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Effects of a social network enhancement intervention for older adults: a feasibility study

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Abstract

Background Social networks play a critical role in the mental health of older adults. This pilot study investigates the feasibility of a newly developed intervention to enhance older adults' social networks. This intervention was designed on the Theory of Mind's foundation and aimed to enhance older adults' social interaction motivation through theoretical explanations. Furthermore, the courses fostered more social opportunities for the participants through group-based sessions.

Methods The feasibility of this intervention was tested using a double-blind, two-arm, non-randomized grouping approach. Older individuals residing in two separate residential buildings ($n=31$, mean age = 66.81, 48% women) were divided into an intervention group ($n=15$) and a control group ($n=16$). They attended daily group sessions at a designated location and completed homework assignments. The primary outcomes of this pilot study were the feasibility of the intervention, and secondary outcomes included Theory of Mind levels and social network indicators. Additional outcomes encompassed levels of global mental health and depression.

Results All participants completed the pilot intervention and completed assessments. The primary outcomes indicated that the intervention had excellent feasibility, including compliance (attendance and homework completion rates met the standards) and satisfaction (average ratings for all items ranged from 4.47 to 5.00 on a 5-point scale). Interview results revealed that participants in the intervention group found the intervention beneficial for their daily lives and expressed a desire to participate in a formal intervention. Regarding secondary and additional outcomes, compared to the control group, the intervention group exhibited a significant improvement in emotional recognition performance of Theory of Mind. There was a significant increase in the whole network density in the intervention group. There were no significant differences in other social network indicators, global mental health, and depression levels in the intervention group compared to the control group.

Conclusions The social network enhancement intervention for older adults is feasible. This pilot study has identified several improvements in the courses and tests. It is necessary to carry out a formal course to examine the effectiveness of the intervention on social networks in older adults.

Trial registration Registration number: ChiCTR2100053779; Reg Date: 29/11/2021.

Keywords Social network, Older adults, Mental health, Feasibility, Pilot study

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Background

Research has shown that the social networks of older adults weaken with age, and social networks have been proven to be one of the critical factors affecting the mental health of older adults [1–4]. Currently, there is a lack of intervention-relevant research on the social networks of older adults. Therefore, this study attempts to find an effective intervention to enhance the social networks of older adults.

The definition of a social network is the collection of social actors and their relationships, emphasizing the interactions between individuals, which are composed of nodes and links [5]. Social networks can be divided into ego networks and whole networks [6]. Ego networks consist of a behavioral agent (Ego) and other behavioral objects (Alter), with direct connections (Ties) between the agent and objects and potential connections among objects. Whole networks utilize information regarding all individuals and their relationships within the network to construct a whole network structure and describe and explain the structural relationships within the network. Prior research indicates that the ego network size, diversity, and the mental health of older adults are closely related [2, 3, 7]. Centrality and reciprocity within the whole network have been identified as critical factors influencing the mental health of older adults [2, 8]. When individuals reach the old age stage, the social network shows a weakening trend, which has been proven to have a negative impact on the mental health of older adults.

Intervening to strengthen the social networks of older adults could be an effective means of enhancing their mental health. Presently, research on the social networks of older adults has predominantly been cross-sectional, with a lack of direct intervention studies targeting older adults' social networks. Therefore, it is necessary to investigate an intervention program to enhance the social networks of older adults. Previous studies have found that many factors affect the social network of older adults, of which the objective factors include age, educational attainment, socioeconomic status, and health conditions [9–11], which are challenging to manipulate artificially. Subjective factors open to intervention involve social motivation, social engagement, and social ability [12–14].

Theory of Mind (ToM) is an ability to understand the desires, beliefs, intentions, and other mental activities of oneself and others, allowing inferences about the intentions of others' actions [15]. This capability has significant implications for social life across the lifespan as it affects daily social interactions, social intelligence, and social ability [16–18].

Based on the above, we developed an intervention program aimed at enhancing the social networks of older adults, which is based on improving the ToM of the older adults and combined with the course explanation to enhance their social motivation, enhancing their frequency of social engagement by regular group activities, aiming to enhance the social network of older adults.

In this pilot study, our objective was to assess the feasibility of this newly developed intervention measure through compliance and satisfaction evaluations, providing information for future formal full-scale trials.

Methods

Design

This pilot study was a single-blind, 2-arm, parallel design, non-randomized trial with convenient sampling. The study was approved by the Ethics Committee of the Institute of Psychology, the Chinese Academy of Sciences (approval number: H21081), and registered in the Chinese Clinical Trial Registry (ChiCTR2100053779, 29/11/2021). We aimed to examine the feasibility of the social network enhancement intervention for two groups of older adults from a Chinese community. Moreover, we examined the effects of the intervention on social network indices, depression, and global mental health levels in the intervention group.

Participants

This study was sampled from a community in Mentougou District, Beijing. By calculating sample size based on pilot studies and referring to previous studies, a sample size of 20–30 has been chosen for the current study [19, 20]. The whole network research usually adopts the principle of non-random cluster sampling [21]. We informed the community committee staff of the inclusion and exclusion criteria. They selected two independent residential buildings with a similar number of elderly residents to form the intervention and control groups for this study, and mobilized all eligible elderly individuals as participants. All participants signed a written informed consent form prior to the activities. Inclusion criteria: (1) Age 60 and above; (2) Residents who have resided in this community for more than one year; (3) Have basic communication skills; (4) Agree to participate in the entire event and undergo testing fully. Exclusion criteria: (1) Having confirmed mental illness, cognitive impairment, or severe emotional problems; (2) Diagnosed visual, hearing, or language impairment; (3) Physical diseases with restricted mobility (including arthritis that restricts daily activities, stroke, and neurological disorders). Finally, 31 eligible older adults were recruited to participate in the pilot study, including 15 in the intervention group and 16 in the control group (see Fig. 1).

Social network enhancement intervention

The intervention consisted of in-person group training sessions led by coaches who had received standardized training, along with after-class exercises completed

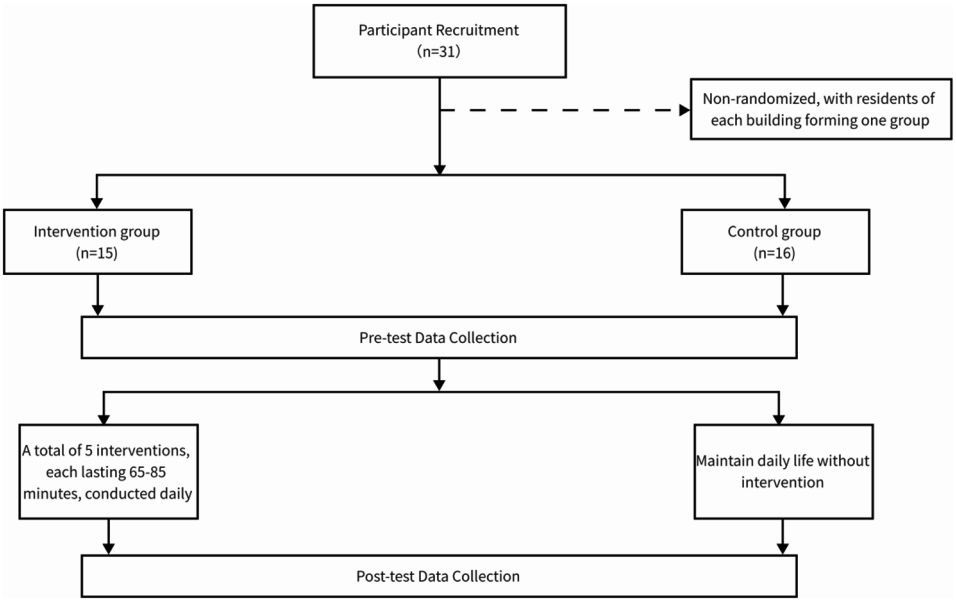

Fig. 1 Flow diagram of the study

as homework. Participants in the intervention group received 12-session social network enhancement program, with one session held weekly., which included two sessions for an introduction to the course, two sessions for social emotion recognition, six sessions for social cognition, one session for review, and one session for course summary (see Table 1). Each face-to-face session lasted 60 to 90 min. The control group maintained their usual daily activities without receiving any intervention.

This study's intervention approach utilized the concept of Social Cognitive Intervention Training (SCIT), which delineated social emotion recognition and social cognition as two primary components [22]. Given the potential decline ToM among older adults [23, 24], we reduced the emphasis on emotional perception training while amplifying social cognition interventions. We recorded video demonstrations and case analyses relevant to older adults' experiences, such as "Mrs. Wang's Dislike for Medical Check-ups" and "My Granddaughter's College Entrance Exam." Throughout the sessions, we integrated theoretical explanations of social networks and mental health to comprehensively enhance older adults' ToM and motivation for social interaction, thereby strengthening their social networks.

Furthermore, we designated the older adult with the highest in-degree centrality (popularity) as the group leader, responsible for reminding participants to attend classes on time, assisting with homework, and encouraging participation during group interactions to enhance the intervention's effectiveness.

The intervention comprised 12 face-to-face group sessions supplemented by homework assigned at the end of each session for older adults to practice. A psychology graduate student with qualifications in psychological counseling led the teaching, supported by another psychology graduate student serving as a teaching assistant. Prior to the intervention, the graduate students underwent training based on a standardized manual we developed and conducted at least two trial sessions to ensure the duration and completeness of the course. The course began with two introductory sessions focused on group formation, setting course objectives, and fostering familiarity among members. This was followed by ToM enhancement training, which included two sessions on social emotion recognition and six sessions on social cognition. In the 11th and 12th weeks, we conducted comprehensive exercises to review the learned material and engage in advanced activities, such as role-playing scenarios and sharing personal insights from the entire course.

Each session followed a structured design that included four components: homework sharing, theoretical introduction, discussions and exercises, and homework assignments. To ensure the completeness and uniformity of each session, we developed the 'Social Network Enhancement Intervention Manual,' which included the overall structure and verbatim scripts for each session's content. At the beginning of each session's outline, there was an evaluation form to be monitored and completed by the teaching assistant. This form recorded the duration and completion status of each section. If a section was not completed as planned, the instructor was required to provide an explanation in the 'Incomplete' section, facilitating post-session evaluations of course quality. For specific course details, refer to Table 1.

Table 1 Outline of the training courses

Week	Objectives	Title	Content	Homework
1	Group building	Welcome session	• Introduce group settings • Introduce instructor, the teaching assistant, and group leaders • Use small games to help classmates in the same group remember each other's names	Build new friendships within your community and gain insights into their lifestyles and habits.
2	Course introduction	Let me into your heart	• Introduction to social network and mental health • Overview of the overall course structure	Discuss life events with residents outside the group.
3	Social emotional recognition	How are you feeling now?	• Introduction to social-emotional recognition • Recognizing basic emotions and facial expressions	Chat with family or friends and experience emotions.
4		Have a guess	• Introduction to the four quadrant theory of emotions • Facial expression mimicking game	Scene reading and emotional imagination.
5	Understanding and Identifying "Jump to conclusion"	Seeing is not always believing	• Using games and videos to introduce the concept of "Jump to conclusion"	Discuss life events with friends and record them.
6		Distinguish between facts and conjecture	• Discussing "Jump to conclusion" in everyday life scenarios • Identify facts and conjectures in life events through games	Observe life events and provide comments.
7		Nonchalant Mrs. Li	• Understanding the Multiple Attribution Theory through games and videos	Practice empathy with friends.
8		There is not just one answer	• Review "Jump to conclusion" and recognition methods through video and live performance systems	Discuss life events with friends and record them.
9	Social Cognitive Rules	The world on the other side of the kaleidoscope	• Helping older adults understand and master social cognitive rules, convenience rules, and symbolic rules through explanations, games, and videos	Discuss life events with friends and record them.
10		Be a rational judge	• Helping older adults understand and master basic proportion information, as well as anchoring and adjustment rules, through explanations, games, and videos	Rehearsing a scene play with fellow group members.
11	Comprehensive practice and review	In unity, there is strength	• Comprehensive review • Participants create their own social network-related scene plays and engage in discussions	Engage in themed conversations with family and friends.
12		Looking forward to meeting again	• Comprehensive review • Sharing and discussing individual social challenges encountered • Graduation ceremony	Write graduation wishes for fellow group members.

Homework activities included meeting new friends in the community, discussing specific social topics with family members, and engaging in conversations related to course content. Participants shared their homework during the next class, followed by group discussions.

Feasibility study

We selected the most critical five sessions from the entire course (including one session on group building, one on social-emotional recognition, and two on social-cognitive training, with one review session) as the pilot study course. The structure of each session remained unchanged. The course duration and the participants' composition were identical to the formal intervention. During the pilot phase, a control group was set up with older adults residing in one building that did not receive any intervention and maintained their regular daily routines.

Feasibility monitoring and quality assurance

Throughout the course, the instructor and assistant continuously monitored any potential risks to the participants' physical and mental health. After the courses, the feasibility of the intervention course was assessed using two indicators: compliance and satisfaction, which were measured through questionnaire surveys, attendance records, and completion rates of homework assignments. Participants' subjective satisfaction with the pre- and post-test questionnaires was evaluated, and their acceptance of the course content was examined through interviews.

The quality of the study was continuously monitored throughout all stages of data collection and the entire intervention implementation. The study followed the standardized intervention manual procedures meticulously, including the duration of each session, coaching instructions, multimedia aids (videos), game materials, and worksheets in the classroom. Coaches and assistants summarized the progress of each week's session to monitor the quality and progress of the intervention.

Safety considerations

This study carried low risk since it involved enhancing the social networks of older adults through group activities, lecture sessions, and post-class exercises, constituting a non-pharmacological intervention. Although

serious adverse events were not expected, we continuously monitored any potential incidents during each group session. The group coaches were trained professionals, and a standardized intervention manual was provided with methods to address any potential adverse events, thereby ensuring the safety of the intervention to a large extent.

Measurement

Demographics and background factors: A self-designed questionnaire was used to collect demographic information from the participants, including age, gender, years of education, socio-economic status (annual income of themselves or their spouses, and the scoring method was as follows: 1 for annual income less than 5,000 Yuan, 2 for 5,000–10,000 Yuan, 3 for 10,000–30,000 Yuan, 4 for 30,000–50,000 Yuan, 5 for 50,000-100,000 Yuan, 6 for more than 100,000 Yuan.) (Note: 1 Yuan approximately equal to 0.14 US dollars), and number of children. The background factors assessed were subjective health state and social participation. The physical health status ("How would you rate your health condition?") of the tested 6-point Likert scale was 1 as "very good" and 6 as "very bad." Social participation comprised five items: (1) Communicating and chatting with people, (2) Playing card games, (3) Engaging in group fitness or dancing, (4) Participating in collective activities, (5) I was joining volunteer groups. Scores for the frequency of social participation ranged from 1 (rarely or never) to 5 (almost every day). The total score ranged from 5 to 25, with higher scores indicating a higher frequency of social participation.

Primary outcome

Feasibility. The feasibility was measured by compliance and satisfaction with the intervention. According to previous studies [25–28], compliance was measured through the following criteria: (a) attendance rate. At least 80% of the subjects' attendance rate reached 80% to meet the standard; (b) homework completion. At least 80% of the subjects completed 80% to meet the standard. Satisfaction was assessed through a 5-point Likert scale questionnaire, which includes overall satisfaction, helpfulness in daily life, course enjoyment, knowledge acquisition, perceived safety, possibility of recommending to others, and willingness to participate in formal interventions [29–32]. Additionally, an open-ended interview was conducted to inquire about the participants' gains from the intervention and their suggestions for the course.

Secondary outcomes

Theory of Mind. The emotional component of the ToM was measured using the Mental State Reading Task in the Eye Task; the Faux Pas task measured the cognitive component of the ToM.

The Mental State Reading Task required the participants to choose one of the four alternative words that best reflected the character's psychological activities according to the eye area pictures (34 in total, 17 for men and 17 for women). These alternative words were selected based on the original research's vocabulary list and were annotated regarding the "Modern Chinese Dictionary" (7th edition). The 34 eye area pictures were the localized and assessed Asian face pictures [33], with a score range of 0–34 points. The higher the score, the better the emotional recognition level.

The faux pas task was used to measure the participants' social cognitive ability in ToM [34]. For this task, Baron-Cohen's open-source repository was adopted. To ensure compatibility with the habits of older adults in China, original foreign names were replaced with more common names among Chinese older adults without changing the basic meaning of the story. The ten stories (five faux pas and five control stories) were randomly shuffled and read to participants. If the participant did not understand the content of a story, the story was repeated until they understood. The stories in the pre-test and post-test were different and randomly selected. Faux pas stories were scored, and control stories were not scored. After each story, the participants were asked six questions, which individually assessed the participants' abilities to perceive Faux Pas situations, understand the Faux Pas scenarios, comprehend the mental states of both the listener and speaker, grasp the intentionality of the behavior, and evaluate empathetic abilities. The score range for the Faux Pas Task is 0–30 points, with higher scores indicating better cognitive levels of ToM.

Social Network. The interview method was used to collect the participants' ego network and whole network information, respectively. The following questions were posted for ego network interviews: (1) Contact (face-to-face or remote) at least once a month on average; (2) People/organizations that are emotionally/physically important to you. There was no upper limit for nominations, and the size of an ego network was the number of nominations. Diversity refers to the statistics of different types of social relationships, including core and extended family members, friends, and community organizations [35].

For the whole network interview, we listed a list of all the older adults aged 60 in the village who participated in the interview. Participants were asked to select whether they considered each person on the list a "friend." The term "friend" was operationally defined as meeting the following criteria: (1) Having contact with the person at least once a week, and (2) Having emotional recognition and liking for each other. Subsequently, participants

were asked to make their selections based on this definition. The calculation of whole network metrics included in-degree centrality, which represents the number of older adults chosen as friends by others, reflecting the popularity of the older adults, and reciprocity, which indicates the number of mutual friendships. Since this study involved two communities, all whole network metrics were standardized. To explore the effects of the whole network structure, we also calculated the density of the whole network for both groups before and after the intervention. For specific ego and whole network metric details, please refer to Table 2.

Additional outcome

Mental Health. We used the Mental Health Inventory for the Elderly (MHIE) to assess participants' global mental health levels. This MHIE scale consists of 65 items, measuring older adults' global mental health status across five dimensions: cognitive efficacy, emotional experience, self-awareness, interpersonal interactions, and adaptability. The scale uses a 4-point Likert scoring system (1=totally disagree; 4=totally agree), with higher scores indicating better global mental health [36]. To assess the participants' emotional state, we employed the Center for Epidemiologic Studies Depression Scale (CES-D). The scale uses a 4-point Likert scale (1=rarely or not at all/less than one day, 4=most of the time/5–7 days), with higher scores indicating more severe depression [37].

Table 2 Measurement, definition, and Scoring Scope of Social Networks for the participants

	Network Variable	Definition	Measure	Scoring Scope
Ego network	Size	The total number of members in the ego network	nomination	0-
	Diversity	Different social relationships (core/extended family members, friends, community organizations)	self-reporting categorization	0–4
Whole network	In-degree centrality	Number of participants who nominated he/she as a friend (standardized)	nomination	0–1
	Reciprocal ratio	The number of participants who mutually select each other as friends (standardized)	nomination	0–1
	Density	The ratio of the actual number of ties to the total possible number of ties	nomination	0–1

Data collection

Data collection was conducted simultaneously in two residential buildings. Individual interviews were conducted to assess demographic information, course satisfaction, and social network indicators. The pre-test was completed within one week before the intervention began, and the post-test was completed within one week after the intervention ended. The study was designed as single-blind. Teaching assistants recorded attendance and completion of homework, while trained researchers collected participants' ToM scores through standardized tasks. Participants' global mental health levels were assessed through self-evaluation.

Considering issues related to the visual acuity of older people and their acceptance of electronic devices, data in this study were collected through paper-based questionnaires. Trained graduate students conducted the data collection process, and data input was completed using Epidata software.

Analysis

Descriptive statistics for baseline data and the analysis of differences in mental health indicators before and after the intervention for the two groups were conducted using SPSS 22.0. The general characteristics of the participants were analyzed using independent sample t-tests and chi-square statistical methods, repeated measures analysis of variance was used to analyze the participants' ToM scores, and the chi-square analysis was used to compare the whole network density between two groups before and after the intervention.

All outcome variables were analyzed at the 0.05 α level. The whole social network centrality and reciprocity were analyzed using UCINET software. Feasibility records and interview findings related to the intervention were presented in tabular form.

Results

A total of 31 participants from two residential buildings in the community who met the inclusion criteria were included in this pilot experiment. Fifteen participants from one building were assigned to the intervention group, while sixteen from the other building were assigned to the control group. The basic characteristics of the participants are presented in Table 3. There were no significant differences between the two groups at baseline regarding gender, age, years of education, socio-economic status, self-rated physical health status, and social participation.

Study feasibility

Compliance

Both indicators reflecting participants' compliance reached acceptable standards. In terms of attendance,

Table 3 The general characteristics of the participants

	Intervention group ($n=15$)	Control group ($n=16$)	X^2/t	*p*
Age	66.33 ± 6.03 Range: 60–80	67.25 ± 5.03 Range: 60–80	−0.461	> 0.05
Gender	8 females (53.3%)	8 females (50.0%)	0.034	> 0.05
Years of education	6.20 ± 3.10	7.44 ± 2.63	-1.201	> 0.05
Socio-economic status	4 (80.0%)	4 (56.3%)	2.899	> 0.05
Number of children	2.00 ± 0.54	1.81 ± 1.05	0.621	> 0.05
Physical health	2.60 ± 1.12	2.13 ± 0.96	1.271	> 0.05
Social participation	7.26 ± 4.59	6.75 ± 2.74	0.383	> 0.05

Values are expressed as mean ± standard deviation or n (%)

Socio-economic status is presented using the mode

a total of 11 participants completed all five intervention sessions, while 4 participants completed four sessions. Regarding homework completion, 8 participants completed all five assignments, 4 completed four assignments, 1 completed three, and 2 completed two assignments.

Satisfaction

All participants assigned to the intervention group responded to the satisfaction survey. The average ratings for overall course satisfaction, help in daily living, interest in the course, knowledge acquisition, safety, possibility of recommending to others, and willingness to participate in formal interventions were 5/5, 4.8/5, 4.8/5, 4.5/5, 5/5, 4.5/5, and 4.8/5, respectively (Table 4). Additionally, we received no reports of adverse events related to the intervention.

Interview

After the intervention, the participants in the intervention group were interviewed. The results showed that five people believed that the most helpful content obtained during the intervention was "aware of the existence of jump to conclusion", 3 participants believed the intervention helped them "communicate better with others", 2 people believed that the intervention course could "relieve and adjust their mood", 2 participants reported they were " more willing to ask others for help when they encounter difficulties" after the intervention, and 1 participant thought the intervention helped them "change irrational thoughts in social interactions". All participants unanimously agreed that there was no "least useful aspect" of the intervention. During the interview, 9 participants expressed a desire for more interventions, 2 expressed high satisfaction with the intervention, and 4 had no further comments.

Table 4 Feasibility (compliance and satisfaction) of this study

Compliance				
	Index	**Assessment method**	**meeting the standard or not**	**Specific results**
Attendance	At least 80% of the participants achieved an attendance rate of 80% or higher.	counting using attendance sheets	Yes	11 participants completed 5 interventions, while 4 participants completed 4 interventions
Homework	At least 80% of the participants achieved a completion rate of 80% or higher.	counting using paper-based homework	Yes	All 8 participants completed the study; 4 participants completed it 4 times; 1 participant completed it 3 times; and 2 participants completed it 2 times.
Satisfaction				
	Mean(SD)		**Range**	
Overall satisfaction	5.00 (0.00)		5–5	
Help in daily living	4.80 (0.41)		4–5	
The interest of the course	4.80 (0.56)		3–5	
Knowledge acquisition	4.53 (0.52)		4–5	
Safety	5.00 (0.00)		5–5	
Possibility of recommending to others	4.47 (1.06)		1–5	
Willingness to participate in formal interventions	4.80 (0.56)		3–5	

Theory of mind

After controlling for variables including age, gender, and years of education, and socio-economic status, and number of children, the participants in the intervention group showed a significantly greater improvement in faux pas task performance (F [1, 23]=7.737, p=0.011, partial η^2=0.252) compared with those in the control group. An increasing trend of Mental State Reading Task scores in the two tests was found for the intervention arm, while for the control arm, the scores were unchanged from the pretest to the posttest.

Social network and mental health

No significant group × Time interaction were found after controlling for control variables (ps>0.05) for the size and diversity of ego networks. Additionally, no significant interaction was observed in the whole network's in-degree centrality and reciprocity indicators (ps>0.05). However, a significant improvement was evident in the whole network's density indicator in the intervention group compared with the control group (X^2=23.12, p<0.001) (refer to Fig. 2). There were no significant alterations in mental health levels, including global mental health and CES-D scale scores (ps>0.05).

Discussion

This pilot study represents the first attempt to implement social network enhancement intervention among older adults in Chinese communities. The intervention was based on ToM and utilized a combination of theoretical explanations and group activities, aiming to intervene simultaneously in older adults' ego and whole social networks. The primary outcomes of the pilot study indicated that this intervention training was feasible and acceptable.

A total of 31 participants were recruited in the two groups of the pilot study. After completing five sessions, no participants dropped out of the posttest, which can be attributed not only to the inherently short duration of the pilot study but also to the unique nature of the whole network intervention, which required group sampling. In the case of cluster sampling, the residents of a single building were invited to participate in the intervention. Although they might not have had close friendships, a sense of collective participation was fostered, potentially increasing attendance and compliance with the intervention.

It should be noted that in the satisfaction interview, one participant rated a 1 in the "recommending to others" option. Subsequent inquiry revealed that this participant considered herself introverted and tended to play a more passive listening role in social interactions. Therefore, she was not inclined to actively recommend the courses to others, which does not reflect the courses' quality.

In terms of ToM indicators, it was evidenced that the intervention group showed a slight improvement in ToM levels after five intervention sessions compared to the control group. This finding was consistent with previous research, suggesting that ToM in older adults can be enhanced through intervention. However, the reading performance of the Mental State Reading Task was not significantly improved as that of the Faux Pas task. This discrepancy might be attributed to the course design itself, that is, the reduction in the frequency of emotion recognition sessions and the increase in social cognition sessions. The pilot study also followed this proportionate design. This result indicated that the intervention demonstrates good efficacy.

On individual participants' social network indicators, neither ego nor whole network significant improvements were observed, and no significant changes were found in mental health levels before and after the intervention, which may be due to the short duration of the pilot study. It is important to note that this study was a pilot study intended to evaluate feasibility, with no intention

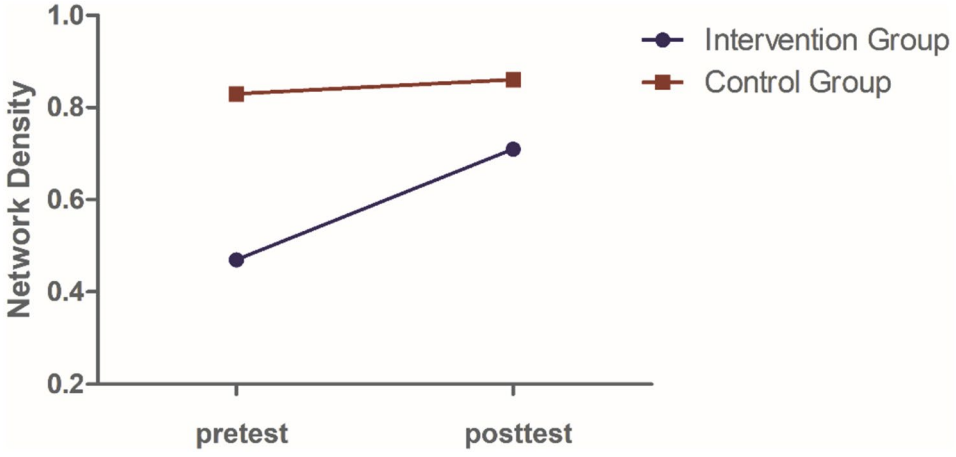

Fig. 2 Whole network density change in the intervention and control groups

or motivation to assess effectiveness [38]. Nevertheless, in terms of whole network density, it was observed that the intervention group exhibited a significant increase in proportions compared to the control group after the intervention, indicating certain social network enhancement even within the short five-session duration.

Furthermore, their opinions regarding the overall course design were solicited after interviews with the intervention group participants. After the summary, we found several areas for improvement: (1) The case-sharing segments could incorporate more real-life stories to make the program more engaging; (2) Homework should be designed as closed-ended questions with reduced complexity to facilitate writing and summarization for older adults; (3) Ambiguous parts of the Faux Pas stories in the pre and posttests should be replaced with more appropriate wording. For example, one of the stories includes the content, "Uncle Li is going to the store to buy wild pheasants." Wild pheasants are classified as a national second-grade animal under state protection in China. Some participants in the pilot study perceived trading wildlife as unreasonable rather than considering the manner of communication as unreasonable. So, it can be replaced with "roast duck" in the original story.

Limitations

This study has some notable limitations. Firstly, due to its pilot nature, the group activities were conducted at specific locations, resulting in a potential sampling bias. Additionally, only participants free from severe illnesses and able to engage in daily activities were included, thus excluding those older adults who are unable to partake in such activities (with mental illnesses and physical mobility impairments). Furthermore, the sampling method used in this study was limited, as considering an individual building as a group does not accurately represent the wider network. To remedy this, future research should be conducted at a community level. Thirdly, this pilot study was based on a small sample size, and thus a more formal intervention with a larger sample size and a longer duration is needed to ascertain its effectiveness. Finally, the sample in this study predominantly consisted of younger older adults, with relatively few participants aged 75 and above (only a total of 3). This limitation affects the generalizability of the findings. In subsequent formal intervention, we will strive to select communities with a broader age range of elderly individuals to enhance the representativeness of the study population.

Conclusions

In this pilot study, we demonstrated the feasibility of a newly developed social network enhancement intervention for older adults. This intervention is delivered as group sessions to older residents living in Chinese communities. Based on the results of the pilot study, we believe that this intervention holds potential for enhancing social networks and mental health and can be further validated for its effectiveness through formal intervention.

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Author contributions

JF was responsible for the design and implementation of the pilot study, as well as the main writing of the manuscript. ZZ was responsible for revising the manuscript and monitoring the quality of the data. BZ mainly handled the data collection and assisted the whole intervention. RG and NK were responsible for data analysis. XL contributed to part of the writing and the revision of the manuscript. JL designed the intervention courses, supervised the data analysis process, and contributed to writing the manuscript. All authors participated in the editing process of the manuscript and agreed on the final version.

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Data availability

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Declarations

Ethics approval and consent to participate

The study was approved by the Ethics Committee of the Institute of Psychology, the Chinese Academy of Sciences (approval number: H21081), and registered in the Chinese Clinical Trial Registry (ChiCTR2100053779, 29/11/2021). All participants signed formal informed consents before the start of the study.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

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