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Effectiveness of the "Photo-with-Movement Program" for Elders with Pain and their Carers: A Randomized Trial

Tse MMY[1*], Chan AWY[2], Wu TCM[1], Tsang WWN[1] and Tse PPS[1]

[1]School of Nursing and Health Studies, Hong Kong Metropolitan University, HKSAR, China

[2]School of Nursing, Tung Wah College, HKSAR, China

[*]**Corresponding author:**

Mimi MY Tse,
School of Nursing and Health Studies, Hong Kong Metropolitan University, Jockey Club Institute of Healthcare, 1 Sheung Shing Street, Ho Man Tin, Kowloon, Hong Kong

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1. Abstract

1.1. Background and Objectives: The COVID-19 pandemic has imposed limitations on older adults with chronic pain concerning accessing adequate support. Consequently, they rely on assistance from caregivers, and the burden of caring deteriorates caregivers' physical and psychological health. Thus, a dyadic non-pharmacological pain management program, Photo-with-Movement Program (PMP), that helps older adults relieve pain, lowers caregivers' stress and improves their psychological well-being is necessary.

1.2. Methods: This study was a two-arm, pilot randomized controlled trial. Participants were recruited from Neighborhood Elderly Centers subsidized by the Social and Welfare Department of Hong Kong. The sample comprised 24 dyads of participants; one older adult and one informal caregiver in each dyad. The 8-week PMP included watching photos and exercising. The Brief Pain Inventory, Pain Self-Efficacy Questionnaire, Subjective Happiness Scale, UCLA Loneliness Scale, Caregiver Burden Inventory, and Semi-structured interviews were used to examine the effectiveness of the PMP.

1.3. Results: The PMP significantly reduced pain intensity in the experimental group from baseline at 3.69 ± 1.59 to 2.50 ± 1.06 post-intervention (p-value=0.043). It reduced loneliness in the experimental group from baseline at 1.52 ± 0.34 to 1.45 ± 0.37 post-intervention. It reduced caregiver burden from baseline at 0.67 ± 0.62 to 0.56 ± 0.44 post-intervention.

1.4. Conclusions: Normal activities have resumed after the COVID-19 pandemic, and continuous support for older adults and their informal caregivers is needed. In order to sustain the support, more non-pharmacological pain management interventions like the PMP should be developed. More promotion could raise awareness in managing their physical and psychological well-being.

2. Introduction

Chronic pain is a common yet complex problem worldwide, and it is defined as persistent pain in a person for at least three months or more that could arise from an initial injury or an ongoing chronic illness [1]. The prevalence of chronic pain in older adults was high in many Western countries, with approximately 65-75% of older adults having experienced chronic pain. The prevalence of chronic pain among community-dwelling older adults was as high as 30% in Hong Kong [2]. Unmanaged chronic pain could cause a myriad of negative consequences, including impaired physical activity, disability in daily activities, and poor quality of sleep [1].

Pain often affects physical and psychological well-being. Older adults living with chronic pain often face challenges like reduced mobility, disrupted sleep patterns, and increased use and costs of healthcare services [3]. Also, emotional distress, depression and anxiety, social isolation, and even suicidal thoughts [4]. Therefore, older adults need a comprehensive and tailored treatment approach to help manage their deteriorated physical and psychological conditions due to chronic pain.

Pharmacological treatments for chronic pain were widely proposed, yet, the use of painkillers could be restricted by comorbidities of older adults, side effects of the painkillers, and polypharmacy [5]. In addition, due to the physiological changes related to

aging, the pharmacokinetics and pharmacodynamics of the analgesics were altered, affecting the absorption, excretion, and response to the pharmacological treatments [5]. It highlighted the need for effective non-pharmacological interventions.

Indeed, non-pharmacological strategies are appealing to older adults. Non-pharmacological interventions include visual stimulation, pain exercise programs, pain education programs, acupuncture, transcutaneous nerve stimulation, massage, relaxation therapy, cognitive-behavioral therapy, music therapy, guided imagery, multisensory stimulation arts, and crafts therapy [6, 7]. Such interventions could create a sense of control over persistent pain, which was suggested to be a practical approach to chronic pain management.

Older adults with pain need constant care from their caregivers, and the COVID-19 pandemic has created more burden on the caregivers. Many community centers and healthcare services for older adults in Hong Kong were closed in response to the social restrictions [8]. As a result, older adults could rely solely on their caregivers to care for them. Caregivers' responsibilities include helping older adults with daily activities, such as getting in and out of bed, walking, and bathing, reminding them to take medicines and perform exercises, accompanying for doctors' visits, providing emotional support, and encouraging them to participate in social activities [9]. Consequently, caregivers tend to experience more psychological, behavioral, and physiological issues than non-caregivers. Caregivers feel helpless, sad, and frustrated when providing care to older adults with chronic pain and their pain situations do not improve.

We came across family members and caregivers of older adults who expressed difficulties communicating with older adults about pain management and encouraged them to participate in various non-pharmacological strategies [10, 11]. Indeed, most existing pain management education services only focus on serving older adults instead of both older adults and their caregivers. Family members, peers, and healthcare professionals are equally important to older adults, influencing their commitment to health-promoting behaviors [9, 12]. Therefore, a dyadic pain management program that pairs an older adult with his/her caregiver would be a solution.

The Photo-with-Movement Program (PMP) was the first to integrate visual stimulation and exercise as a non-pharmacological intervention for chronic pain management among community-dwelling older adults and their caregivers. Indeed, the PMP gave tools for older adults and their caregivers to manage/control their pain situations. Older adults who have concerns about the side effects of analgesics and painkillers could consider the PMP as an alternative chronic pain management method.

The PMP was based on literature reviews driven by Gate Control Theory [13]. A study has suggested that visual stimulation by the natural scenery of the mountain, river, waterfall, and colorful flowers could benefit pain control6. Further studies have also reported that viewing natural scenes for visual stimulation could reduce stress, promote positive moods, and facilitate recovery from illness [14]. Thus, photo albums could anchor pain distraction to alleviate chronic pain in community-dwelling older adults. Indeed, we shall design a photo album that covers the mountains, beaches, rivers, and parks of Hong Kong. Also, a recent scoping review reported that older adults, who suffered from chronic pain and participated in physical exercise programs, reported a significant reduction in pain level, improvement in physical function, and enhancement of self-efficacy [6]. Therefore, various exercises focusing on upper limbs, lower limbs, back, posture, and balance were incorporated in the PMP.

Objectives of the study:

Primary objective: To evaluate the effectiveness of a PMP in reducing pain scores

Secondary objectives:

- To evaluate the effectiveness of a PMP in improving pain self-efficacy, happiness, and loneliness
- To explore the perspectives and experiences of older adults on participating in the PMP

3. Materials and Methods

3.1. Study Design

This study was a two-arm, pilot randomized controlled trial. Participants were recruited from Neighborhood Elderly Centers (NECs) subsidized by the Social and Welfare Department of Hong Kong. The sample size was 24 dyads, i.e. 12 dyads in the experimental group and 12 dyads in the control group. Each dyad consisted of one older adult and their informal caregiver.

3.2. Setting and Participants

Inclusion criteria

3.2.1. Older adults / Participants:

- Aged 60 or above who are mainly cared for by an informal caregiver and willing to participate in the program together [15].
- Scored >6 in the Abbreviated Mental Test; a cut-off points of 6 is valid in differentiating between normal and abnormal cognitive functions for geriatric clients who can understand Cantonese16; Have a history of non-cancer pain in the past 6 months [17]; Have a pain score of at least 2 on the Numeric Rating Scale (0-11 numeric scale) [18]. Able to take part in light exercise and stretch.

3.2.2. Informal Caregivers:

Those will be included if they are aged 18 or above; act as an informal caregiver for the participating older adult [15]; scored >6 in the Abbreviated Mental Test and can understand Chinese.

Exclusion criteria

3.2.3. Older adults / Participants:

Those who have a serious organic disease or malignant tumor, have a mental disorder diagnosed by neurologists or psychiatrists and will have further medical/surgical treatment in two months or experienced drug addiction were excluded [17].

3.2.4. Informal Caregivers:

Those who have a serious organic disease or malignant tumor or have a history of cognitive or mental disorder diagnosed by neurologists or psychiatrists and experienced drug addiction were excluded.

Allocation and concealment

Allocation concealment, blinding, and the control arm: a statistician independent of the study team used a random-numbers table to make the group assignments (1=experimental PMP; 2=control).

3.3. Intervention: Photo-with-Movement Program (PMP)

Participants in the intervention group participated in an 8-week Photo-with Movement program (PMP) as an intervention—details as in Table 1. From week 1 to week 8, the intervention program consisted of four face-to-face and digital-based sessions via an instant messaging platform (WhatsApp). Participants received visual stimulation, exercise training, and pain education in each face-to-face session. Photo albums capturing the mountains, beaches, rivers, and parks of Hong Kong were adopted as a distraction and visual stimulation tool. The researchers selected the photos based on the participants' age group. During the procedure, participants were repeatedly encouraged to direct their attention to the scenery of the albums for 10 minutes.

Following visual stimulation, participants attended a 30-minute age-appropriate exercise training session, covering exercise of upper limbs, lower limbs, back, and cardiopulmonary function. Exercise videos developed by healthcare professionals were used. The participants received a 10-minute pain education after the exercise training. A panel of experts consisting of a registered nurse, pain specialist, physiotherapist, and professor in nursing and health studies validated the content of pain education. The face-to-face session was about 50 minutes in duration.

Participants were advised to practice the exercises they had learned from the face-to-face sessions twice a week at home. Each self-practice session would last for 30 minutes. Motivational techniques were used to increase the adherence of participants to self-practice sessions. Audio recordings of training exercises were sent to participants via WhatsApp weekly. From week 1 to week 8, the research assistant sent participants reminders of the self-practice session twice a week.

Web-based learning platform

In addition, a website was developed with the materials of PMP (https://pain-management-program.mailchimpsites.com/) given to all participants. The participants were encouraged to visit the materials through the website, including videos of exercise, pain education, and photos to relieve pain. The research article on the development and evaluation of the website was published [19].

Table 1: Schedule of PMP

<table>
<tr><th colspan="5">The Photo-with-Movement Program (PMP)</th></tr>
<tr><td rowspan="4">Week</td><td colspan="3">Face-to-face activity in community centres</td><td rowspan="4">Digital-based activity via WhatsApp (20 minutes, two per week, from 1 to week 8) Led by investigator/ research assistant</td></tr>
<tr><td colspan="3">(50 minutes, one session per week, week 1 to 4)
Led by investigators/ research assistant</td></tr>
<tr><td><u>Photo album-sharing sessions</u></td><td><u>Exercise sessions</u></td><td><u>Pain Education sessions</u></td></tr>
<tr><td>(10 minutes)</td><td>(30 minutes)</td><td>(10 minutes)</td></tr>
<tr><td>1.</td><td>Theme1: Mountains in Hong Kong</td><td rowspan="3">• Introduction of PMP (week 1);
• Warming up and breathing deeply (week 1 to 4);
• Exercise guided by videos* (Week 1 to 4);
• Revise the critical steps of the exercises
• Video 1 - Upper Limbs exercise (Sitting position), 10 minutes</td><td>• Advantages of exercise
• Explanation of how to use the exercise logbook</td><td rowspan="3">• WhatsApp group to receive the photo album
• WhatsApp group to receive the videos of exercises learned in the sessions
• Send reminders to participants twice per week through WhatsApp to remind them to practice the exercise and record the progress in the logbook</td></tr>
<tr><td>2</td><td>Theme 2: Beaches and rivers in Hong Kong</td><td>• Definition of pain
• Effects of pain in physical and psychological aspects</td></tr>
<tr><td colspan="2"></td><td>• Pharmacological interventions for pain management</td></tr>
</table>

0.	Theme 3: Hiking trail	• Video 2 - Upper Back & Posture exercise (Sitting position), 10 minutes • Video 3 - Upper Limbs & Back exercise (Sitting position), 10 minutes • Video 4 - Lower Limbs & Abdomen exercise (Sitting position), 10 minutes • Video 5 - Lower Limbs & Balance exercise (Supported Standing position), 7 minutes • Video 6 - Heart & Lung Function exercise (Sitting position), 13 minutes • Video 7 - Heart & Lung Function exercise (Standing position), 6 minutes • Video 8 - Ten skills, 8 minutes • Video 9 - Towel Exercise for Elderly, 10 minutes • Video 10 - Brain Health Exercise, 6 minutes	• Non-pharmacological interventions of pain management: Deep breathing, aromatherapy, music therapy, application of heat and cold therapy • Remind advantages of exercise	
0.	Theme 4: Parks in Hong Kong			

3.4. Outcome Measures

Data was collected at baseline before the randomization and right after the intervention program.

3.4.1. Primary Outcome

1. Pain intensity: The Chinese version of the Brief Pain Inventory was used to assess the multidimensional nature of pain, including intensity and interference with life activities in the previous 24 hours [20].

3.4.2. Secondary Outcome

1. Pain self-efficacy: The Chinese version of the Pain Self-Efficacy Questionnaire (PSEQ) was used to measure self-efficacy in coping with activities despite pain [21]. It consists of 10 statements about a person's confidence in performing 10 activities or tasks despite experiencing pain. Higher scores indicate stronger self-efficacy beliefs.

2. Happiness: The 4-item Chinese version of the Subjective Happiness Scale (SHS) was used to assess subjective happiness. It consists of 4 items rated on a 7-point Likert scale. A higher score indicates a higher level of subjective happiness [22].

3. Loneliness: The Chinese version of the UCLA Loneliness Scale was used [23]. The scale measures the subjective experience of loneliness on a 4-point Likert Scale. The total score ranges from 20 to 80. A higher score represents a greater sense of loneliness.

4. Caregiver Burden (for caregivers only): The Caregiver Burden Inventory was used. It comprises 24 items measuring five dimensions of burden related to the caregiving role [24]. Higher scores indicate higher caregiver burden.

5. Semi-structured interviews for older adults and their caregivers: The Research Assistant conducted individual interviews upon the completion of the PMP (post-test). Older adults and their caregivers were asked to comment on the perceived benefits, limitations and barriers in managing pain, its usefulness, and recommendations for improving the PMP to meet their needs.

3.5. Ethical Consideration

Ethical approval was sought from the Research Ethics Committee of Hong Kong Metropolitan University. An information sheet stating the purpose and procedure of the study was given and explained to participants. Informed consent was obtained from participants before data collection. Participation in this study was voluntary. Participants had every right to withdraw from the study without any consequence. All collected data was anonymous and kept strictly confidential for research purposes.

3.6. Statistical Analyses

The IBM-SPSS version 22 was used to perform statistical analyses. Descriptive statistics (frequency %; mean (standard deviation)) was used to describe the demographic data of the participants. An

intention-to-treat analysis was conducted for any missing data. A multilevel regression was used to compare pain intensity and pain self-efficacy at baseline (T0) and week 8 (T1). A Generalized Estimating Equation was used for within-group and between-group comparisons if the data did not follow a normal distribution. A Cohen's d effect size of the intervention effect was calculated for all outcomes. A p-value of <0.05 was considered statistically significant.

A qualitative analysis of the contents of the interview data and the WhatsApp text message was conducted. The tape-recorded interview data was transcribed by the research assistant and cross-checked for accuracy by the Principle Investigator or one Co-Investigator. The research team compared, discussed, agreed on codes, and then combined them with verbatim data to form categories/subcategories describing the older adults' and caregivers' experiences and perceptions of the benefits and difficulties of participating in the PMP. For WhatsApp text messages, responses to reminders, questions, and discussions were organized into themes. A set of categories/subcategories with supporting text message data was generated to describe the strengths, limitations and further improvements of the PMP.

EQUATOR reporting guidelines have been followed during the preparation of the manuscript.

4. Results

4.1. The Periods of Recruitment and Follow-up

The pilot randomized trial started October 1, 2022, and the follow-up was at week 8 of the intervention. It ended as the research team is preparing to submit a substantial grant application to fund the pivotal main study.

4.2. Demographic Characteristics of Participants

A total of 24 groups of "dyads" completed the study, 12 dyads in the experimental group and 12 in the control group. Thus, the data analyses were performed using 24 dyads. For the participant selection flow, see Figure 1. The demographic characteristic of the older adults, see Table 2, shows the mean age was 74.29 ± 10.56 and 75.75 ± 9.55 in the experimental group (n=12) and 72.83 ± 11.72 in the control group (n=12). Overall, 62% of the participants were females, and 38% were males. The participants were primarily females in the control group, accounting for 75%. The participants were 50% females and 50% males in the experimental group.

For informal caregivers, the mean age was 59.25 ± 13.01, ranging from 20 to 77. The control group's mean (n=12) was 51.08 ± 12.24, and the experimental group (n=12) was 67.42 ± 7.67. For the demographic characteristic of the informal caregivers, see Table 3.

Table 2: Demographic characteristic of older adults

Demographic data	**Overall (n=24)**		**Control group (n=12)**		**Experimental Group (n=12)**	
	74.29 ± 10.56 (60-97)		72.83 ± 11.72 (60-92)		75.75 ± 9.55 (65-97)	
Age	*n*	%	*n*	%	*n*	%
Gender						
Female	17	71	7	58	10	83
Male	7	29	5	42	2	17
Marital status						
Single	0	0	0	0	0	0
Married/partnered	18	75	8	67	10	83
Divorced	0	0	0	0	0	0
Widowed	6	25	4	33	2	17
Highest education level						
No formal education	1	4.2	0	0	1	8.3
Primary school	18	75	11	92	7	58
Middle school	5	21	1	8.3	4	33
College degree or above	0	0	0	0	0	0
Employment						
Unemployed	0	0	0	0	0	0
Employed	3	12	3	25	0	0
Employed (Part- time)	0	0	0	0	0	0
Retired	21	88	9	75	10	100
Occupation[1]						
Housekeeper	5	21	3	25	2	17
Industrial worker	11	46	5	42	6	50

Decoration worker	4	17	0	0	4	33
Janitor	3	12	3	25	0	0
Nurse	1	4.2	1	4.2	0	0
***Monthly income** (HKD$)*						
<10,000	24	100	12	100	12	100
10,000-14,999	0	0	0	0	0	0
15,000-19,999	0	0	0	0	0	0
20,000-24,999	0	0	0	0	0	0
25,000-29,999	0	0	0	0	0	0
>30,000	0	0	0	0	0	0
Living Arrangement						
Alone	4	17	2	17	2	17
With spouse	14	58	7	58	7	58
With relative(s)	6	24	3	25	3	25
Other	0	0	0	0	0	0

[1]For the retired participants, it shows the occupation before their retirement.

Table 3: Demographic characteristic of Informal Caregivers

Demographic data	**Overall (n=24)** 59.25 ± 13.01 (20-77)		**Control group (n=12)** 51.08 ± 12.24 (20-66)		**Experimental Group (n=12)** 67.42 ± 7.67 (53-77)	
Age	*n*	%	*n*	%	*n*	%
Gender						
Female	15	62	9	75	6	50
Male	9	38	3	25	6	50
Marital status						
Single	4	17	2	17	2	17
Married/partnered	19	79	10	83	9	75
Divorced	1	4.2	0	0	1	8.3
Widowed	0	0	0	0	0	0
Highest education level						
No formal education	0	0	0	0	0	0
Primary school	10	42	6	50	4	33
Middle school	9	38	3	25	6	50
College degree or above	5	21	3	25	2	17
Employment						
Unemployed	0	0	0	0	0	0
Employed	14	58	12	100	2	17
Employed (Part- time)	1	4.2	0	0	1	8.3
Retired	9	38	0	0	9	75
Occupation[1]						
Housekeeper	9	38	2	17	7	29
Businessman	1	4.2	1	8.3	0	0
Salesperson	3	12.5	1	8.3	2	17
Clerk	7	29	5	42	2	17
Teacher	2	8.3	1	8.3	1	8.3
Cook	1	4.2	1	8.3	0	0
Janitor	1	4.2	1	8.3	0	0

***Monthly income** (HKD$)*						
<10,000	11	46	3	25	8	67
10,000-14,999	1	4.2	0	0	1	8.3
15,000-19,999	7	29	6	50	1	8.3
20,000-24,999	2	8.3	1	8.3	1	8.3
25,000-29,999	2	8.3	1	8.3	1	8.3
>30,000	1	4.2	1	8.3	0	0
Relationship with older adults						
Matrimony	9	38	1	8.3	8	67
Relative or friend	11	46	9	75	2	17
Son or daughter	4	17	2	17	2	17

[1]For the retired participants, it shows the occupation before their retirement.

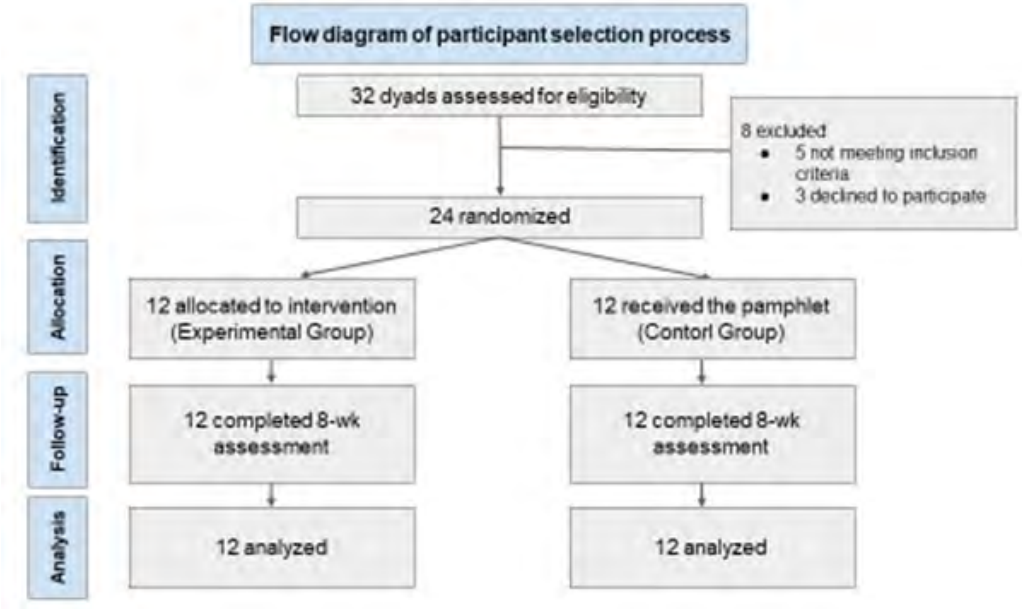

Figure 1:

4.3. Pain Intensity

The pain intensity baseline in the control group was 4.00 ± 0.98 and 3.69 ± 1.59 in the experimental group. After the intervention, the pain intensity in the experimental group reduced to 2.50 ± 1.06, and the p-value was 0.043, which was significant. The pain intensity in the control group reduced to 3.79 ± 1.14, and the p-value was 0.636 in the control group, showing no significance. Comparing the two groups, the p-value of the post-intervention outcome was 0.009, indicating its significance. For the outcome results, see Table 4.

4.4. Psychological Well-Being

The pain self-efficacy baseline in the control group was 4.01 ± 0.82 and 4.52 ± 1.45 in the experimental group. Upon completing the intervention, the pain self-efficacy in the experimental group increased to 4.70 ± 0.85. The loneliness score in the experimental group also decreased from baseline at 1.52 ± 0.34 to 1.45 ± 0.37. The caregiver burden scores in the experimental group reduced from 0.67 ± 0.62 to 0.56 ± 0.44. Though the psychological well-being of older adults and caregivers improved, no significance was found in them.

4.5. Semi-Structured Interview

Comments and feedback from the semi-structured interview were organized into categories: Increased pain management knowledge, increased motivation and confidence, improved social health, and feedback on the content of the PMP. The results were arranged in a table format as in Table 5.

Table 4: Outcome

Categories	Control Group (n=12)			Experimental Group (n=12)			p value (n=24)	
	Baseline	*8-wk follow up*	**p value**	*Baseline*	*8-wk follow up*	**p value**	*Baseline*	*8-wk follow up*
	Mean ± SD	**Mean ± SD**		**Mean ± SD**	**Mean ± SD**			
Pain Intensity	4.00 ± 0.98	3.79 ± 1.14	0.636	3.69 ± 1.59	2.50 ± 1.06	0.043*	0.568	0.009*
Pain self-efficacy	4.01 ± 0.82	4.24 ± 0.89	0.51	4.52 ± 1.45	4.70 ± 0.85	0.709	0.301	0.211
Happiness	4.65 ± 0.76	4.12 ± 0.54	0.067	4.88 ± 1.11	4.81 ± 0.80	0.876	0.562	0.022
Loneliness	1.45 ± 0.23	1.47 ± 0.16	0.88	1.52 ± 0.34	1.45 ± 0.37	0.632	0.604	0.861
The caregiver burden inventory	0.36 ± 0.19	0.37 ± 0.14	0.92	0.67 ± 0.62	0.56 ± 0.44	0.639	0.119	0.169

*p value > 0.05 considered to be significant

Table 5: Comments and Feedback of the PMP

Categories	Older Adults:	Caregivers:
Increased pain management knowledge	Knowledge of pain was important for me to find out the causes of pain and a proper way to manage it. As I understood “what”, “why” and “how”, it reduced the anxiety and fear of pain.	Good to know these important concepts of pain, increased my knowledge of pain management to become a better caregiver. It was good for me to take care of older adults; it also could be the preparation for myself.
Increased motivation and confidence	It helped me to explore another way like photo-viewing activity, which motivated me to try different methods to manage my pain. I am now more confident to participate in many outdoor activities, the fear feelings are rapidly decreased.	The older adults appeared to be more confident after joining the program. The reason must be the atmosphere in the class that motivated them.
Improved social health	I met some friends in the program. They shared a similar situation with me; I felt motivated as I knew someone understands me. Rather than being alone to face the pain, I preferred to find someone who shared my pain. Then, we could face it together.	Many of the older adults shared the similar experience of pain, it improved social health when they shared their stories with each other. As a caregiver, I also met some friends in this program. We exchanged our experience on taking care of older adults.
Feedback on the content of the PMP	The content was fair enough to me and to the older adult. It was straightforward and easy to understand. The content provided me with basic information about pain management so I could take care of myself when the caregiver is not around.	The PMP provided professional guides to me, and now I can take care of older adults in the right way.
Feedback on photo-viewing activity	I liked looking at photos, it triggered my memories and made me forget about pain. These photos helped me remember the past and good memories, it reduced pain. It was the easiest way to relieve pain; on the other hand, it was effective.	Watching photos was effective for older adults to reduce their pain for a while. It was the simplest way to reduce painful feelings. We can try it in different situations.
Feedback on the exercise part	The exercise videos were easy to follow and I can do it at home now. I can share these to my friends and we can do the exercise together.	The exercise allowed me to know more about older adults, like which specific body parts they feel pain the most. I enjoyed exercising with older adults because I was happy to see their improvements.

5. Discussion

The study's objectives were to examine the effectiveness of the PMP in reducing older adults' pain scores, enhancing their psychological well-being, and relieving caregivers' burden. The research team employed a two-arm, pilot randomized controlled trial involving 24 dyads of older adults and caregivers and collected data through self-report outcome measures to achieve these objectives. The results revealed that the PMP met the research's objectives, relieving pain, improving self-efficacy, reducing loneliness in older adults, and alleviating caregivers' burdens.

Many community service centers were shut down due to the COVID-19 pandemic, limiting older adults' access to necessary care and services. They lost access to healthcare resources and community facilities, affecting their quality of life and well-being. They could only rely on their informal caregivers (e.g., family members/relatives) for assistance in managing their pain situations and daily activities. The increasing responsibilities and stress of providing care during the pandemic had also put a strain on caregivers' physical and psychological health. Thus, as the city began reopening, the research team then implemented a dyadic pain management program dedicated to older adults and their caregivers. This program used a hybrid learning format to deliver face-to-face lessons and digital-based learning material and technical support to participants via WhatsApp. Older adults embraced and exhibited an overall positive attitude towards this lesson format, as it is more practical than fully remote programs since they might not have the necessary skills or technological infrastructure to pursue distance learning [25]. The research team prioritized the safety of all participants and staff by adhering to COVID-19 guidelines suggested by the World Health Organization (e.g., hands-sanitizing and wearing face masks during the in-person lessons [26].

The major findings implied that the pain situations of older adults were significantly improved upon completing the PMP. The mean pain intensity score in the experimental group waTfigs significantly lower than that of the control group, implying that the PMP effectively relieved pain in older adults. Indeed, the photo-viewing activity (visual stimulation) was an essential element in the PMP. According to the theory of Cognitive Adaptation, integrative reminiscence is helpful to people regarding wellness in later life [27]. The theory suggested "cognitive reconstruction," which means reconstructing past memories in a positive way. When people look at photos of reminiscent places, this reminds them of personal stories or historical developments, which could lead to positive emotions [28]. Thus, older adults recollected their good memories and gained pleasant feelings by watching photos of historical places and the nature of Hong Kong. This photo-viewing activity also served as a visual distraction that captured older adults' attention with pleasant stimuli. Distraction alleviates pain by inhibiting the activities in the pain-processing areas, including the thalamus, insular cortex, and anterior cingulate cortex (ACC) [29]. Hence, older adults felt less pain after viewing these photos.

Pain self-efficacy refers to the confidence of a person with chronic pain in their ability to carry out daily tasks despite experiencing pain [30]. In the PMP, the participants learned exercise routines that help with their pain situations. Most of the participants in the experimental group showed increased pain self-efficacy after the intervention. In the semi-structured interview, participants claimed to be more confident about participating in more outdoor activities and that their pain-related fear (i.e., fear of pain, pain-related anxiety, and fear-avoidance beliefs) was decreased [31]. The exercise routines in the PMP improved their pain tolerance [32], leading to increased confidence in handling their daily tasks and better psychological health.

The loneliness scores of older adults in the experimental group also decreased, which implied the importance of a dyadic method on the psychological well-being of older adults. According to the Health Promotion Model (HPM), the multifaceted interactions among individuals, their interpersonal relationships, and their physical environments are closely connected to their health9. Thus, interventions that incorporate specific forms of social support, like a "dyadic" system, hold more potential to enhance the engagement of older adults in health-promoting activities, foster greater adherence to treatment, encourage sustained commitments, and elevate enjoyment levels over an extended duration. The positive social environment and inclusive nature of face-to-face lessons provided motivation and reduced feelings of loneliness among older adults [33]. In the semi-structured interview, older adults reported making new friends in the PMP. Since the older adults all shared similar experiences concerning pain, they felt supported and encouraged to commit to this program, which created a sense of connection and ultimately reduced feelings of loneliness.

The caregivers' burden scores in the experimental group were reduced, which indicated that support through face-to-face lessons and digital-based learning material on pain management was adequate. In the semi-structured interview, informal caregivers also reported having improved psychological health. A previous study found that the loss of caregiving services and access to supportive programs during the COVID-19 pandemic led to greater distress and a sense of isolation in informal caregivers, and they expressed the need to establish supportive networks apart from the caregiver-care recipient relationship [34]. The PMP provided caregivers with a supportive network, including other caregivers who shared similar experiences and the research team who provided professional guidance in caring for older adults with chronic pain. Furthermore, the digital-based learning material in the PMP provided additional support to caregivers. Caregivers received the exercise videos and weekly reminders to perform the exercises with older adults via WhatsApp. Also, caregivers could refresh and strengthen their knowledge learned in the classroom by visiting the website (https://pain-management-program.mailchimpsites.com/) [19].

Hence, sufficient support empowered caregivers, which decreased their stress and anxiety about caring for older adults [35].

6. Limitations

This study was a two-arm, pilot randomized controlled trial that evaluated the effectiveness of a face-to-face delivered, digitally-supported pain management program dedicated to older adults with chronic pain and their informal caregivers. The main limitation of this intervention was the small sample size. The findings of this study may lack generalizability and may not accurately represent the entire population of older adults with chronic pain. To address this limitation, further studies with larger sample sizes are necessary. A larger sample size could provide a broader range of perspectives and suggestions, helping the research team draw meaningful conclusions and improve the intervention.

7. Conclusions

The PMP significantly improved the pain situations and psychological well-being of older adults suffering from chronic pain and lowered the burden of their caregivers. The results of this study suggested that more dyadic-based, non-pharmacological interventions should be widely implemented in pain management and caregiving. It is crucial to prioritize promoting pain education and management in older adults. By doing so, we could strive toward a better-equipped society for the growing aging population.

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8.1. Authors' Contributions

Study concept and design (MT, AC, TW, WT), acquisition of data (MT, AC, TW, WT), analysis and interpretation of data (MT, PT), drafting of the manuscript (MT, PT), critical revision of the manuscript for important intellectual content (MT, PT), administrative, technical, or material support, study supervision (MT, AC, TW, WT).

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