



## THE EFFECTIVENESS OF TECHNOLOGY-BASED NON-CLINICAL COMMUNITY INTERVENTIONS TO REDUCE LONELINESS IN THE ELDERLY: A LITERATURE REVIEW

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Literature Review

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### ABSTRACT

**Introduction:** The condition of the elderly who experience various declines in biological and psychological functions can affect mobility and social contact, one of which is a sense of loneliness (loneliness). The purpose of this study was to identify the effect of Digital Information Technology-based interventions in reducing loneliness in the elderly. **Methods:** A systematic review using three electronic databases (Scopus, PubMed, and Web of Science) from the last 7 years (2014-2021). The research used quasi-experiments and Randomized Control Trials (RCT). The data analysis used is descriptive analysis with a narrative approach. **Results:** There were 8 articles that met the inclusion criteria in the review. All selected studies discuss the effect of Digital Technology-based interventions on reducing loneliness in the elderly. Other interventions are needed such as technological interventions (eg, digital applications (apps), online social networks and social robots) to enhance emotional support and social interaction. **Conclusions:** This systematic review concluded that the evidence for the effectiveness of technology-based interventions for reducing loneliness in the elderly is uncertain. Basically, technology is not a solution to reduce loneliness in the elderly, but a tool that helps them stay connected with family members, friends, neighbors, etc. and get access to information and resources.

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### INTRODUCTION

The aging process is a natural process for a person who has gone through three stages of life which include childhood, adulthood, and old age. When starting old age means also starting to experience a setback physically and psychologically. The condition of the elderly who experience various declines or setbacks in both biological and psychological functions can affect mobility and social contact, one of which is a sense of loneliness (Mubarak et al., 2009). Elderly people who experience loneliness often feel bored and bored with their lives, so they hope that death will come to pick them up soon (Bini' Matillah et al., 2018). This is because he does not want to trouble his family and the people around him. Lonely conditions can indeed lead to many psychological problems. Some of them are depression, anxiety, chronic stress, and insomnia.

Loneliness is an unpleasant experience experienced when there is a lack of quantity or quality of social relationships. Loneliness is

increasingly considered a public health problem, especially among the elderly. The number of elderly people in Indonesia in 2025 is expected to increase to 11.09% of the total population (22,277,700 people) with a life expectancy of 70-75 years, so that Indonesia is ranked 3rd in the world after China, India and America in an elderly population. As the number of elderly people increases, the number of lonely people is getting bigger, it is estimated that 50% of the elderly are now suffering from loneliness. This is also supported by the research of Johnson et al. (1993) in the National Council on Aging and Older People (2004), reported that the prevalence of loneliness in America is quite high, namely 62% of the elderly. Research by Wardiyah (2007) elderly who experience loneliness in the community, namely 66.67% with moderate loneliness, 23.33% mild loneliness, and 10% severe loneliness (Fahrudiana & Kusbaryanto, 2019).

Loneliness is a feeling of being left out, isolated from other people because you feel

different from other people, left out from your group, feeling unnoticed by the people around you, isolated from your environment, and not having someone to share your feelings and experiences (Domènech-Abella et al., 2017). This condition creates feelings of helplessness, lack of confidence, dependency, and neglect. Someone who claims to be lonely tends to see himself as a worthless individual, uncared for, and unloved. The feeling of loneliness will be increasingly felt by the elderly who were previously someone who was active in various activities that presented or connected with many people (Bini' Matillah et al., 2018). The elderly will also experience depression such as feeling sad, depressed, feeling empty, isolated, feeling bored, anxious, feeling ashamed of themselves, and feeling afraid. When the elderly experience these things and without support or limited social support, loneliness is something that is very feared by the elderly. Individuals who experience feelings of loneliness really need social support.

Social and technology-based interventions may be ways primary care practitioners can refer patients to non-clinical community-based sources of support. The adoption of technology, especially information and communication technology, to reduce loneliness in the elderly has attracted increasing attention worldwide. Technology-based solutions, for example, the use of video calls and online group chats, are believed to have the potential to maintain social relationships and reduce loneliness in the elderly (Jin et al., 2021). Some experts suggest that technology can increase the interaction of the elderly with family, relatives, and friends, enabling them to connect socially without face-to-face communication so as to reduce

loneliness (Shah et al., 2021; Yuan, 2021). However, not all researchers agree with technology-based interventions in the elderly because of some problems in the elderly, such as the ability to use technology and it takes a relatively long time to learn it. Considering the controversial opinion about the effect of technology-based interventions to reduce loneliness in the elderly, it is necessary to carry out a systematic review to find more reliable evidence. In addition, recent evidence on the effectiveness of technology in reducing loneliness is especially important from the perspective of the elderly and their families and other stakeholders such as health and social service providers.

**MATERIALS AND METHODS**

The method used in this paper is to use a Literature review. Literature search used 3 databases namely Scopus, PubMed and Web of Science (WOS). The question format for finding study results is using PICOS (P = population, I = intervention, C = comparison, O = results, S = type of study), PICOS is used to formulate research questions. The literature study was searched using three groups of keywords based on Medical Subject Heading (MeSH) and combined with the Boolean operators AND, OR and NOT. so that the search keywords obtained are "Intervention Based-Technology" AND Loneliness AND (Elderly OR "Older Adult"). Search results are limited to cross-sectional studies, Quasy-experiments and Randomized Control Trials (RCT), published from the last 5 years (2014-2021) using English and taking open access journals.

**Table 1. PICOS**

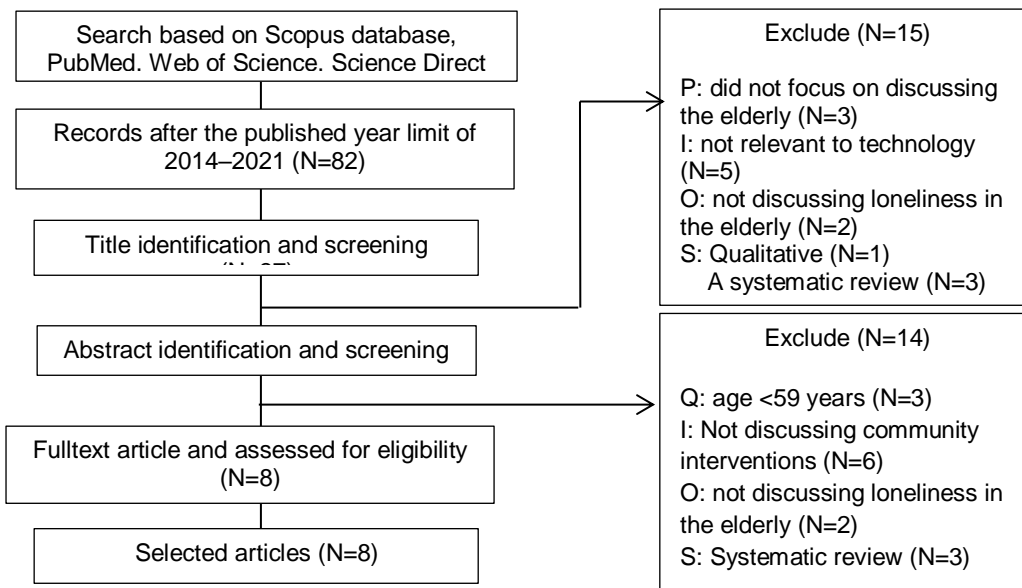
Criteria	Inclusion	Exclusion
Population	Elderly > 59 years old	Community aged <59 years
Interventions	Technology-based community interventions	In addition to technology-based community interventions
Comparator	No comparator	
Outcome	Reducing loneliness in the elderly	Not discussing loneliness in the elderly
Study Design and Publication type	Quasy-Experiment, Randomized Control and Trial, Cross-sectional	Qualitative studies and systematic reviews
Publication years	2014-2021	Before 2014
Language	English	Other than English

**Study selection**

Two hundred and ten articles (210) were found from searching 3 databases. Then limit the year of publication (N=82), open access records (N=51), delete duplications (N=14) from the results and leave a total of 37, evaluate and filter titles (N=37), filter abstracts (N=22),

full and appropriate text (N=8). Eight complete texts have been found and are eligible for literature review. During the literature screening process, the investigator defined general reasons for the exclusion criteria, including irrelevant study type, lack of full explanation of

the prevention of risky sexual behavior in adolescents, and an inappropriate sample.



Picture 1. Diagram PRISMA flow

**Data extraction and analysis**

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**RESULTS**

**Characteristic Study**

All included studies were RCTs (6 studies) and Quasy Experiments (2 studies) published in peer-reviewed journals. The entire study was conducted in Taiwan, China, the United States and United Kingdom between 2014 and 2021. Study sample sizes ranged from 30 to 234, and follow-up duration ranged

from 3 to 12 months. Each of the eight included studies compared a technology-based intervention is Digital Technology Information (DTI).

DTI includes social internet-based activities, i.e. social activities through social websites (1 study), video conferencing (2 studies), customized computer platforms with simplified touch screen interfaces (1 study), personal reminder information, and social management systems (1 study). 1 study), and social media such as Line, Whatsapp group and Facebook (3 studies). Enrolled participants are aged 60 and over who are in a Nursing Home with basic cognitive abilities and have wireless internet access on their residential floor. The entire study recruited older adults who lived independently and had cognitive function. All studies report outcomes of loneliness. Loneliness is a personal thing and will be responded to differently by each person, for some people loneliness is acceptable normally but for some people loneliness can become a deep sadness.

Table 2. Literature review

No	Title	Participant and study design	Intervention	Result
1.	Effects of a smartphone-based videoconferencing program for older nursing home residents on depression, loneliness, and quality of life: a quasi-experimental study.	<b>Design:</b> RCT <b>Participants:</b> Elderly aged 60 years and over <b>Total:</b> 62 Elderly <b>Time:</b> 3 Month <b>Follow up:</b> 3 Month after intervention	Interact with their family members using smartphones and the "LINE" Application (app).	After the intervention, compared to the control group, participants in the intervention group had a significant reduction in baseline loneliness scores. However, changes in mean depression scores did not differ significantly between groups.

No	Title	Participant and study design	Intervention	Result
	(Hsiu-hsin Tsai et al., 2020)			
2.	Videokonference program enhances social support, loneliness, and depressive status of elderly nursing home residents (H Tsai et al., 2015)	<b>Design:</b> RCT <b>Participants:</b> Elderly aged 60 years and over <b>Total:</b> 49 Elderly <b>Time:</b> 3 Month <b>Follow up:</b> 3 Month after intervention	Five minutes/week of video conferencing interactions with their family members for three months	Subjects in the experimental group had significantly higher mean social-emotional support scores and ratings at one week and three months after baseline than those in the control group. The experimental group also had lower mean loneliness scores at one week and three months after baseline compared to the control group, and lower mean depressive status scores at three months after baseline.
3.	Putting Life in Years (PLINY): a randomized controlled trial and mixed-methods process evaluation of a telephone friendship intervention to improve mental well-being in independently living older people (Hind et al., 2014)	<b>Design:</b> RCT <b>Participants:</b> Elderly aged 75 years and over <b>Total:</b> 39 Elderly <b>Time:</b> 12 Week <b>Follow up:</b> 15 Week after intervention	Teleconferencing 1 hour per week for 12 weeks.	Dissatisfaction focuses on a lack of face-to-face contact and shared interests or attitudes. Larger groups experience better cohesion. Interviewed volunteers (n=3) expressed a lack of clarity about procedures, anxiety about managing group dynamics, and a lack of confidence in the training and in their management and found scheduling calls challenging.
4.	Effects of a social internet-based intervention program for older adults: an explorative randomized crossover study (Larsson et al., 2016)	<b>Design:</b> RCT <b>Participant:</b> Elderly aged 61-89 years <b>Total:</b> 30 Elderly (6 man and 24 woman) <b>Time:</b> 3 Month <b>Follow up:</b> 34 Week after intervention	SIBAsb, namely social activities through social websites	Loneliness decreased significantly in both post-intervention groups, and satisfaction with online social contact increased significantly in one group. Significant treatment effects were detected for all outcomes.
5.	Activating and Guiding the Engagement of Seniors with Online Social Networking: Experimental Findings from the AGES 2.0 Project (Morton et al., 2018)	<b>Design:</b> Quasy-experiment <b>Participants:</b> Elderly aged 60 years and over <b>Total:</b> 76 Elderly (26 man and 50 woman) <b>Time:</b> 3 Month <b>Follow up:</b> 4 Month after intervention	EasyPC is a customized computer platform with a simplified touchscreen interface	Results showed significant cognitive improvement over time in the training group, but not in the control. This effect is mediated through a combination of increasing social activity, increasing self-competence, and maintaining personal identity strength. Indirect effects on mental health outcomes through this process were also observed.
6.	An Evaluation of a Low-Intensity Cognitive Behavioral Therapy mHealth-Supported Intervention to Reduce Loneliness in Older People (Jarvis et al., 2019)	<b>Design:</b> RCT <b>Participants:</b> Elderly aged 61-87 years <b>Total:</b> 32 Elderly (6 man and 26 woman) <b>Time:</b> 3 Month <b>Follow up:</b> 4 Month after intervention	WhatsApp Group Living in Network-Connected Community for low intensity cognitive behavioral therapy	There were significant changes in social cognition and loneliness levels and an increase in WhatsApp Usage. At 1 month follow-up, even with a significant reduction in WhatsApp usage, a significant reduction in loneliness was maintained. LI-CBT delivered via instant messaging may be effective in reducing the feeling of loneliness experienced by the elderly.

No	Title	Participant and study design	Intervention	Result
7.	Improving Social Support for Older Adults through Technology: Findings from the PRISM Randomized Controlled Trial (Czaja et al., 2018)	<b>Desain:</b> RCT <b>Participants:</b> Elderly aged 65-98 years <b>Total:</b> 234 Elderly (119 intervention group, 115 control group) <b>Time:</b> 12 Month <b>Follow up:</b> 12 Month after intervention	PRISM <sup>e</sup> system	The PRISMA group reported significantly reduced loneliness and increased social support and perceived well-being at 6 months. Trends are showing a decrease in social isolation. Group differences were not maintained at 12 months, but the PRISM conditions still showed improvement from the baseline. There was also improvement in computer self-efficacy, proficiency, and comfort with computers for PRISM participants at 6 and 12 months.
8.	Cognitive benefits of online social networking for healthy older adults (Myhre et al., 2017)	<b>Design:</b> quasy-experiment <b>Participants:</b> Elderly aged 75-86 years <b>Total:</b> 41 Elderly <b>Time:</b> 8 Week <b>Follow up:</b> 2 Month after intervention	Learn to use the online social networking site, Facebook.com	The Facebook groups showed a significant increase in the combined size of updating, a factor executive function associated with a complex working memory task, compared to no significant change in the control group. Other measures of cognitive function and social support did not show any distinct improvement within the Facebook group.

## DISCUSSION

The results of this study are one way to address the potential for technology-based interventions to prevent or reduce loneliness, and subjective negative feelings that can exacerbate the physical and psychological well-being of the elderly. The elderly trend to be less familiar with communication technology. This creates a lack of contact with the family. Restrictions on physical distance can lead to restrictions on emotional contact and affection if this is not handled properly (Hind et al., 2014). They will feel confined, confused, and even afraid. It is at this time that the elderly must try to learn to use communication tools to contact with relatives to reduce loneliness (Larsson et al., 2016; Hsiu-hsin Tsai et al., 2020).

Various conveniences due to technological developments that occur in the digital era, to affect human behavior. By introducing older adults to electronic devices, technology-based interventions are designed to help increase social connection and reduce loneliness (Czaja et al., 2018; Jarvis et al., 2019; Morton et al., 2018). Future studies or reviews should focus on seniors who are at high risk of experiencing loneliness in everyday life, especially those living at home or in nursing homes far from their families. In terms of intervention methods, the main intervention methods are smartphone-based video calls, computer-based training, and internet use (Jin et al., 2021). Exploring technology-based

interventions more broadly could help identify more evidence about the role of technology in reducing loneliness in the elderly. The elderly also needs effective communication with other people, especially with people they miss. Unfortunately, there is a stereotype which states that the elderly is often considered less effective in communicating because of the minimal communication process carried out by the elderly, not only face-to-face communication but also communication using mass media including the internet.

Digital technology is a communication tool that can be used by the elderly. Even though there are limitations for the elderly in accessing technology, the use of the internet, especially social media, has a positive impact on the elderly in communicating, especially in providing social support to them. Digital Technology Information (DTI) is a technology-based communication plan in care where events and interactions are designed therapeutically to increase social support, build self-confidence and increasing self-esteem in the elderly, and making the elderly feel valuable. However, the findings of several studies contradict the general view that digital technology can solve the problem of loneliness, especially in the elderly. Nonetheless, digital technologies can provide tools and means that facilitate social interaction, which can help reduce loneliness for a limited period of time because the effects of DTI are short-lived (Hsiu-

hsin Tsai et al., 2020). This is probably because digital technology does not provide real human interaction and cannot replace human contact (Anderson & Thayer, 2018; Shah et al., 2021). But by doing so, they do not reduce real-life social disconnection in the long term because communication technologies can be used at any time.

## CONCLUSION

This systematic review concluded that the evidence for the effectiveness of technology-based interventions for reducing loneliness in the elderly is uncertain. Although some of the results of this review indicate that technology-based interventions have little or no difference in reducing loneliness in the elderly. According to existing research, minimal use of technology does not hurt the elderly who experience loneliness and desire social relationships. For practical purposes, attention should be paid to the abilities, conditions, needs and resources of the elderly to determine whether technology-based interventions are an appropriate approach to reducing loneliness. Basically, technology is not a solution to reduce loneliness in the elderly, but a tool that helps them stay connected with family members, friends, neighbors, etc. and get access to information and resources.

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