



Case Study

Integrated Dance and Dance Movement Therapeutics (IDDMT) To Fall Prevention among Chinese Community-Dwelling Older Adults: The Preliminary Findings

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Abstract

Background: Majority of the studies emphasized either of the physical or psychological outcomes for fall prevention, the combined effects was rarely evaluated. Studies of an integrated approach to fall prevention on the physical and psychological changes were indicated. **Aim and Objectives:** This study aimed to explore the impact of the integrated dance and dance movement therapeutics (IDDMT) on the physical and psychological health outcomes among the community-dwelling older adults. **Methods & Materials:** Pre-experimental pretest and posttest design of the IDDMT on the paired dependent groups. The physical health outcomes were measured by the uni-pedal stance (Balance) test and Timed-Up & Go (TUG Mobility) test. The psychological fear of fall and well-being were measured by the revised fear of fall questionnaire (FFQ-R) & 5-Item World Health Organization (WHO-5) Well Being Index respectively. **Data Analysis:** The descriptive analysis, paired-sample T-test and Wilcoxon test were used to examine the effects of the IDDMT program on mobility, balance, fear of fall and wellbeing to fall prevention. **Significance:** The study added further knowledge and evidence on the effect of IDDMT on fall prevention among older adults.

Keywords: Fall prevention; Dance; Dance movement program; Mobility; Balance; Wellbeing

Introduction

According to the Census and Statistics Department (2023) [1], more than one-third of Hong Kong's population will be aged 65 or above in 2046. The growing aging population increases the demand for community care programs to promote the physical and psychological health outcomes of the older adults in a society. For instance, physical frailty and poorer subjective well-being in older adults are widely discussed [2-4]. Considering the associated factors, physical inactivity is one of the common unhealthy lifestyles contributing to adverse health outcomes. To prevent or reverse the suboptimal condition, it is recommended by the World Health Organization to replace sedentary time with an active lifestyle, such as light-intensity exercise [5,6].

Prevalence of fall in Older Adults

As the second leading cause of death from unintentional injury, a fall is described as an unintentional coming to rest on the ground or at a lower level with or without loss of consciousness [7]. In Hong Kong, it was estimated that 28-35% of older adults aged 65 or above fall every year. Amongst hospitalized fallers, fractures at around 9.9% and soft tissue injuries at around 31.3% [8]. Concerning the negative consequences, falls in older adults can lead to hospitalization, disability, morbidity, and death [9]. Besides, a higher risk of falls is proven in older people with comorbidities, such as diabetes or hypertension, whereas lower physical activity levels and fall history are other predisposing factors [10,11]. Focusing on fall history, the subsequent fear of falling is a crucial predictor of future fall likelihood independent of balance performance [12,13].

Dance Therapeutics to Health & Fall Prevention

Dance movements are psychotherapeutics to promote emotional, social, cognitive, and physical integration of the individual for the purpose of improving health and well-being [14]. Recent meta-analysis on the effects of dance movement therapy and dance on health-related psychological outcomes identified that the dance movement therapy decreases depression and anxiety and increases quality of life and interpersonal and cognitive skills, whereas dance interventions increase (psycho-)motor skills [15,16].

Community-based exercise programs focused on balance and strength training were effective in reducing the risk of falls among older adults at average or high risk [17]. Considering an array of exercise-based interventions, dancing was perceived as a popular leisure-time activity in the older adult community that would improve adherence [18]. Concurrently, extant literature

explored the therapy of dance to reduce fall risks in healthy older adults. As an exemplar, a systematic review reported that dance could be a therapy to enhance balance, gait and dynamic mobility, strength, and physical performance which are fall-related physical factors [19]. Most of the fall prevention literature were assessing the physical benefits. El-Khoury et al. [20] examined the effect of the fall prevention program through systematic review and meta-analysis of randomized control trials and recently Ewan et al. [20] also conducted a systematic review on physical activity programs for balance and fall prevention in elderly, however, the focus was only on physical outcomes without taking into account of the importance of psychological needs which was also vital for preventing fall in recent studies. The linkage of current fall prevention programs to the multifaceted causes of fall was mostly focusing more on physical exercises.

A recent meta-analysis study of the psychological benefits of dance-based intervention highlighted that dance therapy was superior to other physical activity interventions to improve motivation, aspects of memory, social cognition, and distress. It was also consistent with previous systematic review on dance movement therapy and fall prevention [21] stating that dance was a popular form of physical activity with multiple health benefits and there was some indication that dance may reduce fear of falling.

Significance of the study

Despite the above benefits, there was a paucity of global and Chinese studies investigating the integrated approach of dance and dance movement to fall prevention from physical and psychological health dimensions. Given the limited studies on these related outcomes in Chinese population, and the diverse approaches of the dance therapy, further studies on the effects and approaches were indicated.

Aim

The study aimed to explore the effect of the integrated dance and dance movement therapeutics on the physical and psychological factors to fall prevention among the Chinese community-dwelling older adults.

Objectives

To examine the difference between the pretest and the posttest score of the paired groups on fear of fall, wellbeing, mobility and balance after the DDMT intervention.

Method & Procedures

Study design

A case study with pretest posttest design.

Subject recruitment

Participants were invited through phone calls and emails to the recruitment talks in two district health centers which mainly serve the older people. Subjects were recruited according to the selection criteria. Participants were well informed of the program details with the information sheets.

Ethics Consideration

Participants were fully informed of the potential risks and benefits of the program participation. Participants' consents were obtained from using the program evaluation data. No identifiable personal information would be disclosed in any of the public report. Participants had the right to withdraw from the evaluation study of the program anytime with no consequence on their program participation.

Inclusion criteria included subjects who aged 50 or above; were able to read Chinese and listen Cantonese for the instructions of the dance. Subjects were able to give consents to the study involvement and able to attend at least 8 sessions including the first and last session for the pre-test and post-test evaluation.

Exclusion criteria included the history of bone & joint injury, history of fall in the last three months. Participants were required to complete a self-declaration of physical fitness checklist before the program begins. Subjects were excluded if they were unable to provide the fitness declaration for the dancing exercise.

Program structure

The IDDMT consisted of ten sessions. Each session lasted for 1.5 hours of the rhythmic dance movements and body-mind awareness training. Participants were engaged in a group of 12-15. The physical exercises, the rhythmic dance movements and the experiencing process of the five senses and awareness to the well-beings of body and mind were facilitated by the occupational therapist and the dance/movement therapist. The dance choreography involved a greater social and emotional expression, together with body-mind dance therapy elements. Take-home video was provided to seniors for home practice.

Data Collection

A pretest-posttest design of a case study was undertaken. The subject variables included demographics, history of fall and health conditions. The outcome measures consisted of the self reported well-being and fear of falls and the objective assessment on mobility and balance.

Measures

- The physical balance was measured by the balance (uni-pedal stance) test that was sensitive to assessing risk of falls;

clients were instructed to stand on a single leg (right) with eyes closed and time was counted [22].

- The physical mobility TUG (Timed-Up & Go) test with excellent intra-rater, interrater and test-reliabilities [23]. The TUG test was also adopted by the health service sectors [24,25].

- The psychological measure of fear of falls (FFQ- R) with Cronbach's α ranged from 0.72 to 0.83, and test-retest reliability of 0.82. The FFQ-R is a 15-item self-report questionnaire; rated on a 4-Likert scale from 1 (strongly disagree) to 4 (strongly agree). The total possible score ranged from 15–60, with higher scores indicating greater fear of falls [26].

- The psychological wellbeing was measured by the 5-item World Health Organization Well Being Index (WHO-5) which is a short self-report measure with a sensitivity of 0.93 and a specificity of 0.83 in the detection of depression from young to older adults [27].

Data Analysis

All statistical analyses were performed using the IBM-SPSS version 28. Descriptive statistics was used to summarize the sample characteristics and health variables. Dependent sample t-test was used to test the significant difference between the means of the paired pretest and posttest on balance and mobility. Paired non-parametric Wilcoxon test was used to test the median difference of the pretest and posttest on fear of fall and well-being. The level of significance was set at p-value <0.05 Table 1.

Results

Variables	N (%)
Q1) Demographics Characteristics	
Gender	
Male	6 (11.5)
Female	46 (88.5)
Age (years)	
50 -64	18 (34.6)
65-79	34 (65.4)
Mean (66.77)	
Monthly personal income (\$HK)	
0	17 (32.7)
Below 5001	21 (40.4)
5001-10000	12 (23.1)
10001-15000	0 (0)
15001-20000	2 (3.8)
Q2) History of fall in the past 12 months	

Yes	7 (13.5)
No	45 (86.5)
Q3.1) With chronic diseases	
Yes	29 (55.8)
No	23 (44.2)
Q3.2) Use of medication	
Yes	15 (28.8)
No	37 (71.2)
Q4) Vision or hearing impairment	
Yes	20 (38.5)
No	32 (61.5)
Q5) Unsteady gait	
Yes	17 (32.7)
No	35 (67.3)
Q6) Inadequate physical activity	
Yes	30 (57.7)
No	22 (42.3)

Table 1: summarizes the demographics, health conditions, and history of fall of the sample.

Demographics

Fifty-two over seventy-nine participants completed the program with a 34% attrition rate. Forty-six of the sample were female (88.5%) and six of them were males (11.5%). The mean age is 66.77 with a range of 52-79. Eighteen (34.6%) aged between 50-64 and thirty-four (65.4%) aged between 65-79. The personal income including government subsidy was respectively 32.7% (n=17) of zero income; 40.4% (n=21) below HK5000, 23.1% (n=12) between HK5001-HK10000; and 3.8% (n=2) between HK10001-HK20000.

Health conditions

The majority of the participants (86.5%; n=45) had no history of falls in the past 12 months. More than fifty percent (55.8%; n=29) were diagnosed with chronic diseases; 28.8% (n=15) were taking medication; 38.5% (n=20) had visual or hearing impairment; 32.7% (n=17) had an unsteady gait, 57.7% (n=30) self-reported physical inactivity.

Effects on Mobility & Balance

The Table 2 summarized the paired T-test on both the balanced test (Uni-pedal test) and mobility test (Timed-Up and Go <TUG> test). The balance score was significantly higher (p<0.05) after the program and mobility level was increased with great significance (p<0.01) after the IDDMT program.

		Paired Differences	t	df	Significance
		95% Confidence Interval of the Difference			Two-Sided p
		Upper			
Pair 1	Balance_Lt_T1 – Balance_Lt_T2	-0.031	-2.054	51	.045*
Pair 2	Balance_Rt_T1 - Balance_Rt_T2	-0.29	-2.554	51	.014*
Pair 3	Mobility_T1 – Mobility_T2	1.531	2.963	51	.005**

*p<0.05; **p<0.01

Table 2: Paired T Test

Effects on Fear of fall & Well-being

The Table 3 summarized the Wilcoxon test on the measures of fear of fall and well-being. Participants' level of fear of fall were significantly lower ($p < 0.01$) and the state of positive well-being was very significantly higher ($p < 0.001$) after the participation of the IDDMT program.

	Fearoffall_T2 - Fearoffall_T1	WHO5_T2 - WHO5_T1
Z	-2.630 ^a	-3.728 ^b
Asymp. Sig. (2-tailed)	.009 ^{**}	.000 ^{***}
** $p < 0.01$; *** $p < 0.001$		
a. Based on positive ranks.		
b. Based on negative ranks.		

Table 3: Wilcoxon Test

Discussion

Dance & Dance Movements to Mobility & Balance

Results of this study were consistent with previous studies that physical activities can enhance mobility and balance significantly by strengthening lower limb muscle [20,28]. Dance was found to improve strength, flexibility, motor ability, aerobic endurance, muscle mass and body composition in older adults to prevent age-related functional decline [29]. It is also coherent with a study on the effect of dance therapy [30] on the balance of women aged over 60 that the dance elements in dance therapy showed a significant improvement in the indicators of balance skills and stability limits, which indirectly decreased the risks of fall.

It was suggested by Ungar et al. [31] that causes of falls were often multifactorial, due to physiological age-related changes including sight, hearing, locomotor or more properly pathological factors; and the environment barriers that limit interaction within the environment increased individual susceptibility to fall. The combined efforts of dance and dance movement activities integrated the therapeutic effects on body-awareness and body mind through the five senses stimulation and perception may contribute positively the proprioception response to better physical results on balance and mobility.

Pessoa et al. [32] stressed that dance therapy was a potentially relevant intervention in physical activity among older people. Dance is multifaceted and acts on the sensorimotor, cognitive and psycho-emotional, and social aspects of the elders. They were more easily motivated to continue the practice on their own when compared with other physical exercises. Dance itself yields higher

motivation for participants than normal exercise [18]. Participants were highly motivated to practice dance at home with their recorded dance video in the program. This self-motivated practice might also contribute to the significant findings of the physical and psychological outcomes.

Dance and Dance Movements on Fear of fall and Well-being

The psychological outcomes were also consistent with previous studies on the effects of dance and dance movement therapy on well-being. Dance therapy on decreasing negative symptoms and enhancing quality of life [16]. Dance therapeutics were effective for decreasing clinical symptoms such as depression and anxiety; the positive effects were also found on the increase of subjective well-being, positive mood, affect, and body image [15]. The significant results of reducing fear of fall and enhancing well-being in this study may be related to the integrated body and mind approach in the dance and dance movement therapeutics.

The integrated dance and dance movement therapy (IDDMT) provided the emotion expression of body mind awareness to fall may result in positive well-being and reducing fear of fall. The body mind awareness consisted of the three main components: rhythmic movements, body-mind connection and social movements.

Rhythmic movements in dance involved music and movements in a happy and relaxing manner, not like routine exercises. The integrated physical exercises into dance and make varieties and intensity even for the same exercises to build up the lower body strength. The integration of dance and dance movement therapy might increase the joy of the physical exercise. Thaut et al. [33] also suggested that rhythmic auditory stimulation significantly reduced the number of falls in Parkinson's disease and modified key gait parameters, such as velocity and stride length. Stephen Porges [34] in his study reported that by engaging in body-mind practice in a social context such as vocalizing, breathing practices, shifting postures and movements, the active and passive pathway activities of ventral vagal nerves would stabilize and restore the autonomic nervous system into equilibrium which can promote safety and trust as well as reducing anxiety and fear. Furthermore, improvement in physical performance may also contribute to higher confidence of walking or fall prevention in seniors, resulting in less fear of fall.

Body-mind connection (embodiment) in dance and movement therapy was proven to enhance well-being in western literature [35]. Body-mind awareness practice enhanced psychological well-being [36]. Greater sense of body awareness enhanced better understanding on bodily sense and emotions. The self-regulation may also be reinforced from enhancing five senses and proprioception.

Individuals while positively interact with others help strengthening social support network and well-being [37]. The integrated dance therapeutics also reinforced elders to interact in a social environment through the relaxing dance and dance movement activities [38]. Pessoa and his team conducted a systematic review in 2019 found that DMT induced a significant increase in well-being and socialization for elders, such as more willingness to participate in other social activities, happiness, and motivation in the face of new friendships stemming from the meetings.

Aging is a natural process that encompasses physical, cognitive, emotional, and social issues; dance therapy is a physical activity that can deeply influence all these aspects in elderly individuals [32]. Continuous studies can be done to investigate more specifically the correlation between.

Limitation

This study was a pre-test & post-test design without a control group causing a Hawthorne effect. The sample size was small with limited statistical power. The uneven gender in the participants, that might be related to females usually were more interested in dance activities than males, affected the generalizability of the result to other Chinese senior population groups.

Conclusion

The preliminary findings of the integrated dance and dance movement therapeutic program on mobility, balance, fear of fall and well-being to fall prevention were positive. Future studies on the experimental design with control group in multi-centers was recommended to increase the sample size and generalizability of the findings.

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Conflict of Interest

The authors declare no conflict of interest.

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