A Multicomponent Exercise Program for Institutionalized Older Adults

Effects on Depression and Quality of Life

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ABSTRACT

This study examined the effects of a multicomponent exercise program on depression and quality of life in institutionalized older adults. A quasi-experimental pretest-posttest design was used. Participants were recruited from a publicly funded shelter home in Seremban, Negeri Sembilan Malaysia. The experimental group consisted of 23 volunteers 60 or older who performed 60 minutes of supervised exercise three times per week for 12 weeks. The control group consisted of 20 volunteers who continued with a sedentary lifestyle. At 12 weeks, the exercise group demonstrated an improvement in quality of life by 10.74% (p > 0.05) but not depression (−1.6%, p > 0.05). The control group demonstrated a decrease in both quality of life by 11.26% (p > 0.05) and level of depression by 17.7% (p > 0.05). This study suggests a multicomponent exercise program is a feasible intervention to improve quality of life in institutionalized older adults.

The psychological well-being and overall perception of quality of life (QOL) of institutionalized older adults tend to decline with the passage of time. Depression is the most commonly reported psychological problem among institutionalized older adults, ranging in prevalence from 22.2% to 81.8% (Chow et al., 2004; Demet, Taskin, Deniz, Karaca, & Icelli, 2002; Lin, Wang, & Huang, 2007; Mohd Aznan & Samsul, 2007). Osness and Mulligan (1998) found depression might strongly affect the QOL of older adults.

Previous studies have reported a moderate to strong association between functional fitness and both psychological well-being (Morala, Shiomi, & Maruyama, 2006; Penninx, Deeg, van Eijk, Beekman, & Guralnik, 2000; Penninx et al., 1998) and QOL (Karinkanta, Heinonen, Sievanen, Uusi-Rasi, & Kannus, 2005; Larson, 2001; Ozcan, Donat, Gelecek, Ozdirenc, & Karadibak 2005; Regan, 2004; Sayer et al., 2006). Therefore, participation in regular physical activity and exercise has been recommended to improve functional fitness and thus enhance the overall well-being of older adults (American College of Sports Medicine [ACSM], 1998a; Brach, Simonsick, Kritchevsky, Yaffe, & Newman, 2004; Mazzeo et al., 1999; McDermott & Mernitz, 2006).

LITERATURE REVIEW

On the basis of various recommendations, physical activity and regular exercise should focus...
on improving functional fitness by engaging in cardiorespiratory, flexibility, strength, and balance training 3 to 5 days per week (ACSM, 2006; Nelson et al., 2007; Nied & Franklin, 2002; Topp, Fahlman, & Boardley, 2004; Centers for Disease Control and Prevention, 1999). However, studies incorporating all of these components of functional fitness were lacking. A few studies using different components of exercise such as strength training (Damush & Damush, 1999), balance training (Steadman, Donaldson, & Kalra, 2003), and functional training (Chin A Paw, van Poppel, Twisk, & van Mechelen, 2004) produced inconsistent positive effects on QOL.

Similarly, regarding effects of exercise on psychological function, various types of exercise have been tested, such as aerobic training alone (Antunes, Stella, Santos, Bueno, & de Mello, 2005; Babyak et al., 2000; Blumenthal et al., 1999; MacRae et al., 1996), resistance training alone (Morris et al., 1999; Sims, Hill, Davidson, Gunn, & Huang, 2006; Singh, Clements, & Fiatarone, 1997; Singh, Clements, & Singh, 2001; Singh et al., 2005), or different combinations of two or three types of exercise interventions (Bastone & Filho, 2004; Chin A Paw et al., 2004; Mather et al., 2002; McMurdo & Rennie, 1993; Sjösten, Vahlberg, & Kivela, 2008; Sung, 2007). Single components of exercise such as aerobic or strength training operate through different mechanisms in promoting health in older adults (Cassilhas et al., 2007; Madden, Blumenthal, Allen, & Emery, 1989; Rydwik, Frandin, & Akner, 2004; Seguin & Nelson, 2003; Takeshima et al., 2007). Therefore, an exercise intervention or recommendation for older adults should consist of a multicomponent program that includes aerobic, strength, balance, and flexibility training.

In terms of intensity, Tsutsumi, Don, Zaichkowsky, and Delizonna (1997) reported participation of older adults in high-intensity or low-intensity strength training improved overall fitness, mood, and physical self-efficacy; cognitive functioning remained constant in the study. Singh et al. (1997) found high-intensity progressive resistance training to be more effective than low-intensity training for the treatment of depressed patients. However, the drawback to high-intensity training was that it discouraged long-term compliance and adherence, and also predisposed older adults to be at risk for adverse events (ACSM, 1998a; Chin A Paw et al., 2004; Littbrand et al., 2006). In addition, high-intensity training, especially when using training machines, required proper instruction and close supervision. In another study, Tsutsumi et al. (1998) observed that a moderate-intensity rather than high-intensity training regimen might be more beneficial to improve psychological health in sedentary older adults.

Various outcome measures have been used to measure the effect of exercise intervention on psychological well-being and perception of QOL, which may contribute to the inconsistent results. Psychological well-being as represented by level of depression has been tested with the Geriatric
Depression Scale (Antunes et al., 2005; Bastone & Filho, 2004; Chin A Paw et al., 2004; MacRae et al., 1996; Mather et al., 2002; Morris et al., 1999; Sims et al., 2006; Sjosten et al., 2008; Sung, 2007), Beck Depression Inventory (Babyak et al., 2000; Blumenthal et al., 1999; Singh et al., 1997, 2001), and Hamilton Rating Scale for Depression (Babyak et al., 2000; Blumenthal et al., 1999; Mather et al., 2002; McMurdo & Rennie, 1993; Singh et al., 1997, 2005), whereas perception of QOL has been tested using Cantril’s Self-Anchoring Scale (von Faber et al., 2001), SF-36® Health Survey (Bowen et al., 2006; Helbostad, Sletvold, & Moe-Nilssen, 2004), SF-12® Health Survey (Damush & Damush, 1999), Geriatric Depression Scale, and the Dartmouth Primary Care Cooperative Information project (MacRae et al., 1996).

Despite the importance of a multicomponent exercise training program for improving psychological well-being and QOL in older adults, there are insufficient studies that have documented the effects of such programs, especially among institutionalized older adults. Therefore, the purpose of this study was to determine the effects of participation in a group-based multicomponent exercise program at low to moderate intensity on psychological well-being (level of depression) and perception of QOL (life satisfaction) in institutionalized older adults.

**METHOD**

**Participants**

Participants for this quasi-experimental study were recruited from a publicly funded shelter home in Seremban Negeri Sembilan, Malaysia. The 12-week intervention started in November 2007 and ended in February 2008.

The inclusion criteria for the study were adults 60 and older living in a publicly funded shelter home who were able to walk 6 or more meters with or without any walking devices; able to comprehend the study procedures; had no medical conditions that would prohibit safe, independent participation in low- to moderate-intensity exercise; had a physician’s clearance for exercise participation; and were oriented to name, place, and time. Participants needed to be able to follow simple instruction based on the Mini-Mental State Examination (Folstein, Folstein, & McHugh, 1975) (i.e., take a piece of paper, fold it into two, and place it back on the table or in their lap). Participants could not be currently involved in a regular exercise program more than 30 minutes per day for three times per week and were also required to be independent in basic activities of daily living (e.g., bathing, grooming, climbing stairs, walking). Those not meeting the inclusion criteria were excluded from the study.

A total of 52 individuals met the inclusion criteria. Participants self-selected themselves into either the intervention (exercise) group (n = 27) or the control (no exercise) group (n = 25).

Permission to conduct the research in the institution was obtained from the appropriate Ministry in Malaysia. We obtained ethical approval from the university’s ethics committee. All participants provided written consent prior to data collection.

**Exercise Group**

The exercise intervention was designed based on recommendations for frail older adults by the ACSM (2006), Nelson et al. (2007), and Nied and Franklin (2002), with components of cardiorespiratory endurance, strength, balance, and flexibility being incorporated in the program. The program was conducted three times per week (Monday, Wednesday, and Friday) and supervised by one of the researchers (M.J.) who is a trained physiotherapist. Two assistants were appointed from among the staff at the institution to assist in the exercise program. Their responsibilities included supervising and monitoring participants’ safe performance of exercise and good posture as well as observing for any signs of fatigue. All exercise classes were conducted in the physiotherapy department within the institution.

The class consisted of 5 to 10 minutes of warm-up, 20 to 45 minutes of aerobic, 15 to 20 minutes of resistance training, 10 minutes of balance, 10 minutes of stretching, and 5 to 10 minutes of cool down exercises (Table 1). Resistance training was conducted every Monday and Friday; during classes on these 2 days, the aerobic session was shortened to approximately 20 minutes to allow for 15 minutes of resistance training.

Aerobic exercise was started with participants in a sitting position and involved continuous movement of major muscles of the upper limb, performed alternately with movement of the lower limb. In the first 2 weeks of the aerobic phase, participants performed exercise for 20 minutes at comfortable limits without feeling any difficulty in breathing. Progression started in week 3, with participants performing aerobic exercise in a standing position (e.g., walking in place with arm movements). Aerobic activities were also incorporated with balance training such as lifting one leg forward, backward, and sideways; tiptoeing; and heel standing. These activities were performed continuously and rhythmically with arm movements until participants experienced slight difficulty in breathing, which indicated moderate intensity (Nelson et al., 2007).

Resistance training was designed based on functional tasks that are required for older adults to be independent. The source of resistance came from participants’ own body weight or an elastic band. Exercises that mimicked functional tasks such as standing from a sitting position, heel standing, turning, reaching forward, and lifting objects were performed with participants using either an elastic band or their own body weight as resistance. In the first 2 weeks, the participants started with low intensity, performing between 5 and 8 repetitions for each muscle group. Progression began in Week 3 and continued with movements increased by 2 to 4 repetitions every 3 weeks until participants...
were able to perform 15 repetitions by Week 8. Participants performed between one and three sets of 8 to 15 repetitions, with 30 seconds of rest between sets to prevent fatigue.

Balance training was also conducted based on functional tasks required by older adults such as alternating leg lifting, walking sideways, and throwing and catching a ball. Prior to cool down participants performed stretching exercises designed to improve the flexibility of major muscle groups; each stretch was sustained between 15 and 30 seconds to the point of tightness and repeated three times.

Control Group
A one-time health education talk was held for participants in the control group. The talk covered topics such as the importance of:
- Participating in regular physical activity and exercise (e.g., walking daily for 30 to 60 minutes).
- Preventing falls (e.g., information on risk factors for falling, benefits of exercise to reduce risk of falling, how to get up from a sitting position, use of proper gait devices and footwear).
- Maintaining a balanced diet.
- Using correct posture during activities (e.g., proper posture for sitting, standing, lifting).

Participants were then asked to continue with their previous lifestyle. The control group participants were followed up with social visits by the researcher once in 2 weeks, in which they were asked about any problems with their health and any exercise participation. Researcher continued to stress on the importance of exercise in improving well-being.

Instruments

Demographic Data. Participants’ demographic data, including age, gender, ethnicity, and length of residency in the institution, were obtained using a structured questionnaire. Participants’ height, body weight, and body mass index (BMI) were also measured. Health history (reported medical conditions) was obtained from participants’ medical records available in the institution’s clinic.

Participants’ outcomes were assessed at baseline and at 12 weeks of intervention. The outcomes were measured by two physiotherapists.

### TABLE 1

**MULTICOMPONENT EXERCISE PROGRAM FOR THE INTERVENTION GROUP**

<table>
<thead>
<tr>
<th>Exercise Component</th>
<th>Movement</th>
</tr>
</thead>
</table>
| Warm-up            | - Breathing exercise  
|        Duration: 5 to 10 minutes | - Range of motion exercises for neck, shoulder, wrist, trunk, hip, knee, and ankle |
| Aerobic            | - Marching in place, alternate toe touches to front, alternate heel touches, and alternate toe touches to sides, alternate heel touches to sides, alternate kicks, alternate knee lifts, and alternate double knee lifts  
| Movement performed continuously, beginning in a sitting position for the first 2 weeks and progressing to a standing position; speed of movement increased slowly  
| Intensity: Low to moderate (slight difficulty in breathing)  
| Duration: 20 to 45 minutes | - All movements were incorporated with upper limb movement, such as clapping, elbow flexion and extension, and shoulder abduction/flexion/extension/cross adduction |
| Resistance         | - Sitting: arm side raise, biceps curl, and arm horizontal abduction with elastic band; double hip abduction with elastic band tied at mid-thigh  
| Sets: 1 to 3 sets | - Standing holding a chair and performing plantar flexion, knee flexion, hip flexion, knee extension, squatting, hip extension, and side leg raise; toe-standing and walking, sitting to standing |
| Intensity: First 2 weeks, 5 to 8 repetitions, then progressing to 8 to 15 repetitions  
| Duration: 10 minutes | - All movements were incorporated with upper limb movement, such as clapping, elbow flexion and extension, and shoulder abduction/flexion/extension/cross adduction |
| Frequency: 2 times per week, 8 to 10 movements per session | - All movements were incorporated with upper limb movement, such as clapping, elbow flexion and extension, and shoulder abduction/flexion/extension/cross adduction |
| Balance            | - Standing: lifting leg forward, backward, sideways, tiptoeing, heel-stand; toe-walking; side-walking, sitting to standing while holding balls, throwing balls to partner while standing |
| Duration: 10 minutes | - All movements were incorporated with upper limb movement, such as clapping, elbow flexion and extension, and shoulder abduction/flexion/extension/cross adduction |
| Frequency: 3 times per week | - All movements were incorporated with upper limb movement, such as clapping, elbow flexion and extension, and shoulder abduction/flexion/extension/cross adduction |
| Stretching         | - Shoulder flexion with arm touching the arm: hand pushing up  
| Intensity: 15 to 30 seconds stretch  
| Duration: 10 minutes | - Hamstring stretch: knee extension with hands trying to reach toes  
| Frequency: 3 times per week | - Trunk side bending, calves stretch, and shoulder retraction  
| | - Sitting: wrist flexor and extensor stretch, double hip abduction  
| | - Neck side flexion, neck extension, and neck rotation to the left and right |
| Cool down          | - Range of motion exercises for the neck, shoulder, wrist, trunk, hip, knee, and ankle  
| Duration: 5 to 10 minutes | - Exercise is ended with breathing exercise |

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who were not involved in the exercise program and were blinded to the participants' assignment at baseline and at 12 weeks. The researcher was not involved in data collection to avoid any bias caused by developed familiarity to participants during the 12-week intervention program.

**Malay Version of the Geriatric Depression Scale (GDS).** The 12-item Malay version of the GDS was used to measure participants' level of depression. The original GDS is a 30-item self-report measure with response categories of *yes* or *no* (Yesavage et al., 1982-1983). The 30-item GDS was translated into Bahasa Malaysia and later was validated into shorter 15-item, 14-item (Teh & Hasanah, 2004), and 12-item (Hamid, 1999) versions. The shorter versions of GDS in Bahasa Malaysia have been used to measure depression among community-dwelling and institutionalized Malaysian older adults (Mohd Aznan & Samsul, 2007; Teh & Hasanah, 2004).

In the 12-item GDS, items 5, 9, and 11 from the 15-item GDS were omitted. Participants responded to the 12 questions by answering *yes* or *no* in reference to how they felt on the day they completed the GDS. The higher the score, the higher the level of depression.

The GDS was chosen for this study because it is easily comprehended by older adults and takes approximately 5 minutes to complete. The GDS was administered prior to the start of the exercise program and at the end of the training regimen. Cronbach's alpha coefficients for the 12-item GDS in this study ranged from 0.78 to 0.95, suggesting good internal consistency.

**Cantril's Self-Anchoring Scale.** This instrument was used to measure participants' subjective perception of life satisfaction or general well-being that reflected their overall perceptions of QOL (von Faber et al., 2001). This instrument, which was designed by Cantril in 1963 (as cited in American Thoracic Society, 2007), is a single-item measurement technique that consists of a scale ranging from 0 (*worst possible life*) to 10 (*best possible life*) that is presented as a vertical ladder. Participants were asked to describe the best possible QOL they could imagine as the top of the ladder and the worst possible QOL imaginable as the lowest point on the ladder.

Reliability has not been reported previously for this instrument. According to the American Thoracic Society (2007), its content validity is determined each time researchers use the technique by how they decide what question to ask. Cronbach's alpha coefficients for Cantril's Self-Anchoring Scale in this study ranged from 0.76 to 0.85, suggesting good internal consistency.

### Data Analysis
 Changes in level of depression and perception of QOL (life satisfaction) were the main outcome variables. Results were reported as means (SD) and ranges. Independent sample *t* tests were used to determine baseline demographic differences between groups. Repeated measures analysis of variance (ANOVA) was used to determine whether there were time factor effects, group effects, and interaction between two factors (group and

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**TABLE 2**

CHARACTERISTICS OF PARTICIPANTS (*N = 43*) AT BASELINE

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Exercise Group (n = 23)</th>
<th>Control Group (n = 20)</th>
<th>p Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age, mean (SD)</td>
<td>70.19 (8.84)</td>
<td>71.80 (6.88)</td>
<td>0.506</td>
</tr>
<tr>
<td>Gender, n (%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Women</td>
<td>11 (47.8)</td>
<td>10 (50)</td>
<td></td>
</tr>
<tr>
<td>Men</td>
<td>12 (52.2)</td>
<td>10 (50)</td>
<td></td>
</tr>
<tr>
<td>Height (m), mean (SD)</td>
<td>1.53 (0.08)</td>
<td>1.53 (0.07)</td>
<td>0.979</td>
</tr>
<tr>
<td>Weight (kg), mean (SD)</td>
<td>53.18 (9.11)</td>
<td>55.30 (10.34)</td>
<td>0.48</td>
</tr>
<tr>
<td>Body mass index (kg/m²), mean (SD)</td>
<td>22.93 (4.17)</td>
<td>23.95 (5.23)</td>
<td>0.479</td>
</tr>
<tr>
<td>Ethnicity, n (%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Malay</td>
<td>14 (60.9)</td>
<td>13 (65)</td>
<td></td>
</tr>
<tr>
<td>Chinese</td>
<td>5 (21.7)</td>
<td>4 (20)</td>
<td></td>
</tr>
<tr>
<td>Indian</td>
<td>3 (13.0)</td>
<td>3 (15)</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>1 (4.3)</td>
<td>0 (0)</td>
<td></td>
</tr>
<tr>
<td>Length of residency (years), mean (SD)</td>
<td>3.14 (2.82)</td>
<td>4.56 (3.97)</td>
<td>0.165</td>
</tr>
<tr>
<td>Reported medical conditions, mean (SD)</td>
<td>0.70 (0.57)</td>
<td>0.55 (0.61)</td>
<td>0.417</td>
</tr>
<tr>
<td>Medication intake, mean (SD)</td>
<td>0.61 (0.66)</td>
<td>0.65 (0.98)</td>
<td>0.871</td>
</tr>
</tbody>
</table>

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time), whereas analysis of covariance (ANCOVA) was used to determine the presence of confounding variables in both the intervention and control groups. An alpha level of \( p < 0.05 \) was considered significant for all statistical tests. Percentage of changes in the outcome variable was reported.

**RESULTS**

The final sample consisted of 43 participants (23 in the experimental group and 20 in the control group). Mean age of participants was 71.09 (SD = 7.41 years). Mean height, body weight, and BMI were 1.53 m (SD = 0.07 m), 54.46 kg (SD = 9.56 kg), and 23.8 kg/m² (SD = 4.65 kg/m²), respectively. Baseline characteristics of both groups are shown in **Table 2**. Mean length of residency in the institution was 3.14 years (SD = 2.82 years) for the intervention group and 4.56 years (SD = 3.97 years) for the control group. There were no significant differences between the two groups on demographic characteristics.

**Table 3** shows the mean, SD, range, and percentage of change for level of depression and QOL before and after the intervention for both groups. Baseline depression scores for the intervention (mean = 5.48, SD = 2.99) and control (mean = 4.80, SD = 3.22) groups were not statistically different (\( p > 0.05 \)). Repeated measures ANOVA showed no significant differences in the level of depression after the 12-week intervention due to effect of time, \( F(1, 41) = 1.068, p > 0.05, \eta² = 0.025 \); time and group interactions, \( F(1, 41) = 1.068, p > 0.05, \eta² = 0.025 \); and between-group effect, \( F(1, 41) = 0.117, p > 0.05, \eta² = 0.003 \). The mean score for the intervention group increased 1.64% from pretest (5.48, SD = 2.99) to posttest (5.57, SD = 3.31) (\( p > 0.05 \)), whereas the mean score for the control group increased by 17.71% from pretest (4.80, SD = 3.22) to posttest (5.65, SD = 3.28) (\( p > 0.05 \)).

Baseline QOL ranged from 4 to 10 for both groups. There were no statistically significant differences between the two groups at baseline. Repeated measures ANOVA showed no significant difference in the main effect of time for QOL, \( F(1, 41) = 0.054, p > 0.05, \eta² = 0.001 \); however, the time and group interaction was statistically significant, \( F(1, 41) = 5.417, p < 0.05, \eta² = 0.117 \). There were no significant differences between the two groups after the intervention.

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**TABLE 3**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Exercise Group (n = 23)</th>
<th>Control Group (n = 20)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean (SD), Range</td>
<td>Mean (SD), Range</td>
</tr>
<tr>
<td></td>
<td>Baseline 12 Weeks</td>
<td>Baseline 12 Weeks</td>
</tr>
<tr>
<td>% Change</td>
<td></td>
<td>% Change</td>
</tr>
<tr>
<td>Depression</td>
<td>5.48 (2.99), 0 to 11</td>
<td>5.57 (3.31), 0 to 11</td>
</tr>
<tr>
<td></td>
<td>1.64</td>
<td>1.64</td>
</tr>
<tr>
<td>Quality of life</td>
<td>6.52 (1.95), 4 to 10</td>
<td>7.22 (1.91), 3 to 10</td>
</tr>
<tr>
<td></td>
<td>10.74</td>
<td>7.55 (2.28), 4 to 10</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6.7 (2.3), 3 to 10</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-11.26</td>
</tr>
</tbody>
</table>

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**TABLE 4**

| Covariates            | Depression Homogeneity of Slopes ANCOVA Quality of Life Homogeneity of Slopes ANCOVA |
|-----------------------|----------------------------------------------------------|----------------------------------------------------------|
|                       | F \( p \) Value                                         | F \( p \) Value                                         |
| Gender                | 0.295 0.592                                            | 0.511 0.479                                             |
| Age                   | 0.116 0.736                                             | 0.609 0.440                                             |
| Body mass index       | 0.211 0.648                                            | 0.462 0.501                                             |
| Ethnicity             | 1.358 0.255                                            | 0.361 0.551                                             |
| Length of residency   | 3.961 0.058                                            | 0.193 0.663                                             |
| Presence of chronic disease | 0.016 0.900                                           | 0.499 0.484                                             |
| Medications           | 0.943 0.338                                            | 0.956 0.334                                             |
12-week intervention $F(1, 41) = 0.215, \ p > 0.05, \ \eta^2 = 0.005$. Examination of the changes in QOL between baseline and after the 12-week intervention showed an improvement of 10.74% in the exercise group, whereas the control group worsened by 11.26%.

The results of the ANCOVA for level of depression and QOL are shown in Table 4. The ANCOVAs for all covariates were not significant for level of depression and QOL. Therefore, controlling for each of the covariates did not yield a significant difference between the two groups. Results of this analysis demonstrated gender, age, BMI, ethnicity, length of residency, presence of chronic conditions, and medication intake did not contribute significantly to reported level of depression and QOL.

**DISCUSSION**

This study was conducted for 12 weeks because a meta-analysis report on the relationship between physical activity and psychological well-being found that longer exercise duration was less beneficial for several types of psychological well-being (Netz, Wu, Becker, & Tenenbaum, 2005). However, after the 12-week intervention, both groups showed no significant changes in GDS score. According to the ACSM (1998b), sedentary older participants may take several weeks to adapt to the initial rigors of training and thus need a longer adaptation period to get the optimal benefit from an exercise program.

A nonrandomized controlled design was used for this study. The findings are consistent with similarly designed studies on institutionalized older adults with 12 to 24 weeks of exercise intervention in which changes in levels of depression were measured using the 30-item GDS (Chin A Paw et al., 2004; MacRae et al., 1996). In a quasi-experimental study using weight training intervention for 10 months among older adults living in residential care nursing homes, Morris et al. (1999) also observed no significant effects on depression score using the 30-item GDS. However, in another study, Bastone and Filho (2004) observed significant improvement in depression that was measured using the 30-item GDS (28.2%, $p < 0.01$) among institutionalized older adults who participated in 6 months of functional exercise incorporated with strength training and aerobic training that mimicked functional activities. McMurdie and Rennie (1993) also found significant improvement in the self-rating of depression ($p < 0.01$) following 7 months of seated exercise in institutionalized older adults age 64 to 91.

Because the results from previous studies with intervention duration ranging from 3 to 10 months are inconsistent, we cannot conclude whether the duration of the intervention in this study was too short to observe beneficial effects on the level of depression. Netz and Jacob (1994) argued in their literature review that neither long- nor short-term exercise brought about changes in effect. However, the common finding of improved psychological function immediately following exercise suggests physical activity did have some positive effect on cognition in institutionalized older adults.

The selection of the shorter 12-item GDS to measure the outcome of the intervention could be the reason for the lack of positive changes in the level of depression. The shorter version GDS may lack sensitivity compared with the longer versions, especially when detecting changes in a short duration of intervention. In addition, the mean preintervention score for both groups was low, indicating floor effects (i.e., a large number of participants showing minimum scores), which limits the ability to detect any changes. Measures for which a sizable proportion of participants perform at ceiling or floor level typically fail to provide meaningful information (VanSwearingen & Brach, 2001).

Thus, the 12-item GDS may have limited ability to provide much information about improvement compared with the original 30-item GDS or the 15-item GDS. However, even previous studies that have used the 30-item GDS failed to observe significant changes in levels of depression after an exercise intervention (Chin A Paw et al., 2004; MacRae et al., 1996; Sims et al., 2006; Sjosten et al., 2008). Two studies using the 15-item GDS also revealed no significant changes in levels of depression after an exercise intervention (Fujisawa et al., 2007; Inokuchi, Masusaka, Hayashi, & Shindo, 2007). Therefore, it is inconclusive whether the 12-item GDS used in our study is lacking in sensitivity to detect any changes in levels of depression among older adults; this warrants further study on the use of various versions of the GDS.

It is also possible that no significant improvement in GDS scores could be due to the time lapse between the last exercise and the posttest measurement, which was conducted 2 days after the last exercise class. According to Netz and Jacob (1994), improvement in psychological function was reported immediately following an exercise session among institutionalized geriatric patients.

Other reasons that could have contributed to the lack of improvement in GDS score could be related to several factors found to predict depressive symptoms. In previous studies, comorbidity or number of chronic diseases (Al-Shammari & Al-Subaie, 1999; Chow et al., 2004; Lin et al., 2007) and length of residency (Chow et al., 2004; Lin et al., 2007) were found to be factors that significantly predicted depression symptoms. This evidence could be used to justify why the level of depression in the control group increased markedly (17.7%) after 12 weeks. Participants in the control group reported more chronic diseases (27%) compared with participants in the intervention group who reported only 18 chronic diseases. In addition, the average length of residency of participants in the control group was longer (4.56, $SD = 3.97$ years) than in the intervention group (3.14, $SD = 2.82$ years).
However, analysis of covariances found participants were similar in their characteristics (Table 4).

The design of this study in which participants were allowed to self-select their preferred group could also explain the marked increase in the level of depression, especially in the control group. Sabin (2005) argued that unwillingness to participate in rehabilitative effort was associated with low motivational factor. This was supported by O’Connor and Vallerand (1994), who found individuals with less self-determined motivational orientations residing in institutions for older adults displayed lower levels of psychological adjustment such as life satisfaction, self-esteem, depression, and meaning in life. In addition, undiagnosed and untreated depression might have deleterious effects on motivation (Sabin, 2005).

A previous study by Tsai (2006) found that satisfaction with living situation and perceived health status in institutionalized older adults significantly predicted depressive symptoms. In this study, perception of life satisfaction is associated with depressive symptoms at baseline ($r = -0.517$, $p < 0.01$) and after the 12-week intervention ($r = -0.456$, $p < 0.01$), which is consistent with Tsai’s observation.

In their study regarding life satisfaction in institutionalized older adults who were cognitively alert, Mosher-Ashley and Lemay (2001) suggested that interventions aimed at increasing the quality of social life and that encouraged a positive perception of life during and after adjustment to the facility might be successful in improving residents’ life satisfaction. Therefore, the design of this study, which was conducted in a group that allowed for social interaction and development of friendships with motivation and encouragement from the instructor, may have contributed to positive effects on quality of life (Eyigor, Karapolat, & Durmaz, 2007).

In this study, improvement in life satisfaction was evidenced by an increase of 10.74% in Cantril’s Self-Anchoring Scale following the 12-week intervention, whereas the control group demonstrated a decrease of 11.26%. However, the results did not reach statistical significance after the 12-week intervention for the exercise group. This could be due to how participants perceived their general well-being as an older person living in an institution.

Another factor that may have led to the finding of no significant differences in the two groups could be attributed to the nature of the outcome measure. Cantril’s Self-Anchoring Scale requires participants to rate the level of life satisfaction from 0 (worst possible life) to 10 (best possible life). Scores between 0 and 10 show limited range for the outcome measure to be responsive to changes, especially in a short duration of intervention as used in this study. In particular, the multicomponent exercise program consisting of aerobic, strength, flexibility, and balance training is a feasible intervention that may improve and maintain the psychological function and quality of life of older adults.

Nurses are in the best position to regularly assess functional status of older adults and then encourage them to participate in lifelong physical activity and exercise. Institutionalized older adults are at risk for psychological decline and poor quality of life due to a sedentary lifestyle and the aging process.

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**LIMITATIONS**

This study is quasi-experimental in design, and participants self-selected to the group they preferred. The lack of randomization is a weakness to this study that limits its generalizability. Another weakness of the study is the small sample in both groups, which might have contributed to the lack of significant differences in level of depression and QOL. Finally, the length of the study (only 12 weeks) might have been too short to show a positive improvement in depression.

**CONCLUSION AND IMPLICATIONS**

Although the findings of this study indicate participants demonstrated an improvement in life satisfaction, their level of depression did not improve. Given the importance of increasing older adults’ level of physical activity, the results of this study have important implications for nursing practice. In particular, the multicomponent exercise program consisting of aerobic, strength, flexibility, and balance exercises can be safe and enjoyable for institutionalized older adults.

Nurses are in the best position to organize activities and encourage institutionalized older adults to engage in lifelong physical activity such as participating in group exercise, dancing, walking, and using stairs. Regular assessments conducted by nurses can determine whether type and level of activity need to be revised. It is advisable that nurses assess older adults on admission to the institution and regularly assess residents’ functional status so proper exercise intervention can be prescribed.

The findings of this study warrant further study to determine the effectiveness of the multicomponent exercise program.
exercise program with a better study design. Future study should include randomization, longer duration of intervention, larger and more diverse samples, and use of outcome measures sensitive to changes in psychological functioning.

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