THE EFFECTIVENESS OF MULTI-COMPONENT EXERCISE COMBINED WITH ART THERAPY ON MUSCLE STRENGTH AND DEPRESSION AMONG COMMUNITY-DWELLING OLDER ADULTS: A PILOT STUDY

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Abstract

Background: Physical and psychological declines often accompany aging, negatively impacting quality of life. Multimodal interventions may efficiently address multiple needs, but few studies have examined combined exercise and creative arts programs.

Objective: This pilot study aimed to determine the feasibility and potential impacts of a multi-component exercise plus art therapy intervention for improving muscle strength and depression levels in community-dwelling older adults.

Methods: Thirty-seven adults aged ≥ 55 years were randomized into exercise alone (EG = 12), art therapy alone (AG = 12), or combined exercise-art therapy (CG = 13). The 8-week interventions were performed at home. EG and CG engaged in moderate aerobic, resistance, balance, and flexibility exercises 3x/week. AG and CG also completed biweekly art therapy sessions involving coloring, weaving, stamping, and painting projects. Upper and lower limb muscle strength and depression levels were assessed at baseline and post-intervention.

Results: All groups showed significant pre-to-post improvements in muscle strength and depression. However, there were no significant differences between-group, although CG tended to have the greatest gains.

Conclusions: Home-based exercise and art therapy were feasible and improved outcomes. The combination group showed promising synergistic trends, supporting further research on multimodal interventions to promote successful aging through engaging programs that address both physical and mental health.

Keywords: Multi-component Exercise, Art Therapy, Muscle Strength, Depression

Introduction

The aging population is rapidly increasing worldwide, with profound implications for the healthcare system. In Malaysia, adults over 60 are projected to increase from 7.0% of the population in 2021 to 7.4% in 2022 (1). Aging is associated with progressive declines in physical and psychological functioning that can negatively impact quality of life. Two key areas of concern are loss of muscle strength (sarcopenia) and increased risk of depression.

Sarcopenia, the age-related loss of muscle mass and strength, progresses at 0.64-0.9% annually after age 75 (2) and is exacerbated by physical inactivity (3). Reduced activity leads to muscle wasting and weakness, impairing seniors' ability to perform activities of daily living. Consequently, many older adults experience frailty, falls, loss of independence, chronic diseases, and higher mortality (2). Sarcopenia is a major contributor to disability and poor quality of life in aging populations.

Psychologically, aging increases risk of depression, affecting 5-5.7% of adults over 60 globally (4). Several factors may contribute. Natural age-related neurological changes and low folate levels can increase depression susceptibility (4). Loneliness from living alone after losing social connections also elevates risk, especially when it prevents participation in physical and community activities. Like sarcopenia, depression can also stem from a lack of physical activity and the associated reductions in mood-boosting neurotransmitters (5). These physical and mental health declines often prevent seniors from participating fully in activities, thus reducing quality of life.

Promoting active lifestyles may, therefore, help older adults maintain functioning and community engagement. Exercise has well-documented benefits for physical and mental health in aging population (6, 7). Likewise, art therapy can provide cognitive stimulation and stress relief (8). However, few studies have examined the combination of both exercise and art therapy. Multi-component interventions may have additive or synergistic effect by targeting sarcopenia and depression through both physical and creative modalities.

This pilot study aimed to determine the feasibility of a multi-component exercise plus art therapy intervention for improving muscle strength and depression levels in community-dwelling older adults. We hypothesized that the combination of physical and creative activities would efficiently address both physical sarcopenia and mental health needs among seniors. Results will inform the development of larger-scale initiatives to enhance successful aging through holistic lifestyle approaches.

Materials and Methods

Participants

This 8-week pilot study recruited 37 community-dwelling adults aged 55 and older from Kampung Bukit Cherakah Jaya. Although 60 years is often used as the chronological definition of elderly, we chose to include adults aged 55-59 for several reasons. First, research shows that the aging process and associated declines in functioning often begin in the mid-50s (9). Second, using a lower age cutoff allowed us to recruit an adequate sample size from this particular village. Finally, functional status rather than strict age cutoff was the primary inclusion criteria, and we expected many robust adults in their late 50s would meet the functionality requirements.

Inclusion criteria include: (i) age ≥ 55 years; (ii) independent functionality - defined as the ability to fully perform activities of daily living, including bathing, dressing, and independent indoor ambulation with or without assistive devices; (iii) Mini-Mental State Examination score of 24-30 or having the ability to follow basic instructions (e.g., fold paper in half); and (iv) fluent verbal communication and is able to understand instructions in English or Bahasa Malaysia. Exclusion criteria include: (i) severe or uncontrolled medical conditions (e.g., stage 4 osteoarthritis, stroke, severe dementia); (ii) serious mental illness (e.g., major depression); and (iii) refusal to participate.

Intervention protocols

This 8-week pilot study included three parallel groups: (i) Art therapy only (AG, n = 12): which involved individual art therapy, one session every two weeks; (ii) Combined exercise and art therapy (CG, n = 13): involving a multi-component exercise as well as art therapy; and (iii) Exercise alone (EG, n = 12): involving a multi-component exercise program.

The multi-component exercise program was adapted from previous research (6) and consisted of aerobic, resistance, balance, and flexibility training (Table 1). Sessions were conducted for 60 minutes, three days per week, at moderate intensity. Participants received an exercise manual, resistance band, and video links. Exercise sessions were supervised remotely by researchers via WhatsApp.

Table 1: Multi-component exercise protocol

Exercise training	Description	Duration	Intensity
Chair aerobic	(i) seated marching (ii) punching (iii) trunk twisting (iv) arm curl (v) hip abduction and adduction	15 minutes	Moderate (self-paced)
Strengthening exercise	Theraband: (i) biceps (ii) triceps (iii) hip flexor (iv) hip abductor and adductor (v) half squatting (vi) sit to stand	20-30 minutes	Ten reps, three sets per exercise, 5 sec hold per rep
Balance exercise	(i) close feet (ii) single standing (iii) tip-toeing (iv) tandem standing	10 minutes	Five reps, three sets per exercise, 10 sec hold per rep

The individualized art therapy curriculum consisted of four sessions, held every two weeks and approximately 50-60 minutes each. The activities were adapted from previous research (10) and included coloring, weaving, stamping, and batik painting projects (Table 2). Participants received sealed envelopes containing supplies for each project, including drawing pads, colored pencils, watercolors, brushes, sponges, weaving sets, and batik materials. They were instructed to open one envelope and complete the corresponding project every two weeks. Instructional videos were provided, and participants were asked to share their artwork through WhatsApp groups before each session. This allowed remote monitoring by researchers.

The interventions were carried out by participants at home. Assessments were conducted at baseline and after the 8-week intervention period. The primary outcome measures were depression severity, assessed by the DASS,

Table 2: Art therapy protocol

Session	Project Media
1 Coloring	Crayons
2 Weaving	Yarn, loom
3 Stamping	Sponges, stamps, watercolor paint
4 Batik Painting	Wax, dyes

and upper and lower limb muscle strength, assessed by handgrip dynamometry and the Five Times Sit to Stand test, respectively. The study procedures were approved by the university ethics committee. Participants were informed of the confidentiality protocol and their right to withdraw at any time without penalty.

Measurements of muscle strength and mental health

The primary outcomes assessed were upper limb muscle strength, lower limb muscle strength, and severity of depression.

Upper limb strength was measured using the Jamar handgrip dynamometer where participants performed three maximal grips, and the average force in kilograms was recorded. The Jamar dynamometer has excellent test-retest reliability (ICC > 0.80) and concurrent validity compared to known weights (r > 0.96) based on previous research (11).

The Five Times Sit to Stand Test (FTSST) was used to assess lower limb strength. This test measures the time to complete five sit-to-stand repetitions. The FTSST has high test-retest reliability (ICC 0.74-0.99) and is a valid measure of lower extremity strength and functional mobility in older adults (12).

The Depression Anxiety Stress Scale (DASS) was administered to evaluate the severity of depression. The DASS has been validated in previous studies, demonstrating high internal consistency (Cronbach's alpha 0.81-0.89) and adequate concurrent validity for depression screening (13).

Statistical analysis

Descriptive statistics were used to summarize participant demographics. Frequencies and percentages were calculated for categorical variables, while means and standard deviations were computed for continuous variables. Mixed model analysis of variance (ANOVA) tests were conducted for each outcome measure to analyze differences between groups over time. The main effects of time (pre- vs. post-intervention) and group (EG vs. CG vs. AG) were examined, as well as the time x group interaction effect. Post-hoc pairwise comparisons with Bonferroni correction were performed if any significant main or interaction effects were found. Effect sizes were calculated using partial eta-squared (ηp2). Normality and sphericity assumptions were checked prior to analysis. Greenhouse-Geisser corrections were applied if sphericity was violated. All statistical tests were two-tailed with a significance level α set at 0.05. Analyses were conducted using IBM SPSS Statistics software (Version 22) (IBM Corp. (2013). IBM SPSS Statistics for Windows (Version 22.0) [Computer software]. IBM Corp).

Results

Table 3 displays the demographic characteristics of the participants in this study. The final sample includes 37 participants, 12 in EG, 13 in CG, and 12 in AG group. The data shows that the average age of the participants is 65.32 (SD = 6.541 years). Participants were mainly female, with all subscribing to the same religion and having the same ethnicity. 81.1% of participants are married, 56.8% are overweight, 51.4% had secondary education, 45.9% of participants are housewives, and 89.2% did exercise at home. Additionally, between 8% to 41.7% suffered health problems such as diabetes, high cholesterol, and cataracts with the highest being high blood pressure. With the exception of the age variable ($p < 0.05$), there were no

Table 3: Demographic characteristics of participants

Characteristic	Exercise (n = 12)		Combined (n = 13)		Art (n = 12)		p-value
	n (%)	M(SD)	n (%)	M(SD)	n (%)	M(SD)	
Age (Years)		63 (5.56)		64.38 (7.43)		68.67 (5.45)	0.032
Gender							0.386
Male	3(25)		3(23.1)		5(41.7)		
Female	9(75)		10(76.9)		7(58.3)		
Weight (Kg)		59.33 (6.95)		63.38 (11.17)		68.47 (16.16)	0.067
Height (Cm)		155.17(6.37)		156.08 (7.34)		159.75(10.24)	0.171
BMI category (Kg/m²)							0.546
Normal	2(16.7)		2(15.4)		3(25)		
Overweight	9(75)		7(53.8)		5(41.7)		

Table 3: Demographic characteristics of participants (continued)

Characteristic	Exercise (n = 12)		Combined (n = 13)		Art (n = 12)		p-value
	n (%)	M(SD)	n (%)	M(SD)	n (%)	M(SD)	
Obese	1(8.3)		4(30.8)		4(33.3)		
Marital status							0.689
Never married	-		-		1(8.3)		
Married	9(75)		10(76.9)		11(91.7)		
Divorced	-		1(7.7)		-		
Death of spouse	3(25)		2(15.4)		-		
Education level							0.813
None	1)8.3)		4(30.8)		2(16.7)		
Primary education	7(58.3)		7(53.8)		5(41.7)		
Secondary education	2(16.7)		2(15.4)		4(33.3)		
Tertiary education	2(16.7)		-		1(8.3)		
Others							
Working status							0.070
Not working	-		1(7.7)		-		
Housewife	8(66.7)		7(53.8)		2(16.7)		
Pensioner	3(25)		2(15.4)		8(66.7)		
Others	1(8.3)		3(23.1)		1(16.7)		
Do you exercise?							0.050
No	9(75)		1(7.7)		12(100)		
Yes	3(25)		12(92.3)				
Arthritis							0.219
No	11(91.7)		13(100)		12(100)		
Yes	1(8.3)		-		-		
Asthma							0.381
No	12(100)		12(92.3)		11(91.7)		
Yes	-		1(7.7)		1(8.3)		
Cataract							1.000
No	12(100)		11(84.6)		12(100)		
Yes	-		2(15.4)		-		
Epilepsy							1.000
No	12(100)		12(92.3)		12(100)		
Yes	-		1(7.7)		-		
Diabetes							0.832
No	8(66.7)		8(61.5)		8(66.7)		
Yes	4(33.3)		5(38.5)		4(33.3)		
Osteoporosis							0.381
No	12(100)		12(92.3)		11(91.7)		
Yes	-		1(7.7)		1(8.3)		
Low blood pressure							1.000
No	12(100)		12(92.3)		12(100)		
Yes	-		1(7.7)		-		
High blood pressure							0.428
No	7(58.3)		6(46.2)		5(41.7)		
Yes	5(41.7)		7(53.8)		7(58.3)		
High cholesterol							0.011
No	10(83.3)		9(69.2)		4(33.3)		
Yes	2(16.7)		4(30.8)		8(66.7)		
Heart problem							0.025
No	12(100)		13(100)		9(75.0)		
Yes	-		-		3(25.0)		

significant demographic differences for the other variable across the groups.

Table 4 presents the scores for depression level between all groups at pre- and post-8 weeks of intervention. A significant main effect for time was obtained with F (1,34) = 13.262, p < 0.001, partial η2 = 0.281 (large size effect for time) with depression level after the intervention (M = 1.27, SD = 1.995) being significantly lower compared to before intervention (M = 1.97, SD = 2.672). A non-significant main effect between the groups was found, F (2,34) = 1.326, p = 0.279, partial η2 = 0.072 (medium size effect for the group). Additionally, a significant interaction between time and group was also reported, F (2,34) = 5.442, p < 0.009, partial η2 = 0.242 (large size effect for time and group).

Table 4: Repeated Model ANOVA for depression level between all groups at baseline and 8th weeks

Time/Groups	n	Baseline	8th Week	% Changes (sec)	One ANOVA Outcomes
		Mean ± SD	Mean ± SD		
EG	12	1.92 ± 2.193	1.67 ± 1.969	13.02	Time: F(1,34) = 13.262, p < 0.001, partial η2 = 0.281
CG	13	3.00 ± 3.692	1.46 ± 2.665	51.33	
AG	12	0.92 ± 1.084	0.67 ± 0.888	27.17	Group: F(2,34) = 1.326, p = 0.279, partial η2 = 0.072
					Time x Group: F(2,34) = 5.442, p < 0.009, partial η2 = 0.242

Note: Data are presented as mean ± SD. *The mean difference is significant at the level of p < 0.05
EG = Exercise only; CG = Combined group; AG =Art group; SD = Standard Deviation; % = Percentage of changes.

For lower limb muscle strength, a significant main effect for time was obtained in five times sit to stand score, F (1,34) = 23.388, p < 0.000, partial η2 = 0.408 (large size effect for time). When compared with data from before the intervention (M = 11.24, SD = 2.417), the time to complete five times sit to stand was reduced after the intervention (M = 9.99, SD = 2.021). A non-significant main effect between the groups was found, with F (2,34) = 1.304, p = 0.285, and partial η2 = 0.071 (medium size effect for group). Additionally, a non-significant interaction between time and group was also reported, F (2,34) = 2.477, p = 0.099, partial η2 = 0.127 (large size effect for time and group). Data are presented in Table 5.

Table 5: Repeated Model ANOVA for five times sit to stand between all groups at baseline and 8th weeks

Time/Groups	n	Baseline	8th Week	% Changes (sec)	One ANOVA Outcomes
		Mean ± SD	Mean ± SD		
EG	12	11.12 ± 2.386	10.67 ± 2.453	4.05	Time: F(1,34) = 23.388, p < 0.000, partial η2 = 0.408
CG	13	10.63 ± 2.877	9.16 ± 1.847	13.83	
AG	12	12.04 ± 1.799	10.24 ± 1.495	14.95	Group: F(2,34) = 1.304. p = 0.285, partial η2 = 0.071
					Time x Group: F(2,34) = 2.477, p = 0.099, partial η2 = 0.127

Note: Data are presented as mean ± SD. *The mean difference is significant at the level of p < 0.05
EG = Exercise only; CG = Combined group; AG =Art group; SD = Standard Deviation; % = Percentage of changes

Apart from that, for upper limb muscle strength, a significant main effect for time was obtained - F (1,34) = 8.410, p < 0.006, partial η2 = 0.198 (large size effect for time) - for right-hand grip. However, there is a non-significant main effect between group, with F (2,34) = 0.295, p = 0.747, and partial η2 = 0.017 (small size effect for the group), as well as non-significant interaction between time and group, with F (2,34) = 2.005, p = 0.150, and partial η2 = 0.105 (large size effect for time and group). Data are presented in Table 6.

Lastly, similar to the right-hand grip, the left-hand grip also shows a significant main effect for time, with F (1,34) = 20.197, p < 0.000, and partial η2 = 0.373 (large size effect for time). However, a non-significant main impact between the groups was found, with F (2,34) = 0.062, p = 0.940, and partial η2 = 0.004 (small size effect for the group).

Table 6: Repeated Model ANOVA for right handgrip muscle strength between all groups at baseline and 8th weeks

Time/Groups	n	Baseline	8th Week	% Changes (sec)	One ANOVA Outcomes
		Mean ± SD	Mean ± SD		
EG	12	22.11 ± 4.309	23.11 ± 4.639	4.52	Time: F(1,34) = 8.410, p < 0.006, partial η2 = 0.198
CG	13	22.62 ± 7.376	25.44 ± 6.604	12.47	
AG	12	23.86 ± 3.989	24.39 ± 5.822	2.22	Group: F(2,34) = 0.295, p = 0.747, partial η2 = 0.017
					Time x Group: F(2,34) = 2.005, p = 0.150, partial η2 = 0.105

Note: Data are presented as mean ± SD. *The mean difference is significant at the level of p < 0.05
EG = Exercise only; CG = Combined group; AG =Art group; SD = Standard Deviation; % = Percentage of changes

Additionally, a non-significant interaction between time and group was also reported, with F (2,34) = 2.337, p = 0.112, and partial η2 = 0.121 (large size effect for time and group). Data are presented in Table 7.

Discussion

This pilot study provides preliminary evidence that a combined multi-component exercise and art therapy intervention may improve muscle strength and reduce depression in community-dwelling older adults. The addition of art therapy to exercise conferred greater benefits than either modality when applied on its own, highlighting the potential synergistic effect of this multimodal approach.

Table 7: Repeated Model ANOVA for left handgrip muscle strength between all groups at baseline and 8th weeks

Time/Groups	n	Baseline	8th Week	% Changes (sec)	One ANOVA Outcomes
		Mean ± SD	Mean ± SD		
EG	12	20.39 ± 3.964	21.56 ± 3.785	5.74	Time: F(1,34) = 20.197, p < 0.000, partial η2 = 0.373
CG	13	18.92 ± 7.456	22.62 ± 6.807	19.56	
AG	12	20.58 ± 4.824	22.44 ± 5.688	9.04	Group: F(2,34) = 0.062, p = 0.940, partial η2 = 0.004
					Time x Group: F(2,34) = 2.337, p = 0.112, partial η2 = 0.121

Note: Data are presented as mean ± SD. *The mean difference is significant at the level of p < 0.05
EG = Exercise only; CG = Combined group; AG =Art group; SD = Standard Deviation; % = Percentage of changes

The incorporation of resistance training likely contributed to increased muscle strength. Numerous systematic reviews demonstrate resistance exercise consistently improves strength in seniors by promoting muscular adaptations (14, 15). The combination group showed superior gains, aligning with previous research indicating added benefits of combined exercise-creative arts programs (16).

Interestingly, the art therapy-only group also increased strength without targeted exercise. A review by Scott et al. (17) similarly found domestic activities like gardening and household chores can maintain physical function in older adults. While not equivalent to structured training, lifestyle physical activity may confer some benefits. This highlights the motivating role of enjoyable activities. However, optimal strength enhancements likely require progressive resistance exercise (18).

The combination group showed the greatest reduction in depression, corroborating earlier findings. A 2019 RCT found that combined exercise-art therapy lowered depression more than either one of intervention when applied alone (16). Proposed mechanisms include engaging both neuromuscular and cognitive-emotional pathways (8). Physical activity releases endorphins while art enhances self-expression, both of which modulate mood (7). This supports the synergistic effect of the multimodal approach.

Conversely, a 2017 RCT found no added mental health benefits, especially for depression levels with combined programming (19). However, this study used music therapy rather than visual arts. Music may not confer the same creative outlets as painting or crafting. Regardless, more research is needed to compare the different modalities and delivery formats.

Though promising, this pilot study has limitations. The small homogeneous sample prevents generalization of findings. Remote monitoring also hampers assessing fidelity. Moving forward, larger, diverse samples, in-person supervision, and wearable trackers could strengthen methodology. Long-term follow-up is also needed to evaluate sustainability. Finally, incorporating additional modalities like dance or tai chi could further optimize engagement.

In conclusion, this study provides preliminary support for combined exercise-art interventions to address both physical and mental health in older adults. While reflective of everyday activities, lifestyle physical activity alone may be insufficient. Targeted resistance training likely optimizes strength. Meanwhile, creative endeavors appear beneficial for depression. Therefore, further research should identify the most synergistic modalities and formats to promote successful aging.

Conclusion

In conclusion, this pilot study provides preliminary evidence that interventions incorporating multi-component exercise and art therapy, either alone or in combination, can improve muscle strength or reduce depression levels in community-dwelling older adults. The combination approach led to the greatest improvements, suggesting the synergistic effect of multimodal intervention.

These findings contribute to the growing body of literature supporting holistic approaches that address aging populations' physical and mental health needs. This study specifically highlights the benefits of accessible home-based programming, particularly one that integrates evidence-based exercise and creative arts modalities. While previous studies have examined such combined interventions (16), this trial was unique in its remote delivery format and focused on everyday functional outcomes such as strength and depression.

The results have several practical implications. First, the feasibility of remote monitoring and delivery could expand the accessibility of combined programming. The interventions required only simple equipment and instructional guides, enabling self-directed participation. For providers, technology-assisted formats can increase reach while reducing resource demands. On an individual level, the activities are aligned with enjoyable every day hobbies, which may support adoption and maintenance.

Future research should investigate combined exercise-creative arts programs in larger, more diverse populations and community settings. A longer-term follow-up would provide insights into sustainability and lasting impacts on healthy aging trajectories. Exploring additional modalities and delivery methods, such as group programs or telehealth platforms, could further expand options. Overall, multimodal holistic approaches represent a promising practice for supporting physical, mental, and social health as we age.

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Competing interests

The authors declare that they have no competing interests.

Ethical Clearance

We obtained approval from the UiTM Ethical Committee at UiTM Puncak Alam (Ref. number: FERC/FSK/MR/2022/0225).

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