



# Physical fitness exercise versus cognitive behavior therapy on reducing the depressive symptoms among community-dwelling elderly adults: A randomized controlled trial



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## ABSTRACT

**Background:** Depression is a major health problem for community-dwelling elderly adults. Since limited resources are available to decrease the high prevalence of depressive symptoms among the elderly adults, improved support for them can be provided if we can determine which intervention is superior in ridding depressive symptoms.

**Objective:** To compare the effectiveness of the physical fitness exercise program and the cognitive behavior therapy program on primary (depressive symptoms) and secondary outcomes (6-min walk distance, quality of life, and social support) for community-dwelling elderly adults with depressive symptoms.

**Design and settings:** A prospective randomized control trial was conducted in three communities in northern Taiwan.

**Participants:** The elderly adults in the three communities were invited to participate by mail, phone calls, and posters. There were a total of 57 participants who had depressive symptoms and all without impaired cognition that participated in this trial. None of the participants withdrew during the 9 months of follow-up for this study.

**Methods:** Fifty-seven participants were randomly assigned to one of the three groups: the physical fitness exercise program group, the cognitive behavior therapy (CBT) group, or the control group. The primary (Geriatric Depression Scale-15, GDS-15), and secondary outcomes (6-min walk distance, SF-36, and Inventory of Socially Supportive Behaviors

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scales, ISSB) were collected immediately (T2), at 3 months (T3), and at 6 months after the interventions (T4).

**Results:** After the interventions, the CBT group participants demonstrated significantly lower symptoms of depression ( $p = 0.009$ ) at T2 and perceived more social support from those around them ( $p < 0.001$ ,  $< 0.001$  and  $= 0.004$ , respectively) at three time-point comparisons than the control group. Moreover, after intervention, participants in the physical fitness exercise program group had decreased GDS-15 scores at three time-point comparisons ( $p = 0.003$ ,  $0.012$  and  $0.037$ , respectively), had a substantially greater 6-min walk distance ( $p = 0.023$ ), a better quality of life ( $p < 0.001$ ), and a better perceived social support at T2 ( $p < 0.001$ ).

**Conclusions:** Immediately after a 12-week intervention, there were significant decreases in depressive symptoms and more perceived social support amongst those in the CBT group. When considering the effectiveness in the decrease of depressive symptoms longer term, the increase in the 6-min walk distance and raising the patients' quality of life, physical fitness exercise program may be a better intervention for elderly adults with depressive symptoms.

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### What is already known about the topic?

- Depression is a major health problem for community-dwelling elderly adults, but it is often under-diagnosed and under-treated, since it is often hidden behind somatic symptoms.
- Both cognitive behavioral and exercise strategies could reduce depressive symptoms among elders. However, no study compares the effects of these two interventions among elderly with depressive symptoms.

### What this paper adds

- Both exercise and CBT (cognitive behavior therapy) interventions, which are group-based, are appropriate and effective programs for reducing elders' depressive symptoms after a 12-week program.
- If improving physical fitness, quality of life, and maintaining a longer term effect from the intervention are desired, then the group-based exercise program is the best choice for community-dwelling elderly adults with depressive symptoms.

## 1. Introduction

Depression has an ubiquitous influence affecting all ages and both sexes, earning its place as the second most prominent disease in the world (Ferrari et al., 2013) as well as one of the leading causes of suffering for the older adults. Due to the frequent occurrence of somatic symptoms concealing the disease, depression is often under-diagnosed and under-treated (Hsieh and Lai, 2005). Depressive symptoms (DS) are defined as sadness, melancholy, or a feeling of hopelessness (Lai, 2002) and include feelings of sadness that are accompanied by altered mood and somatic symptoms that are not sufficient in severity to lead to a diagnosis of clinical depression (Khalil et al., 2010). The prevalence of DS in community-dwelling elderly adults is 10.4–39.3% (Chung, 2008; Ganatra et al., 2008; Sirey et al., 2008) (in Taiwan, it is 20.3–31.3%, Chen, 2009; Lyu and Lin, 2000). DS decreases the quality of life

(Akyol et al., 2010; Dekker et al., 2011) and increases the risk of suicide (Sirey et al., 2008) leading to a higher mortality rate (Sun et al., 2011).

According to previous research, the two effective strategies to decrease depression amongst the older adults include exercise (Shin et al., 2009; Silveira et al., 2010; Sims et al., 2009) and cognitive behavioral therapy (CBT) (Ekberg and Lecouteur, 2012; Laidlaw et al., 2008; Strachowski et al., 2008). Wright and Cattan (2009) advocated for exercise to decrease depression due to the accessibility and low cost of the activity, even drawing attention to the fact that exercise is free from adverse side effects when done sensibly. Exercise also leads to an increase of neurotransmitters (e.g., serotonin, dopamine, and norepinephrine) available in the brain, which have been diminished by depression (Sharpley, 2013; Wright and Cattan, 2009). A meta-analysis study to determine the effectiveness of exercise in the treatment of adult people with a diagnosis of depression by Mead et al. (2009) targeted 23 trials (907 participants), and found that the pooled standardized mean difference (SMD) was  $-0.82$  (95% CI (confidence interval)  $-1.12$ ,  $-0.51$ ), revealing a large clinical effect. Conversely, when included the three trials with adequate allocation concealment, intention to treat analysis, and blinded outcome assessment, the pooled SMD was  $-0.42$  (95% CI  $-0.88$ ,  $0.03$ ), indicating a moderate and non-significant effect. Mead et al. suggested that more methodologically robust trials should be performed to obtain more accurate estimates of effect sizes.

CBT is based on Beck's (1979) cognitive theory of depression that posits depression is the result of faulty or maladaptive cognitive processes. Thus, the combination of basic behavioral and cognitive principles can change maladaptive thinking and lead to changes in both behavior and affect (Hassett and Gevirtz, 2009; Salmon and Jablonski, 2010). Recent variants of CBT emphasize changes in one's relationship to maladaptive thinking rather than changes in the thinking itself (Hayes et al., 2011).

The effective exercise programs include promoting cardiorespiratory endurance (Brenes et al., 2007; Resnick et al., 2008; Shin et al., 2009), muscle strength and

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