# Living Noise to Combat Loneliness Amongst Older UK Adults - First Insights

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## Abstract

Loneliness is rising amongst several age groups in several countries with older UK adults being one of the affected populations. Early work from South Korea on the use of a network of social robots exchanging activity information between different households, so-called 'living noise', yielded positive results in incentivizing communication between young professionals, thereby reducing loneliness. In this short article, we report the results of a co-design workshop held with lonely, older UK adults that aimed to determine the potential of adoption of living noise transmission amongst this population. The results were encouraging and will feed into future work involving the deployment of robots and virtual avatars in people's homes.

## CCS Concepts

• **Human-centered computing** → **Human computer interaction (HCI)**; **Empirical studies in HCI**; • **Applied computing** → **Psychology**; *Architecture (buildings)*.

## Keywords

loneliness, human-robot interaction, human-agent interaction, social robotics

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## 1 Introduction

Loneliness is a growing public health and policy concern, which has been made more salient by the COVID-19 pandemic [13]. It is estimated that by the year 2026 more than 2 million older adults in the UK may suffer from loneliness [16]. Research shows that social isolation and loneliness can impact older people's health and well-being [9, 12], increasing the risk of developing cardiovascular diseases, dementia, depression, frailty, and suicidal ideation [2, 4, 6].

To reduce loneliness, social robots have been studied with older adults but these studies concentrated on the relationship between the person and the robot [7], with some reporting positive outcomes in terms of human-human communication if participants shared the same living space (e.g. [1, 14], cf.[5, 17] for reviews). Jeong et al. [8] deployed social robots to facilitate, rather than replace, human-human communication of people who lived alone. These robots transmitted *living noise* between households - information about daily activities, e.g. letting the others know that "someone was cooking" or "someone was watching TV". This passive transmission of living noise led to increased communication between participants, more in-person meetings and to a reduction in loneliness among participants. While these results were very promising, it is unclear whether this approach would work with older adults in the UK due to cultural and age differences. Lykes and Kemmelmeier point out significant cultural differences between more individualistic (e.g. UK) and more collectivistic societies (e.g. South Korea) which impacts the interventions that may reduce loneliness [11].

Building on Jeong's and colleagues' initial work, and to de-risk a larger follow-up study, the present study, a co-design workshop, aimed to (1) obtain an initial assessment of the willingness of older UK adults to consider "adopting" a social robot that acts as a transmitter of social noise and (2) identify the crucial factors determining the feasibility and potential success of deploying such robots in the homes of older adults.

## 2 Methods

Participants were recruited from the local branch of the *Compassionate Neighbours* (*CN*) project and the local neighbourhood from the first author. *CN* is a network of projects in the South of England with the aim of reducing loneliness by connecting local lonely people with each other and with volunteers. The study was approved by the University of Hertfordshire Health, Science, Engineering & Technology Ethics Committee with Delegated Authority under protocol number SPECS/SF/UH/05604(1). Given the focus on older UK adults, the recruitment flyers emphasized that participants ought to be 50 or older and ought to experience loneliness at least sometimes. Degrees of loneliness were measured via the ONS scale [3]. The full questionnaire can be accessed via OSF.

The workshop took place on the premises of Isabel Hospice in Welwyn Garden City, lasted three hours, and was held with 7 participants split into groups of 3 and 4 respectively to enable group discussions. An introduction to the topic of living noise, including a video published by Jeong et al. [8], was followed by a demo of the MiRo-E robot [15] and a show of images and explanations of the Fribo [8] and Genie Connect [10] robots. Subsequently the workshop structure followed that of the questionnaire: Participants were first asked to fill in the section on personal information. For the remaining two questionnaire sections, the organisers first read out and explained the questions for that section. Participants were then given 15 minutes to discuss those questions in their group, followed by 10 to 15 minutes where they were asked to fill in the respective section individually. During both the group and individual sessions the organisers were available to provide further explanations.

## 3 Results

***Participant characteristics.*** Six women and one man completed the questionnaire. All except one were aged over 55 years old, all white and 4 disclosed having a disability. Four reported to be[1] retired, one semi-retired, one working part-time, and one only volunteering. All lived in houses with one having assisted living support. Four participants felt lonely occasionally or often and socially isolated occasionally or often. Five lacked companionship occasionally or often. All participants used digital technology, had wireless internet and mobile phones, with one having a smartphone and six of them using social media and messenger applications.

***Preferences regarding Living noise.*** Most participants were happy to share activity information with family and friends, with only one person (P1) stating that they would share with no one. Five participants were also happy to share it either with neighbours (3) or acquaintances or other people (2). One interesting observation is that almost all of those participants scoring low on the loneliness scale (= high degree of loneliness) indicated a willingness to exchange noise with a wider group of people. The one exception was P1, who both scored low on the loneliness scale and did not want living noise to be exchanged at all.

The type of living noise participants were willing to share varied, but most frequently chosen were *watching TV* (4), *getting up* (4), and *cooking a meal* (4), followed by *entering the house*, *having a shower/bath* (3 each), and *going to bed*, *making tea/coffee*, or *leaving the house* (2 each). Most participants preferred communication to be anonymous, but with adjustable privacy levels (4). Two preferred full, non-adjustable anonymous communication followed by one person preferring only minimal privacy. One person also provided textual feedback, with a free-text comment "invasion of privacy, nothing kept private". In terms of mode of communication, most participants indicated that they would like a visual display (6), with three of them indicating that they would like speech output additionally. One person also wanted the gesture function in addition to display and speech. Only one person reported that both gesture and speech was a must.

***Preferences regarding Robots.*** Having seen MiRo-E "in person", and Genie Connect and Fribo in pictures, some participants preferred MiRo-E (2) due to its shape (like a dog, 1), as it seemed more friendly and could give someone the feeling of having a pet while others preferred Genie Connect (2). One person liked Fribo, while another did not as it was too dark in colour. In terms of additional functions, 3 participants suggested radio or the ability to play music, followed by a function to set alarms (2). Other suggestions included: suggesting phoning a friend, taking blood pressure, monitoring (non-specified), keeping diary, and give reminders. Five participants did not want the robot to be mobile (= locomote) due to it being a potential trip hazard, limited space in the home or concerns over the need for more frequent charging, while two were happy for it to be mobile. Importantly, all the participants with a disability or impaired walking ability did not want the robot to be mobile. In terms of maximum costs, three people would pay a one-time payment of £500 (2) or £2000 (1) respectively, two would pay recurring payments of £50 per month (1) or £1000 per year (1), and two people did not know. The functions that participants deemed essential varied, but most deemed the ability to make emergency calls essential (4). Other functions included radio, alarm, and connection to social media and messengers. One person wanted a guarantee if there was a maintenance charge.

## 4 Discussion & Conclusion

The major limitations of the study are the small sample size and the recruitment of a sample from two small, culturally homogeneous groups. These limitations limit the strength of our conclusions as they might not be representative. However, as an early-stage exploratory study, it has provided useful insights, and further work with a larger sample is planned. Another limitation is that the robots were presented during the workshop in a shared space, not in participants' homes.

Early indications gained from the workshop reported here are, that most older UK adults are in principle willing to host a living-noise transmitting robot. However, cost is a limiting factor, and the majority of our participants expressed the wish that the robot should support emergency calls or emergency alarms. Linked to the cost aspect is the open question whether the noise-transmitting agent needs to be a robot or whether a virtual robot avatar on a tablet would be sufficient. Future research is therefore planned involving home trials with both physical robots and virtual robot avatars to validate participants' preferences and gain first hand experience of potential effects and limitations of this technology.

[1]For space reasons, we will abbreviate "x reported to be y" with "x was y" in the following, so seemingly factual statements should be read with this additional qualification in mind.

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