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International Journal of Nursing Sciences

journal homepage: <http://www.elsevier.com/journals/international-journal-of-nursing-sciences/2352-0132>

Original Article

Acceptability and feasibility of public square dancing for community senior citizens with mild cognitive impairment and depressive symptoms: A pilot study

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ARTICLE INFO

Article history:

Received 11 May 2021

Received in revised form

28 June 2021

Accepted 18 August 2021

Available online 2 September 2021

Keywords:

Aged

Depression

Exercise movement techniques

Mild cognitive impairment

Public square dancing

ABSTRACT

Objectives: To explore the acceptability and feasibility of public square dancing among community residents with mild cognitive impairment (MCI) and depressive symptoms.

Methods: This mixed-method study consisted of a quantitative and a qualitative phase. From January to July 2018, a total of 241 community-dwelling senior citizens who complained of memory loss in one community in the Haidian District in Beijing were approached and screened, and 41 qualified for the study. Among them, 35 senior citizens participated in the public square dancing intervention. By the end of the three-month follow-up, 31 senior citizens completed the whole study. The Subjective Exercise Experience Scale (SEES) was used to survey senior citizens at the end of the three-month public square dancing intervention and follow-up to measure the participants' subjective exercise experience. Then 15 senior citizens were interviewed to collect attitudes, opinions, and suggestions related to the intervention.

Results: During the intervention, 90.6% of senior citizens met the requirement for defined hours. All senior citizens continued to dance at the three-month follow-up, and 32.3% met the requirement for defined hours. The scores of psychological well-being (11.03 ± 2.82 vs. 14.87 ± 3.93 , $P < 0.001$) and fatigue ($11.00 [8.00, 12.00]$ vs. $14.00 [9.00, 18.00]$, $P < 0.001$) increased at the end of the three-month follow-up. Qualitative research results extracted four major themes: increased confidence and a sense of accomplishment; easy to learn, close to real life, and sense of belonging; promotes physical and mental health; future expectations include music selection, reduced weather disruption, and self-organizing workouts.

Conclusion: Public square dancing proved to be an acceptable, viable, and valuable intervention for MCI residents with depressive symptoms, which could be carried out by nursing staff in the community. Future studies should consider the appropriate population, intensity, and frequency of public square dancing and its effect on specific cognitive functions.

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What is known?

- Senior citizens with mild cognitive impairment (MCI) often have depressive symptoms, which can accelerate the progress of MCI to dementia.

- Exercise interventions have been demonstrated to help improve the cognitive function of MCI senior citizens. Dance intervention has been shown to effectively prevent and delay the progression of MCI in the general elderly population.

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Peer review under responsibility of Chinese Nursing Association.

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What is new?

- The present study showed that public square dancing is a feasible and acceptable intervention among MCI residents with

<https://doi.org/10.1016/j.ijnss.2021.08.005>2352-0132/© 2021 The authors. Published by Elsevier B.V. on behalf of the Chinese Nursing Association. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

depressive symptoms. It can be carried out by nursing staff in the community.

- In addition to the improvement of psychological well-being, public square dancing increased overall health and physical coordination. Also, it was conducive to decreasing depressive symptoms through enabling more interaction with peers.

1. Introduction

Mild cognitive impairment (MCI)—an intermediate stage between the cognitive changes of normal aging and early dementia—has received attention as it is an important and appropriate stage to take steps to prevent dementia [1]. Psychiatric symptoms, such as depression, anxiety, and apathy [2], are often found among patients with MCI, with depressive symptoms being the most commonly identified [3]. A recent meta-analysis revealed an almost 30% incidence of depressive symptoms among patients with MCI [4] and emphasized that depressive symptoms accelerated the progression of MCI to dementia [5]. Therefore, MCI patients with depressive symptoms should receive particular attention [6].

The effects of exercise interventions among patients with MCI have been demonstrated [7]. Exercise interventions, including aerobic exercise [8], resistance exercise [9], Tai Chi [10], and yoga [11], have benefits for global cognition, executive function, attention, processing speed, and delayed recall. However, some exercise interventions, such as running, swimming, and riding a bicycle, are physically too demanding for some senior citizens with MCI because such activities set high requirements for the physical condition [12]. Meanwhile, the safety of such exercises should be seriously considered, and the cardiorespiratory function of the elderly citizens should be assessed carefully before participation. Other forms of exercise, such as Tai Chi and yoga, are individualized and mindful, but it can be difficult for some senior citizens to follow them long-term. Therefore, there is a need to explore safe, easy to manipulate, and enjoyable to be followed consciously and voluntarily.

Recent studies have shown that dance interventions may be more effective in preventing and delaying the progression of MCI [13–15]. By combining the merits of physical exercise, music, and artistic, social interaction, dance interventions may also reduce anxiety and depression. Zhu et al. [14] showed the effect of a moderate-intensity aerobic dance routine on cognitive function in patients with MCI. Among the types of dance interventions [13,16,17], public square dancing distinguishes itself for its wide acceptability and popularity among the general population of older adults, especially in China [18]. In Wang's study carried out in a large nursing home, through a 12-week public square dancing program, participants showed significant improvement in cognition, mood, balance, and quality of life in MCI. Embodying the beauty of Oriental traditional culture, the self-entertaining, group-based, and form-diverse public square dancing is easy to learn, economical, and requires few equipment or facilities. Therefore, it is regarded as a viable intervention method that can be used by community nursing staff in developing countries like China. Previous studies have shown that it delays cognitive decline among older individuals [19] and alleviate depressive symptoms in older women and adults living alone [20]. However, no study has explored the feasibility of public square dancing in MCI individuals with depression who live in the community, where most potential patients live. Therefore, we investigated whether public square dancing could be carried out among MCI patients with depressive symptoms and how community-dwelling patients view such an intervention.

2. Methods

2.1. Study design

We used a mixed-method approach with two distinct but linear phases: quantitative and qualitative. The first phase employed the quantitative research method. Subjective exercise experience of the participants was measured via a questionnaire at the end of the three-month intervention and the three-month follow-up, and a pre-post-intervention study design was adopted. The second phase used the qualitative research method. Focus group interviews were carried out to collect the attitudes and opinions toward and suggestions for the intervention. The research team consisted of five members, one from clinical practice in neurology nursing, one from community nursing, one from nursing education, and two graduate nursing students. The team leader oversaw the overall design and quality control, and the other four members were responsible for research coordination, participant recruitment, implementation of the intervention, data collection, and analysis.

2.2. Ethical consideration

The ethics committee approved the study protocol of the Chinese university (registration number: S2016025003). Before the initiation of the study, the aims, processes, possible benefits, and risks were explained to each participant by the researchers. All of the participants were informed of their right to withdraw at any time during the study. Written informed consent was obtained from each participant.

2.3. The first phase

2.3.1. Participants

Screening of the qualified participants was done through the questionnaire. The study site was in the Tiancun Community, Haidian District, Beijing, China. Advertisements were posted on the bulletin board of the community health center. All community residents aged 60–85 years who complained of memory loss were qualified and welcomed for cognition screening at the community health center.

Considering that no relevant studies were exploring the effectiveness of public square dancing and that the purpose of this study was to test the feasibility and acceptability of public square dancing, no sample size formula was ideal for the present study. Therefore, considering the time and funding available for the study, the minimum sample size of the quasi-experimental study was intended (30 individuals). Taking into account a 20% drop rate, the sample size was expanded to 35 persons.

They were assessed by the following methods: Activities of Daily Living (ADL), Montreal Cognitive Assessment (MoCA-P) for cognition screening, and Geriatric Depression Scale (GDS-30) for depression assessment. After the initial screening, at-risk MCI senior citizens with depressive symptoms outside the normal range were selected for further diagnosis. For the classification of MCI, cut-off points were set according to the individual's age, that is, >25 for 60 to 79-year-old individuals, 21–24 for 80 to 89-year-old individuals, and 19–23 for individuals aged 90 years above. For the assessment of depression, depression was screened if the total score was 11 or more. Further diagnosis of MCI followed the MCI diagnostic criteria of the Alzheimer's Association Chinese. It was determined by a licensed neurologist with more than five years of clinical practice in a top-grade general hospital in Beijing. Based on the results of the cognition and depression assessment, a face-to-face interview was conducted by the neurologist to determine whether the participant met the criteria or not. Then, community

individuals meeting the following criteria were eligible for the intervention: a) age between 60 and 85 years; b) diagnosis of MCI; c) GDS-30 rating >10. The exclusion criteria were as follows: a) diagnosis of depression or schizophrenia; b) chronic cardiovascular or cerebrovascular disease that did not allow moderate-intensity exercise; c) participation in other clinical trials; d) disabilities, including deafness, blindness, or severe language barriers, which posed significant challenges for communication and exercise; e) use of medications that may improve cognitive function or emotion in the past six months; f) regular participation in other professional or rehabilitation programs, such as Tai Chi, yoga, public square dancing, and psychotherapy.

2.3.2. Intervention

The General Administration of Sport of China issued 12 sets of public square dancing designed by sport experts in 2015. All of the sets of public square dancing were mild to moderate in intensity and suitable for older adults. Three sets of public square dancing with the older adults' favorite music as the background music were selected: *Happy Dance*, *Little Apple*, and *Proud Builder*. Each dance consisted of five sections, including head rotation, upper limb swing, shoulder movement, chest expansion, and lower limb movement, which required most of the body to move. First, two researchers (one community nurse and one graduate student) learned these three public square dancing under the guidance of a dance coach with the national public square dancing coach qualification certificate. Then, the two researchers taught the participants in the group and offered individual advice on the dance steps whenever needed.

The teaching process was carried out in the first two weeks of August, twice a week, from 16:00 to 17:00 on the day of the intervention. To avoid noise pollution and disturbance of residents, dance was carried out near the flower bed at the center of the community, and the sound was controlled at a moderate level. At the end of the teaching session, the coach and the two researchers assessed whether the participants learned the dances. All of the participants danced in the group, and the coach taught those who failed to keep up with the rhythm and pace again to ensure that all participants could dance correctly. Heart rate was measured during the exercise using the instant heart rate measurement approach (Xiaomi wearable device) to ensure that the heart rate reached 60%–70% of the maximum heart rate. Then, the low and medium intensities of the public square dancing movements were classified.

Following the initial two-week public square dancing instruction, the routine public square dancing intervention was initiated. The intervention lasted for three months, from mid-August to mid-November 2018, at a frequency of three times a week for 60 min each time. The first 5 min were used to warm up, followed by 45 min of public square dancing movements with the three sets chosen in turn, and then 10 min of cooling down. The public square dancing intervention was scheduled for 16:00 to 17:00 on Monday, Wednesday, and Friday each week, based on the participants' living habits and daily routine. If participants participated in less than 80% of the total hours, they did not meet the required hours for the study and were excluded from the final analysis. To encourage more participation, one participant with high involvement and good performance was selected as the leader after the first two weeks of the public square dancing. The leader volunteered and had the duty to coordinate, remind, and encourage the participants to engage in the activities.

The participants were advised to wear loose sweatpants and trainers during the public square dancing sessions for safety. Chocolate, biscuits, and candies were available in the event of hypoglycemia. In addition, the participants were provided with instant heart rate monitors to measure and ensure a safe heart rate.

2.3.3. Data collection

A self-developed questionnaire was used to collect general information from the participants. Demographic data, such as age and marital status and sports and social activities, were obtained at the beginning of the intervention. The Subjective Exercise Experience Scale (SEES) developed by McAully and Courneya [21] was employed to measure the participants' subjective experience at two time points: at the end of the three-month public square dancing intervention and three months after the intervention. This 12-item instrument assesses competency from three dimensions—psychological well-being (four items), psychological distress (four items), and fatigue (four items)—which are scored separately. The items are rated on a seven-point scale, with 1 indicating *not at all* and 7 indicating *very much so*. Each dimension of the scale is scored separately, and a higher psychological well-being score signifies a better subjective experience, whereas a higher psychological distress and fatigue score indicates a negative experience. The homogeneity reliability of the three subscales is 0.863, 0.801, and 0.826, respectively, and the test-retest reliability of the scale is 0.825 [22]. The SEES got issued during the last intervention of the three-month public square dancing and collected at the spot. Three months later, SEES was issued and collected again in appointed time in the community office.

2.3.4. Data analysis

Quantitative data analyses were performed using SPSS version 20.0. First, the normality tests were performed. Second, descriptive statistics were used to analyze the participants' characteristics and their scores. Then, a paired-sample *t*-test or Mann-Whitney *U* rank-sum test was used depending on the data type to examine the differences in subjective experience at the end of the intervention and the three-month follow-up. The significance level for all comparisons was set at $P < 0.05$.

2.4. The second phase

2.4.1. Participants

At the last week of the three-month follow-up, the participants who remained in this study were asked to volunteer to participate in the focus group interview. A total of 15 participants were engaged in the focus group interview.

2.4.2. Data collection

The researchers moderated focus group interviews during the last week of the three-month follow-up. The interview questions were as follows. a) What is your attitude toward the public square dancing intervention? Is it acceptable? b) What are your opinions and comments on public square dancing after six months of the public square dancing experience? Do you think it has changed your personal life? c) What do you get, or how have you benefited from the public square dancing? d) Do you have any suggestions for the future of public square dancing?

The two interviews were assessed based on data saturation and were conducted in an office at the community center at a pre-determined time. After obtaining permission from the participants, the interview was recorded using a voice recorder. The time length of each interview depended on the saturation of information. The duration of each interview was limited to 30–50 min. To ensure the rigor and trustworthiness of the interview, we adopted several measures. First, one researcher conducted the interview, while the other two researchers observed and recorded the participants' body movements and facial expressions to collect all-round information. Second, timely reflection was held to reflect on the process and possible bias of the interview to ensure that the data truly reflected the views and opinions of the participants. Also, the

saturation of the data was determined by the interviewer and observers together. Similarly, the interview data were analyzed by two coders independently, and whenever there was a discrepancy between the coders, a conclusion was reached through discussion.

2.4.3. Data analysis

Qualitative data from the interviews were analyzed by content analysis using the seven-step analysis of Colaizzi, which included the careful reading of the interview records, extracting meaningful descriptions, encoding repeated ideas with special significance, summarizing the views after coding, making a comprehensive and detailed description, distinguishing similar views, summarizing and sublimating the theme concepts, and returning to participants for verification.

3. Results

3.1. The first phase

3.1.1. The flow of the study

From January to July, a total of 241 community-dwelling senior citizens were approached and screened, and 41 qualified for the study. Among them, 35 senior citizens participated in the public square dancing intervention. One participant withdrew to join another sports group during the three-month interval (mid-August to mid-November), and two participants failed to meet the required hours of public square dancing. Therefore, 32 participants finished the public square dancing intervention. By the end of the three-month follow-up (mid-November to mid-February next year), one participant failed to join due to a family trip; so, 31 participants finished the follow-up. The flowchart of the study is shown in Fig. 1.

3.1.2. Participants' characteristics

The average age of the 31 participants was 73.35 ± 5.10 years (range, 61–82), and most of them were women (83.4%). Most of the participants were married (83.4%), while five were divorced or widowed. Regarding living status, 24 (77.4%) lived with their spouse, three (9.7%) lived with their children, and four (12.9%) lived alone. All of the participants were retired and lived on a pension. As for sports activities, 22 (71.0%) occasionally engaged in sports like walking, jogging, and riding bicycles. Only a minority of the

participants (25.8%) were involved in social activities, such as community volunteering, neighborhood committee activities, or social volunteering.

3.1.3. General information of the public square dancing intervention

The frequency of the dance intervention was three times a week during the three-month interval for 1 h each time. Therefore, the total time spent on the public square dancing was 36 h. If the participants attended less than 80% of the total hours (29 h), they did not meet the required hours and were excluded from the study.

During the follow-up period, all participants were contacted over telephone or WeChat to determine the amount of time on public square dancing each week. Table 1 presents the total hours of public square dancing the participants engaged in during the intervention and three months after the intervention.

3.1.4. Changes in subjective experience

SEES was employed to measure the participants' subjective experience at the end of the public square dancing intervention and three months after the intervention. Table 2 presents the results of the paired-sample *t*-test. The scores of psychological well-being (11.03 ± 2.82 vs. 14.87 ± 3.93 , $P < 0.001$) and fatigue ($11.00 [8.00, 12.00]$ vs. $14.00 [9.00, 18.00]$, $P < 0.001$) increased at the three-month follow-up.

3.2. The second phase

In the second phase, three focus group interviews lasting for 30–50 min were conducted to collect feedback from the participants, with five members in each interview group. A total of 10,997 Chinese characters were transcribed and analyzed. The code and general information from the interviews are presented in Table 3.

3.2.1. Increased confidence and a sense of accomplishment

All the participants considered the public square dancing intervention acceptable. Although some participants had misgivings initially, the intervention changed their attitude toward the public square dancing intervention from skepticism to acceptance.

"I was doubtful about public square dancing at the beginning and regarded it as an entertainment activity and just wanted to try it for a while. However, when I joined in, I became aware that I was

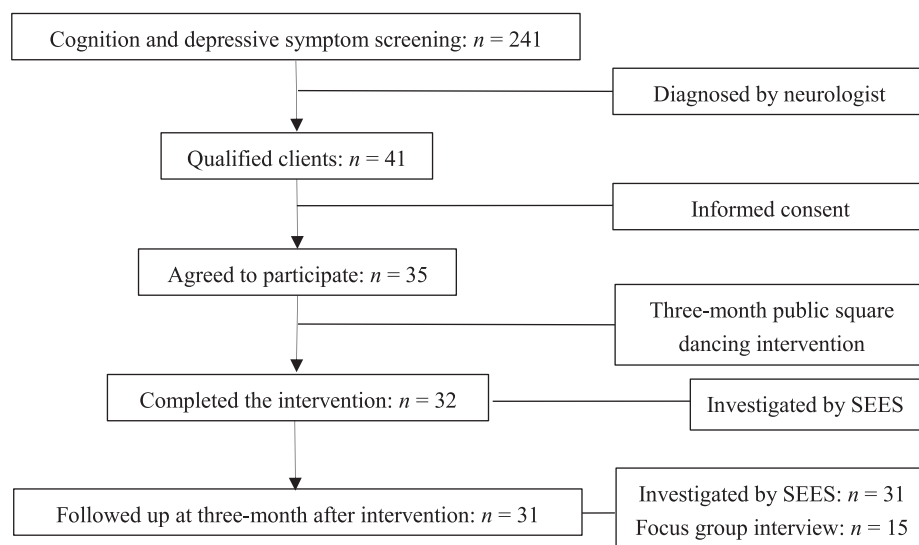


Fig. 1. The flow chart of the study. SEES = Subjective Exercise Experience Scale.

Table 1
The cumulative time of public square dancing of the intervention group.

Period	Cumulative time of public square dancing during three months (h)	n (%)
Intervention period (n = 32)	29–35	29(90.6)
	36–48	3(9.4)
Follow-up period (n = 31)	<12	7(22.6)
	12–28	14(45.2)
	29–36	10(32.3)

Table 2
Intra-group comparison of subjective exercise experience in the intervention group at different time points (n = 31).

Subscale	S2	S3	t/Z	P
Psychological well-being	11.03 ± 2.82	14.87 ± 3.93	−6.58 ^a	P < 0.001
Psychological distress	8.00 (8.00, 11.00)	8.00 (8.00, 10.00)	−1.10 ^b	0.274
Fatigue	11.00 (8.00, 12.00)	14.00 (9.00, 18.00)	−4.09 ^b	P < 0.001

Note: Data are Mean ± SD or Median (P₂₅, P₇₅). S2 and S3 represent the time points at the end of the intervention and three months of follow-up after the intervention, respectively. ^a t, paired sample t-test; ^b z, Mann-Whitney U rank sum test.

Table 3
General information of respondents at the focus group interview phase (n = 15).

Code	Gender	Age (years)	Education	Marital status	Living status
A	Female	71	Senior high school	Married	Lived with spouse
B	Female	73	Senior high school	Widowed	Lived alone
C	Female	78	Junior college	Widowed	Lived alone
D	Female	63	Middle school	Married	Lived with spouse
E	Male	71	Senior high school	Married	Lived with spouse
F	Female	67	Bachelor degree	Married	Lived with spouse
G	Female	61	Senior high school	Married	Lived with spouse
H	Female	76	Bachelor degree	Married	Lived with spouse
I	Female	75	Senior high school	Married	Lived with spouse
J	Female	79	Senior high school	Widowed	Lived with children
K	Female	74	Middle school	Married	Lived with spouse
L	Female	65	Senior high school	Married	Lived with spouse
M	Female	74	Bachelor degree	Married	Live with spouse
N	Female	79	Middle school	Widowed	Lived alone
O	Male	70	Bachelor degree	Married	Lived with spouse

getting old as it was hard for me to follow the simple movements of public square dancing. But when I learned the dance step by step, I felt a sense of success [smile].” (Participant M)

“At the beginning, I agreed to join because I am not good at saying no, and I felt embarrassed because the public square dancing seemed more suitable for women [wink at the interview]. Gradually, I started really enjoying the public square dancing. We even set up a group in the WeChat app to remind each other to join each time. The more I participated, the better I mastered it and the more joy [head nod]. The public square dancing made me healthier both physically and psychologically. I am confident much more than before and plan to continue the dance in the future.” (Participant O)

3.2.2. Easy to learn, close to real life, and sense of belonging

The following three themes were extracted from the interview regarding opinions and comments about the public square dancing intervention: easy to learn, close to real life, and collective participation leading to a sense of belonging.

3.2.2.1. Easy to learn. Of 15 participants, 11 considered public square dancing easier to master than other dance forms and required less professionalism and technique.

“I seldom took part in recreational activities like Fan dance or chorus organized by the community due to the lack of experience at my youth. However, I found the public square dancing life-like and easy to learn because you just need to move your legs and arms to the music [arm extend].” (Participant A)

3.2.2.2. Close to real life. Furthermore, 13 of the respondents mentioned that the experience of public square dancing was life-like and that it was a recreational group activity.

“Public square dancing allows me to move, and the action is not difficult. Some exercises are too professional and need talents, such as Tai Chi and Qigong. You have to follow the principle and rhythm, and it is useless if you follow mechanically. I believe it is difficult for most older adults. In contrast, public square dancing is quite simple, it is close to real life, and it is easy to remember the movements with the cheerful and popular music [head shake].” (Participant J)

3.2.2.3. Sense of belonging. Ten participants stated that the public square dancing increased their sense of belonging.

“We danced together and formed a group, and it is like you joined an organization. We communicated with each other and made the process together. I feel the public square dancing is like a

communication link, and it increased our cohesion [interlock fingers].” (Participant N)

3.2.3. Promotes physical and mental health

For the benefits and experience of public square dancing, four themes emerged, which were as follows: helpful in releasing pressure; improving overall health, coordination, and brain function; contributing to emotional regulation; and beneficial for reducing loneliness.

3.2.3.1. Helpful in releasing pressure. Nine of the older adults highlighted that public square dancing allowed them to release stress.

“Life is not easy for me after retirement. I have to take care of my old mother, and my kid does not live nearby. For me, public square dancing is like an adjustment and relieves my psychological burden. I feel happy while dancing [head nod].” (Participant G)

3.2.3.2. Improving overall health, coordination, and brain function. Seven senior citizens believed that public square dancing was beneficial in improving their overall health, coordination, and brain function.

“Public square dancing is especially suitable for us. Though we do not dance professionally, we benefit from it. We need to pay attention and coordinate the body during dancing, for the action is not monotonous. I feel my coordination increased and my memory also improved because I had to remember the dance steps. I believe it improved my fitness and prevented me from getting dementia.” (Participant H)

3.2.3.3. Contributing to emotional regulation. Additionally, ten participants stated that public square dancing improved their mood and made them happy.

“I do not have any special feeling when just listening to music, which sometimes makes me upset. However, it is different when I dance with music [eye wink]. It is like the music is stirring your heartstrings when you act with it, and this makes me quite happy.” (Participant L)

3.2.3.4. Beneficial for reducing loneliness. Moreover, eight individuals regarded public square dancing as helpful for reducing their sense of loneliness.

“I felt lonely and bored after retirement because of much less connection with my colleagues and friends. Sometimes, I had nothing to do all day [hands open]. When I joined the group, I found there were many older people like me in the community. Through dancing together, we are like an organization, where we can dance and chat together, which is quite interesting for me.” (Participant E)

3.2.4. Future expectations: music selection, reduced weather disruption, and self-organizing workouts

When asked to provide suggestions and advice on the public square dancing intervention for the future, the participants pointed out the selection of public square dancing and the influence of

circumstances and personal arrangements.

3.2.4.1. The selection of public square dancing. Five of the respondents believed that the choice of public square dancing is appropriate for older adults, while pop or fast-paced music with complex rhythms should be avoided.

“As we are getting old and have some problems with legs and feet, we cannot run and jump like young people. So, the dancing exercise should be moderate with simple and light music.” (Participant F)

3.2.4.2. The influence of circumstances and personal arrangements. Seven participants mentioned the effect of weather and sound, and six individuals emphasized the arrangement of public square dancing.

“Because we dance outdoors, the activity is influenced by the weather and circumstances. It is not suitable for us to go out on windy, cold, or heavy smog days. Moreover, we need to pay attention to controlling the sound volume to avoid disturbing our neighbors.” (Participant G)

“As this is a group activity, we need a key person or a dance leader to arrange and manage the group public square dancing. We cannot rely on the neighborhood committee to organize it, and we must do it ourselves. I think a leader should be elected from the group.” (Participant B)

4. Discussion

This study provided data on a type of intervention with Chinese characteristics among senior citizens with MCI. The study showed that public square dancing is a feasible and acceptable intervention among community-dwelling individuals with MCI and depressive symptoms. The subjective experience of public square dancing was positive. Furthermore, the participants benefited from the public square dancing sessions both physically and psychologically.

With the extension of life expectancy worldwide, problems with cognitive function have become increasingly prominent. A recent investigation has revealed that the incidence rate of MCI among older adults (above 60 years) in China has reached 9.67% [23]. Therefore, given a large population, the number of individuals with MCI and their disease burden is considerable. Slowing down cognitive degradation is essential, and the exploration of effective forms of intervention is urgently needed. Dance interventions, such as “PocoPoco” in Malaysia [24], traditional Greek dance [13], and ballroom dance [16], have received attention; these have been demonstrated to be effective in improving cognition. However, public square dancing carries cultural and regional characteristics and has been accepted as one of the most popular exercises for older individuals in the last ten years. The characteristics and popularity of public square dancing make it an ideal form of intervention for individuals with MCI in China [18,25].

Public square dancing has been performed in most cities and communities in China and many rural areas, and it has been a national activity for all ages. The simplicity of the dance steps and music has made it especially popular among older adults. In this study, public square dancing was shown to be acceptable for individuals with MCI and depressive symptoms. At the three-month follow-up, all the participants had adhered to public square dancing, while one-third met the exercise requirements in hours. Because the follow-up examination was during winter, the compliance rate was deemed quite reasonable. Wind, dense fog,

and snow are frequent during winter in northern China, making it difficult to participate in outdoor activities, such as public square dancing.

The subjective experience of public square dancing was measured by a self-reported instrument and proved that the psychological well-being increased. However, in contrast to other reports, the personal feeling of fatigue also increased. Dermers [26] collected dancing experience from clinicians' perceptions qualitatively. In the expertise of healthcare professionals, they found that a dance intervention with low to medium intensity did not increase fatigue in older individuals. Such differences may stem from the different roles of the participants between the two studies and from the older age of the participants in the current study.

Meanwhile, the second assessment was three months after the intervention; most participants had gone through 24 weeks of public square dancing, which could have been physically demanding for the older adults. Still, during the interview, the participants mentioned the benefits of the public square dancing intervention in terms of overall health, coordination, attention, emotion, social support, and a sense of belonging. Although public square dancing is a type of exercise, it carries elements of the music arts, thereby combining the advantages of both [25]. The effectiveness of exercise interventions has been demonstrated in global cognition and cognitive sub-domains, including memory and executive function [7,27].

Moreover, the recent meta-analysis involving 31 studies has demonstrated that physical exercise could significantly alleviate depressive symptoms among senior citizens with cognitive impairment. Although this study did not measure changes in depressive symptoms using a scale, the participants obtained feedback regarding their emotions; based on that, public square dancing helped regulate mood and increase happiness. This may also be related to the characteristics of the target population and public square dancing. As in many Western countries, most older adults live with their spouse or alone without adult children; traditional extended families are increasingly rare in China, especially in cities. Therefore, daily life for older adults after retirement is monotonous, lacking in fun, and prone to social isolation [28]. In addition, more and more "empty-nest" elderly have emerged in China in recent years, and they also show negative emotions such as being forgotten, boredom, loneliness, helplessness, and even depression [29]. Through group activities, participants can get to know and chat with each other, giving them an opportunity for interaction. In addition, the lively music and simple movements engage them in the activity and release negative emotions, which are conducive to psychological well-being [30].

As with many other interventions, public square dancing has its limitations, which were echoed in the interviews. The implementation of public square dancing requires a certain space or area and is dependent on the weather. In this study, public square dancing was performed near the flower terrace of the community. In many communities with limited space for activities, this cannot be easy to carry out. Furthermore, as an outdoor sport, the weather should be taken into consideration. The sound volume should also be controlled at an acceptable level to avoid disturbing other residents living nearby. However, public square dancing can be organized by the participants spontaneously. Therefore, future studies are needed to develop a more feasible and manageable public square dancing program and analyze the optimal intensity and frequency for cost-effectiveness.

5. Limitations

Though the pilot study proved the feasibility and acceptability of public square dancing for individuals with MCI and depressive

symptoms in the community, the main limitation lies in the study design. As this was a pre–post-study, bias was hard to control, which could have influenced the credibility of the observed effects. Additionally, more measurements of physiological outcomes are needed in future studies to analyze health changes in specific domains and functions in addition to self-reported instruments at the end of the three months. Also, the appropriate type, intensity, and frequency of exercise-related to participants' age and its effect on specific cognition functions deserve further exploration. Another limitation of the current research is associated with the study site. Due to personal limitations of the study personnel and limited funding, only one community in Beijing was chosen. Therefore, the application and effects in other communities and cities need further exploration. Moreover, the follow-up time of three months is short, and long-term effects and compliance should be addressed in the future.

6. Conclusion

This study explored the feasibility and acceptability of public square dancing intervention for MCI residents with depressive symptoms in the community. The study demonstrated that public square dancing is a viable and valuable intervention in this population. In addition to the benefit of improving psychological well-being, public square dancing helped increase overall health and physical coordination. It was conducive to decreasing depressive symptoms through enabling more interaction with peers, and participants enjoyed the happy, light music and simple movements. Nevertheless, the implementation of public square dancing is influenced by factors such as weather and management. More studies are needed to explore the optimal intensity and frequency of the intervention and its benefits in specific physical and cognitive domains.

Funding

This work was supported by the Peking Union Medical College.

CRediT authorship contribution statement

Xiuyu Yao: Conceptualization, Methodology, Formal analysis, Data curation, Writing – original draft, Writing – review & editing, Visualization, Project administration. **Yu Zhao:** Conceptualization, Methodology, Formal analysis, Investigation, Data curation, Writing – review & editing, Project administration, Funding acquisition. **Min Yin:** Investigation, Writing – review & editing, Visualization. **Zheng Li:** Writing – review & editing, Supervision, Project administration.

Declaration of competing interest

The authors declare that there is no conflict of interest.

Acknowledgments

We thank the participants for sharing their time and community health center for their support with data collection. We also would like to thank LetPub (www.letpub.com) for its linguistic assistance during the preparation of this manuscript.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.ijnss.2021.08.005>.

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