's expectations and reality of their social relationships (Domènech-Abella *et al.*, 2017). Their social relationships are unsatisfactory by the quantity or quality of interactions (Pitkala, 2016). There can also be a separation between social loneliness and emotional loneliness. Social loneliness alludes to the lack of meaningful relationships, which could lead to a feeling of social disconnectedness with others (Cohen-Mansfield *et al.*, 2015). Whereas emotional loneliness refers to an absence of intimate attachment with other people (Cohen-Mansfield *et al.*, 2015). Hence, people can feel lonely even if surrounded by people. It is important to separate loneliness and social isolation. Social isolation refers to a near or total lack of interaction between the person and other people, so where loneliness is subjective, social isolation is objective (Freedman *et al.*, 2020)

Moving from the family home to a nursing home has plenty of challenges: changing your environment, your surroundings, leaving behind family members and friends, and being surrounded by strangers. Adapting and finding a meaning to the new situation can be hard and finding people to connect is difficult (Paque *et al.*, 2018). What's more, seeing people interact with each other may make feel residents even lonelier (Cohen-Mansfield *et al.*, 2015). The loss of autonomy and control over their own lives, and the subsequent feeling of uselessness and lack of meaning in life also plays a role (Pitkala, 2016).

Loneliness is linked with poor health outcomes, poor quality of life, hopelessness, depressed mood, psychological distress, depression, increase risk of suicide, cognitive decline (increase risk of dementia), risk of heart diseases, and increased mortality (Paque *et al.*, 2018). However, a sense of belonging, fulfilment with place of residence, compliance of medical conditions, ability to adapt, and general life satisfaction reduce the level of loneliness (Pitkala, 2016).

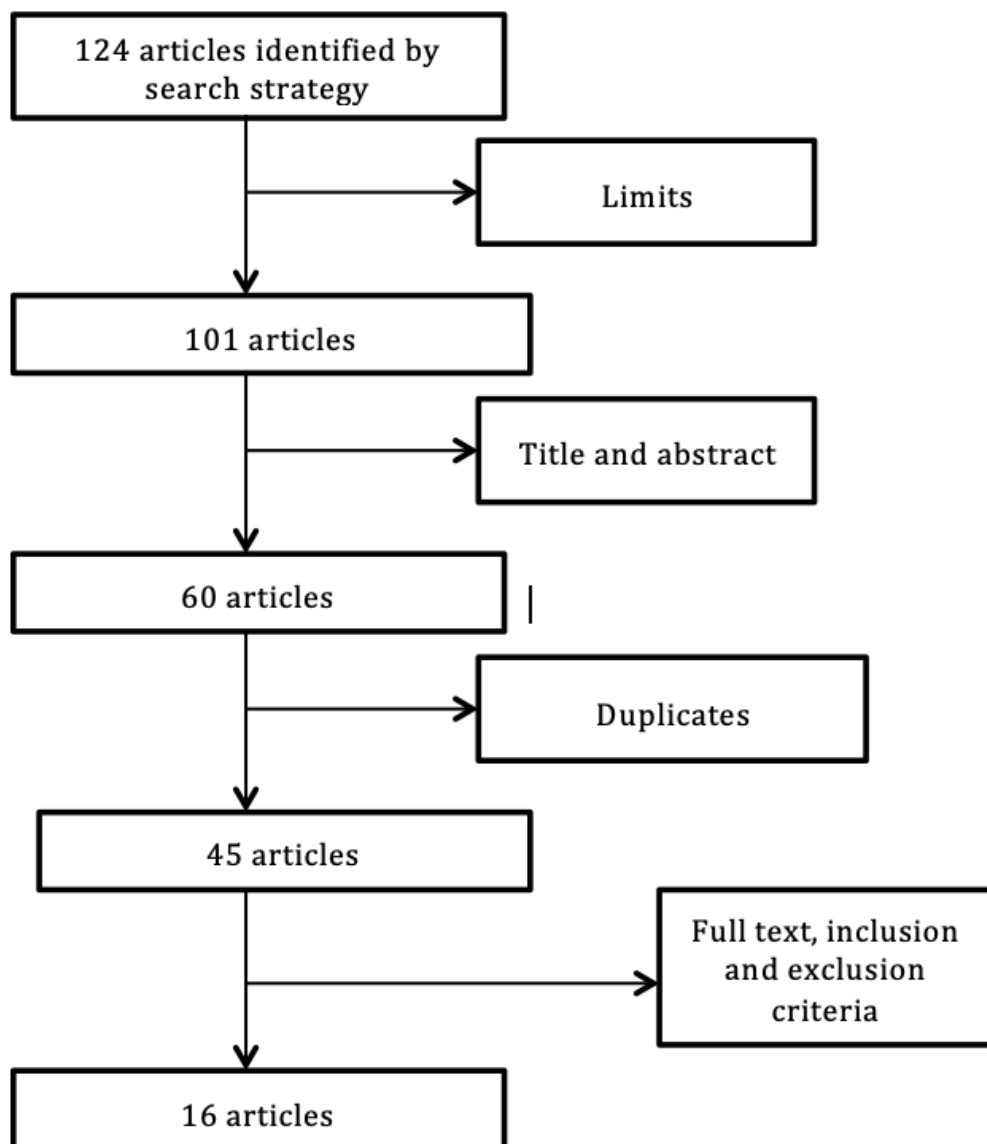
Loneliness is complex and multifactorial, and affects the residents' quality of life (Paque *et al.*, 2018). It is vital to be able to detect those residents that have a higher risk of feeling lonely and help them with appropriate interventions. Interventions should focus on improving, continuation and development of a social network, autonomy and self-determination, and on the development of a meaningful life, taking into consideration the residents and family members preferences (Trybusińska *et al.*, 2019).

## Aim

The aim of this study is to explore the different kind of interventions to prevent loneliness of older adults in nursing homes.

## Methodology

A research question was developed in order to delimit the search terms. The research question was: *What nursing interventions can be implemented to prevent loneliness in older adults living in nursing homes?* Articles were drawn from three databases: PubMed, PsycInfo and CINAHL. The searches were performed using a combination of the following words: “loneliness” AND “Nursing home” OR “Care home” OR “Long term care” OR “Residential care” OR “Aged care facility” AND



**Figure 1.** Flowchart for the selection of studies.

“Prevent” OR “Reduce” OR “Minimize” OR “Decrease” OR “Alleviate” AND “Older people” OR “Older adults” OR “Elderly” OR “Seniors” OR “Aged (MeSH term)” AND “Intervention” AND “Nursing”. These terms were reached after an exploratory phase was carried out to identify the more appropriate terms.

The same limits were applied in the three databases: Articles from the last 10 years (2010 to 2020), and they had to be in English or Spanish.

The following inclusion criteria was followed: Articles with a population older than 60 years of age that where on a nursing home, the study also had to develop and/or apply an intervention and showed its' results. Studies were excluded if they only targeted social isolation.

**Figure 1** shows the followed process for article selection. Five steps were followed:

Step 1: Term search

Step 2: Application of limits

Step 3: Title and abstract screening

Step 4: Removal of duplicates

Step 5: Full text read and application of inclusion and exclusion criteria.

Through this process from the original 124 articles identified, 101 after the application of limits, 60 after reading title and abstract, 45 after removal of duplicates, and 16 were finally selected after reading the full text and applying the inclusion and exclusion criteria.

## Results

A total of sixteen studies were identified after the search. **Annex 1** shows a table with the identified studies and data. Of the sixteen studies, six were identified as quasi-experimental studies, another six as qualitative studies, two as randomized control studies and another two as mixed method studies.

Studies collected data using a combination of interviews, observation, and questionnaires. For example, Zamir *et al.* (2020) and Theurer *et al.* (2014) used observation and interviews, whereas Jarvis *et al.* (2019) only used questionnaires and Chung *et al.* (2020) only used interviews.

Studies used different scales and methods in order to measure loneliness as shown in **Annex 1**. Ten studies out of the total sixteen used the UCLA (University of California Los Angeles) scale for loneliness both the short and long form (Chen *et al.*, 2020; Lin *et al.*, 2020; Robinson *et al.*, 2016; Robinson *et al.*, 2013; Tsai *et al.*, 2020; Tsai *et al.*, 2011; Tsai *et al.*, 2010; Tse *et al.*, 2014; Tse, 2010; Vrbanac *et al.*, 2013). The other six studies used other scales like De Jong Gierveld Loneliness Scale (DJGLS) (Jarvis *et al.*, 2019; Kuru *et al.*, 2018). Robinson *et al.* (2013) used a combination of the UCLA scale and the staff to complete a proxy rating of the residents. Another article followed a different approach using systematic observations and interviews with staff and residents (Theurer *et*

*al.*, 2014). All studies gave the scale before and after the intervention. Some of the studies like Tse *et al.* (2010) or Vrbanac *et al.* (2013) also measured loneliness months after the intervention.

After examining the articles two main thematic areas were identified: Person to person/group interaction interventions and technological interventions.

#### *Person to person/group interaction interventions*

Six articles focused on interventions where there was a person-to-person interaction or a group interaction. One of the articles, Lin *et al.* (2020), used a combination of both person-to-person/group interaction with technological interventions. Among those articles six different intervention themes were identified.

Firstly, Chung *et al.* (2020) looked at the self-regulation of loneliness, how older adults work within themselves, and what they may need in order to overcome their loneliness. They interviewed and analysed how older people from China and Sweden feel about existential loneliness (EL), what was their experience like (loss of control or their inability to identify any meaning, changed circumstances, and need to develop coping strategies), on what their self-regulation focused on (need to adapt, and development of coping strategies), and what kind of needs they may have. Both Chinese and Swedes concluded that in order to alleviate their loneliness, they had to have a new meaning of life focusing on their family and new friends.

Secondly, a therapy focused on laughter therapy was developed by Kuru *et al.* (2018). The therapy consisted on twice a week sessions for five weeks, where an instructor worked with the intervention group with laughter exercise, playing time and singing songs loudly. Post-intervention measurement of loneliness showed a significant statistical difference in loneliness between the control group and the intervention group.

Thirdly, horticultural therapy was used by Lin *et al.* (2020) and Tse *et al.* (2010). Both articles had a control group that did not participate in the intervention and the intervention group worked with different kind of plants. They measured lower levels of loneliness post-intervention in the intervention group compared to the pre-intervention measurements. Control group did not have any significant changes on their loneliness.

Fourthly, Tse *et al.* (2014) looked at the effects of physical therapy as a mean to improve psychological well-being, in which loneliness was measured. The therapy led by a physiotherapist and a nurse worked through all body parts taken into consideration the participants' physical state. After the intervention participants in the intervention group had a lower perception of loneliness compared to the control group.



Fifthly, Theurer *et al.* (2014) developed an intervention based on the concept of personhood. The intervention was based on the use of music therapy in order to build a mutual support group between participants. The music was used in order to facilitate the session and themes to be discussed on. Participants had the opportunity to build relationships with other participants, they were able to tell their worries and problems, and especially felt that they had something to say and that they were going to be listened to. Participants and staff found their experience satisfactory, and it helped in building lasting relationships, thus reducing their loneliness. One characteristic of this intervention was that even participants with lower cognitive function participated and found satisfactory their participation in the program.

Lastly, an animal therapy intervention was developed by Vrbanac *et al.* (2013). The intervention showed statistically significant improvement on loneliness. The intervention group found it was a fulfilling experience and the time spent with the animals as pleasant. It was found that improvements were specially focused on the parameter lack of company of the UCLA scale.

### *Technological interventions*

Ten out of sixteen articles were focused on technological interventions. The focal point was on videoconferences, messaging systems like WhatsApp, the use of virtual reality, and the use of Paro, a pet robot.

Tsai *et al.* (2020; 2011; 2010) developed a series of interventions focusing on the use of videoconferences for a three-month, six-month, and one-year period. The same line of interventions was followed by Zamir *et al.* (2020) that focused on the feasibility of said method, and on the use of videoconferences between nursing homes. The use of videoconference was effective in decreasing the levels of loneliness compare to the control group, but it found several challenges. On the one part, the difficulty and the need of learning for participants, family members and friends about the technology, as they found it confusing and they need several sessions in order to familiarize with the technology, and on the other hand, the need of collaboration of staff and friends and/or family members. Videoconferences also gave participants something to do, and in the case of Zamir *et al.* (2020) the activities surrounding the Skype sessions allowed them to interact with other residents.

Jarvis *et al.* (2019) looked at the use of messaging through a mobile phone in order to have a higher degree of interaction between older adults, and their relatives or friends. Results were analysed in different time periods (pre-intervention, post-intervention, and one month post-intervention) through the intervention. The intervention group (IG) showed significant reduction in the feeling of loneliness compared to the control group (CG). This was maintained after it finished, where the IG had lower results values of loneliness than the CG even if the use of the technology had decrease due to the lack of novelty, and lower engagement.

Lin *et al.* (2020) looked at the combine use of 3D horticulture and hands on horticulture. They had a control and intervention group. The intervention group firstly had a series of session in order to make acquaintance with the technology. After the sessions the intervention group showed a significant improvement compared to the control group regarding their loneliness.

Chen *et al.* (2020) and Robinson *et al.* (2016; 2013) looked at the human-robot interaction for a period of eight and twelve weeks respectively. Robinson *et al.* (2016; 2013) had an intervention group and a control group, whereas Chen *et al.* (2020) only had the intervention group. Robison *et al.* (2016; 2013) control group did alternative activities to their everyday activities, like going to the city. At the end of the intervention in both studies participants experiences and perceptions were explored. Results showed significant reduction on loneliness. Moreover, through this intervention participants humanized Paro, which resulted in a higher engagement with the robot. The robot was used to help them improve their social interactions and connections with other people as it encouraged conversations. According to participants, Paro also offered comfort through companionship and interaction, such as stroking or petting reducing the feeling of loneliness as a result.

## Discussion

The aim of this study was to examine different kind of interventions to prevent loneliness. Sixteen studies were identified from 2010 to 2020 that assess the effectiveness of some interventions in reducing loneliness of older adults in nursing homes or long term care. All sixteen studies showed that they are an effective way in reducing loneliness in the target population. Interventions had a variety of points of view. On the one hand, interventions more focused on a technological approach, ten out of sixteen studies had some kind of technological approach, and on the other hand interventions more focused on group or person interaction, seven out of sixteen, had this approach taking into consideration that one study by Lin *et al.* (2020) had a combination of technological and person-to-person/group interaction.

According to Masi *et al.* (2011) interventions to reduce loneliness follow four strategies: “1) *Improving social skills*, 2) *Enhancing social support*, 3) *Increasing opportunities for social interaction and*, 4) *Addressing maladaptive social cognition*” (Masi *et al.*, 2011). Results in this review are more focused on strategies two and three, where the majority of interventions are focused on enhancing social support (videoconferences or messaging) or increasing opportunities for social interactions through group activities (horticultural therapy, laughter therapy, music therapy). One article by Chung *et al.* (2020) is focused on addressing maladaptive cognition and how working within themselves shows improvements. No interventions focusing on improving social skills were found in an institutionalised setting, but it is an intervention type that it is more applied in a community setting (Cohen-Mansfield *et al.*, 2015). These results follow the same path as Bermeja *et al.* (2018), where in their review they found the same kind of interventions. Another review by Brimelow *et al.* (2017) also found the same variety of intervention, but with a larger focus on animal assisted therapy where they found a majority of studies. Another exception is that they found some interventions focused on reminiscence/

biographical approaches, whereas this study found none. This is corroborated by results found by Menn *et al.* (2020) focused on biographical approaches, that show some promising results regarding quality of life and loneliness, but at the same time it shows that there is a need on further research to reach a general conclusion. Technology related approaches play an important role in this study, but more successful interventions seem to be related to person or group interactions with a higher decrease on the feelings of loneliness (Quan *et al.*, 2020), overall both kind of interventions are effective (Mann *et al.*, 2017). It is also important to notice that scientific data regarding interventions targeting loneliness of older adults in a nursing homes or long-term settings is limited and interventions usually lack a control group (Yanguas *et al.*, 2018).

Results show that interventions focused on people interaction do not need a time period for learning compared to results that use a technological approach. One of the main issues regarding technological approach, specially videoconferencing, is that older adults are often not familiarized with this kind of technology and they need some time and sessions in order to familiarize with it (Moyle *et al.*, 2020). Furthermore, it has been noted that the use of technology represents a challenge for older adults, due in part to their attitude towards technology, where they may not have interest in the use, or due to cognitive barriers, where older adults may found challenging the use of certain technologies (Charness *et al.*, 2009). The need of maintaining interest on the novelty of technology is a necessary duty detected for older adults (Lee *et al.*, 2015). Interventions like videoconferencing must have a third party, like family members or friends, in order to be able to be applied. Barbosa *et al.* 2019 showed results of the effectiveness of videoconferencing program, but at the same time, it showed the need to have an engage person or group of people on the other side in order to be effective. If there is no engagement even if the older adults wants to be proactive their effectiveness is non-existent (Barbosa *et al.*, 2019). As opposed to group interventions, where only the presence of the older adult is needed in order to participate. In fact, group interventions main purpose is to help and facilitate socialisation between group members (Gardiner *et al.*, 2018), giving each other support, companionship, and friendship in order to tackle their sense of belonging, social support, personal development, and caring through social interaction while creating a social network (O'Rourke *et al.*, 2018).

The development and application of an intervention is one of the most important aspects in order to have effective and acceptable results. One of the most successful intervention programs on this study (Theurer *et al.*, 2014) showed and explained all the steps in the developmental process of the intervention and all the considerations they took. The importance of a good planning and development of interventions is stated by O'Cathain *et al.* (2019). One of the most basic and important parts of the developing of an intervention is identifying the problem and what you want to achieve with the intervention (O'Cathain *et al.*, 2019). Nursing home residents usually present a wide range of health problems, from chronic illness to cognitive impairment, and a majority of interventions of this review excluded patients with cognitive impairment. But as Theurer *et al.* (2014) showed, positive results can be seen in older adults with cognitive impairment, and that they can be and are active participants in this kind of settings, but further research is needed in order to look at older adults with cognitive impairment compared to cognitive intact older adults. In fact, research shows that they are a

population that has higher levels of loneliness (Nikmat *et al.*, 2015). The most effective group interventions are those where residents are able to take some control on the organization of the sessions (Cattan *et al.*, 2005). Additionally, providing participants with an active role in producing and participation on the sessions has better results in reducing loneliness (Cattan *et al.*, 2005). Cattan *et al.* (2005) is not the only article that found group interaction the most effective, Dickens *et al.* (2011) also found that group interventions where participants played an active role in the development and participation were more effective than other kind of interventions. Nevertheless, Gardiner *et al.* (2018) found that group interventions are not more effective than individual interventions or technological interventions. Furthermore, the use of videoconference and computer use has provided in recent years with effective results in reducing loneliness (Blažun *et al.*, 2012; Chipps *et al.*, 2017). However, it has been noted that there is a lack of high quality evidence as remarked by Chipps *et al.* (2017) and Noone *et al.* (2020).

Animal therapy has been one of the interventions that has been proved to be more effective in nursing homes to reduce loneliness and other psychological problems that older adults may have, even if further research is needed (Jain *et al.*, 2020). Technological development has made possible to develop robots that look like animals. These robots may be an effective alternative to animals, as older adults may be able to interact with them outside a group environment where the dog needs may not be needed to be considered, and older adults has a calmer environment (Banks *et al.*, 2008). Paro is a robot that looks like a seal, and according to results by Robinson *et al.* (2013) and Chen *et al.* (2020) has been proved useful as a mean to reduce loneliness. Robots are seen as agents that residents can interact with them when they feel to do so, and left them when they are not feeling the need for interaction, but generally the acceptance and interaction with the robots is really positive in the institutionalised older adults (Melkas *et al.*, 2020). Older people also tend to bond with the robot, giving it a name that may be important to the person, and speaking to them about their personal issues or secrets (Turkle, 2017). Furthermore, a pet robot like Paro has also showed results that provide people with the opportunity of nurturing them, and helping them with their mood (Moyle *et al.*, 2019). One question arises when looking more closely to those results: Is the robot responsible for the decrease loneliness? Or is the atmosphere that it creates as a result of its presence that reduces loneliness? On the one hand, the robot itself could create a pastime opportunity where the interaction between the robot and the person creates a sort of dialogue between them that helps (Pirhonen *et al.*, 2020). On the other hand, the robot can also create an atmosphere where people interact with each other, speak among themselves about the robot, using it like an icebreaker, or promotes playing games together, which may facilitate or make it easier to communicate, and forming relationship between each other (Moyle *et al.*, 2013; Riether *et al.*, 2012).

The majority of interventions studied in this review take about three to six month. Interventions are not applied during all the allotted time period; moreover some measure loneliness just after the intervention is finished, while others made measurements one month or later after the intervention period. When looking at the effectiveness of the intervention, articles note the effectiveness of the time

period they have measure. With exceptions, loneliness related interventions results report that they are an effective way of alleviating loneliness, even if the quality of the intervention is not the highest due to the application, measurement of results or results analysis (Brimelow *et al.*, 2017; Chipps *et al.*, 2017; Cohen-Mansfield *et al.*, 2015; Kachouie *et al.*, 2014; Menn *et al.*, 2020; Noone *et al.*, 2020; Quan *et al.*, 2020). One missing element of these interventions is a long-term follow up, for example Dickens *et al.* (2011) notes several articles where there was not a follow up some time later to see the effectiveness of their results. Cacioppo *et al.* (2015) also notices the need to further look into intervention for loneliness and their long-term effects, and what kind of needs patients may need in the future.

### *Limitations*

Generally interventions results have shown them to be an effective way of alleviating loneliness. One limitation of this review is that a majority of interventions had a relatively short duration with a lack of follow up once the intervention period is finished, so there is not a way of knowing if the intervention had a long term effect. In contrast, videoconference interventions that had a longer duration showed to be effective, but they need to have another person present on the other side of the line (Noone *et al.*, 2020).

Another limitation is that due to the nature of interventions and settings, sample sizes are usually small. There is also variability between nursing homes, so what works in a nursing home may not work in another due to the nature of the residents or due to the variation in the facilities, and way of working. In view of that, result may not be conclusive.

This review has showed a great range of different interventions. This heterogeneity may have influence results, as each intervention has measured its' results in a different way. Furthermore, a lot of interventions were very vaguely described, so the methodological quality may be very limited.

Only articles in English and Spanish were selected, so it may be that relevant articles in other languages had not been included. At the same time, only three databases and a ten-year period were used which may further exclude relevant literature.

## **Conclusion**

Horticultural, laughter therapy, music therapy, physical therapy, animal therapy, videoconferencing, messaging and the use of robots interventions had been analysed. Results of this study show that interventions to prevent loneliness of older people in nursing homes are effective. All studies show that they reduce the feeling of loneliness.

Technological interventions are effective because the atmosphere they create or the opportunities for interaction, like what the robot Paro creates, but at the same time they need a learning curve, and

implication not only of residents, but also of a third party if we think about videoconferencing. Group interventions where residents have any kind of input seem to be the more effective interventions. It would be interesting for the future to promote and develop this kind of interventions. At the same time, developing a protocol where the methodology is explained and, a longer follow up would open up a lot of opportunities, and enhance the quality of the studies.

Developing effective interventions may influence treatment and prevention of loneliness in older people, and it is also important to take into consideration older adults with cognitive impairment. This demonstrate that even if effective interventions are being developed, addressing loneliness is still a difficult and challenging issue for older people in long term care facilities.

## **Implications**

Interventions to prevent loneliness are effective both where there is a technological aspect and person-to-person or group interaction. Nevertheless, there is a need to further research in order to develop more knowledge in this topic with the goal to have a better understanding and implementation on care for nursing home residents. For this matter, it is vital to be rigorous in developing and applying the methodologies for interventions. Selecting bigger sample sizes with a more varied participants and not excluding people with cognitive impairment, while taking into consideration cultural factors that may be influential.

Nurses, therapist, and other staff can play an important role in detecting loneliness and applying the needed measures for residents in order to prevent or treat possible problems with the objective of giving the best care possible.

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## Annex

### Annex 1. Data from selected studies.

Reference	Objectives	Data collection method	Population	Main results	Relevant results for research question
<b>Chen et al., 2020; Taiwan and Australia</b>	To look into the effects of a social robot intervention on loneliness and to examine the experiences and perceptions.	A mixed-methods approach. A single group. Quasi-experimental design. Individual interview.  Demographic data and health related information.  Outcome measures: MMSE <sup>1</sup> , GDS-SF, UCLA-3, WHO-QOL-OLD  A week before start of 8 weeks. Mid-point. At the end of 8 weeks  Semi-structured interview to understand participants' experiences.	4 LTC more than 100 beds. >65 years old GDS minimum 6 No cognitive impairment Able to communicate Taiwanese or mandarin Living LTC at least 3 months. 20 final participants	Positive changes at the end of 8 weeks. 1.Humanize Paro through personal experiences and engagement 2.Increase social interaction with other people 3.Campanionship	Intervention with pet robot – Paro– reduces loneliness and increases well-being of participants. Lack of studies long-term
<b>Chung et al., 2020; China, Sweden</b>	How older adults from Asian and European cultures cope with loneliness	Qualitative study. Data collection: Two series of in depth semi-structure interviews	13 Chinese 9 Swedes >65 LTCF living for more	Overcoming EL (existential loneliness) 1.Feeling EL 2.Self-regulating	Participants' self-regulations and search for a new reality. Differences between western and eastern countries

<sup>1</sup> MMSE: Mini Mental State exam

GDS-SF: Geriatric depression scale short form

UCLA-3: University of California Los Angeles loneliness scale version 3

WHO-QOL-OLD: World Health Organization quality of life old version

			than a year Moderate to high level of assistance Diagnosed with one chronic disease Mentally competent		
<b>Jarvis et al., 2019. South Africa.</b>	Implementation of cognitive behavioural therapy -mHealth-intervention via mobile instant messaging to reduce loneliness.	Randomized control study, with two groups. (Intervention and control). YSQ-SF 3 <sup>2</sup> ,DJGLS  Questionnaire: Pre-intervention Post-intervention One month post-intervention	4 NGOs care facilities >60 years Willing to participate Cognitive intact Socially isolated or lonely Decrease mental well being Intervention group, (n=13) Control group (n=16)	Reduction of loneliness. Control group higher loneliness. Intervention Group significant effect on loneliness	mHealth intervention to reduce loneliness. Slow change. Low intent to participation
<b>Kuru Alici, et al., 2018; Turkey</b>	Evaluate the effect of laughter therapy	A quasi-experimental study. A non-equivalent control group. Pre-test–post-test design.  DJGLS TDAS <sup>3</sup> Certified laughter yoga instructor 5 weeks 2 days a week	2 nursing homes: 1 control, 1 intervention >65 years Independence in daily activities n=20 intervention group n=20 control group.	DJGLS lower Post therapy significantly lower TDAS no significant difference	Laughter therapy in nursing homes requires social participation. Doing things together in groups

<sup>2</sup> YSQ-SF 3: Young Schema Questionnaire short-form (disconnection and rejection)  
DJGLS: de Jong Gierveld Loneliness scale

<sup>3</sup> TDAS: Turkish Death Anxiety Scale

<b>Lin et al., 2020; Taiwan</b>	Explore the effects of a combination of 3D virtual reality and horticultural therapy	18 one-hour sessions twice a week for 9 weeks. Intervention group and control group. CHQ-12 <sup>4</sup> Meaning of life questionnaire General mattering scale UCLA-6 GDS-15	>65 years One LTCF Understand verbal meanings Able to operate a joystick n=106 participants	Significant improvements in the intervention group compared to the control group.	Horticulture and 3D horticulture help improvement. Higher social engagement
<b>Robinson et al., 2016; New Zealand</b>	Provide additional data of Robinson, et al., 2013; New Zealand	Interviews with intervention groups. Open ended questions.	Age-care facility. n=40 participants. n= 20 intervention, n=20 control group	Positive reaction to the robot. Both the participants and staff members	Description of intervention with Paro, session with residents and staff. More engage residents
<b>Robinson, et al., 2013; New Zealand</b>	The psychosocial effects of the robot Paro, compared to a control group.	UCLA assessment GDS QoL-AD <sup>5</sup> Sessions biweekly, for 12 weeks Observation Interviews	n=40 Retirement home residents. n=20 intervention, n=20 control group.	Loneliness decreases in the intervention group. Loneliness increases in the control group. Higher interaction between residents.	Decrease loneliness. Intervention how they interact with Paro. More talking and socialization among residents
<b>Theurer et al., 2014; Canada</b>	To describe an intervention containing mutual support groups using music, in order to evaluate it.	Mixed-methods qualitative process evaluation  Observation and Interviews  Assessment component, content  Mini Mental for descriptive measures	Residential care homes n=12-15 participants. Able to communicate verbally, n=65 participants in 6 groups.	Wellbeing improves. Further research needed. Importance of a thematic framework for the session themes. Staff felt it helped residents.	Development of a mutual support group using music and selected themes to talk about by the researcher or selected groups-leaders. Both residents and staff.

<sup>4</sup> CHQ-12: Chinese Health Questionnaire  
UCLA-6: University of California Los Angeles loneliness scale version 6  
GDS-15: Geriatric depression scale 15 item

<sup>5</sup> QoL-AD: Quality of life –Alzheimer Disease

		Group design 6 months data				
<b>Tsai et al., 2020; China</b>	Assess the effectiveness of a videoconference program.	6 month Quasi experimental	UCLA GSD SF36 <sup>6</sup>	7 nursing homes >60 years Mini Mental >16 or 20 (depending education level) No previous smartphone use Agree to participate n=26 participants, 2 groups	6 month study period. More calls in the intervention group. Decrease loneliness at 1 month, 3 month and 6 month period.	Smartphone based intervention. Videoconferences 6-month intervention. Decrease of feeling of loneliness
<b>Tsai et al., 2010; China</b>	Assess the effectiveness of a videoconference program.	3 month Quasi experimental design Barthel index <sup>7</sup> MMS <sup>8</sup> GDS UCLA Social support		2 nursing homes. n=57 participants. n=24 experimental group. n=33 control group >60 years Mini Mental >16 or 20 Wireless access	Loneliness is lowered at 1 week and 3 months period. Statistically significant. Family members' participation important. Many did not want to participate.	Videoconference program 3 month Low family participation. Family computer facilities are important to apply this kind of intervention.
<b>Tsai et al., 2011; China</b>	Assess the effectiveness of a videoconference intervention program over 1 year.	1 year quasi experimental GDS Barthel index (ADL <sup>9</sup> ), MMSE, UCLA Social support behaviour scale. Staff recordings of videoconferences		>60 years Mini Mental >16 or 20 Wireless access Family members access to internet communication. n=50 control group n=40 experimental group	Alleviated loneliness. Similar level for the control group. Experimental group significantly lower	Videoconference 1 year. Effective as other studies by Tsai.
<b>Tse et al., 2014; Taiwan</b>	The effectiveness of a physical exercise program in improving	Randomized-controlled		8 week Aged 60> Musculoskeletal pain Nursing home	Psychological function, regarding loneliness improve with the exercise	Physical exercise program where psychological function is measured. Loneliness being

<sup>6</sup> SF-36: Quality of life short form 36

<sup>7</sup> Barthel scale: Activities of daily living

<sup>8</sup> MMS: Mini Mental State

<sup>9</sup> ADL: Activities of daily living

	psychological wellbeing.	study	UCLA Physical exercise program. 2-3 days before the program and 2-3 days after the program.	Able to communicate in Chinese Control group n=171. Experimental group n=225.	program	one parameter, which improves with the program.
<b>Tse et al., 2010; Taiwan</b>	The effectiveness of a gardening programme in reducing loneliness	A quasi-experimental design. Pre and post-test control group.  8 week program UCLA Lubben <sup>10</sup> Life satisfaction index. Barthel Index	>60 years Cognitive intact Speak Cantonese n=53 participants n=26 experimental group, n=27 control group.	Improvement for experimental group, no for the control group. Very positive experience, improves loneliness and socialization.		Indoor gardening program. Shows an improvement in socialization, and reduces loneliness. More engaging in social activities.
<b>Vrbanac et al., 2013; Croatia</b>	Dog companionship as an intervention that reduces the perception of loneliness	UCLA beginning and six months after intervention. Self-perception questionnaire related to everyday life in the nursing home. Observation of social interaction.	n=21 participants of a Nursing home 4 dogs 6 months program.	Significance differences in loneliness. No differences if participants were previous pet owners		Animal assisted therapy. Reduced the perception of loneliness.
<b>Zamir et al., 2020; UK</b>	If inter-care home video calls are an adequate and doable intervention to reduce loneliness	A collaborative action research design Semi-structured interviews Feedback from staff Observations in note forms.	Three care homes n=22 residents participated in video- call sessions. Age>65	Stimulating activity. Helps to engage in socialisation. Need of staff collaboration.		Videoconference intervention
<b>Zamir, et al., 2018; UK</b>	Normalisation of the use of video-calls in long term care settings.	Action research with added activities. Observing. Interviews, memo collections, feedback forms, reflective diaries	6 care homes 21 Staff + 19 residents + 15 family members	High dropout rate. Confusing technology for staff, participants, and family members. Technology was confusing. Need more collaboration. More optimal design of the study.		A fail videoconference intervention, needs a better design, more collaboration with staff, participants and family members.

<sup>10</sup> Lubben social network scale