Effects of a Behavioral and Exercise Program on Depression and Quality of Life in Community-Dwelling Older Adults

A Controlled, Quasi-Experimental Study

ABSTRACT

Sedentary behavior and low participation in exercise among older adults can lead to depression and low quality of life (QOL). The current study investigated the effects of behavioral and exercise programs on depression severity and QOL among Malaysian community-dwelling older adults. A controlled, quasi-experimental, pre–posttest design was used. A total of 63 participants were divided into three groups: (a) exercise and behavior group (EBG), (b) exercise only group (EG), and (c) control group (CG). Results showed a significant difference in depression among groups ($F(2,58) = 33.49, p < 0.01, \eta^2 = 0.54$; mean, EBG < EG < CG) and in physical ($F(2,58) = 5.33, p < 0.01, \eta^2 = 0.16$; mean, EBG > EG > CG) and mental ($F(2,58) = 4.08, p < 0.01, \eta^2 = 0.12$; mean, EBG > CG > EG) scores of QOL. A combination of behavioral and exercise programs has superior effects on depression and QOL of older adults. [Journal of Gerontological Nursing, 42(2), 45-54.]

Azilyana Azizan, BPT; and Maria Justine, PhD

Depression is a common mental illness, which can severely affect adults 60 and older and is particularly more frequent in individuals with comorbid conditions (Fiske, Wetherell, & Gatz, 2009). Older adults with depression may experience changes in their level of physical and psychological functioning that may adversely impact their health-related quality of life (HRQOL) (Onat, Delialioğlu, & Ucar, 2014; Polenick & Flora, 2013; Potter, Ellard, Rees, & Thorogood, 2011; Salguero, Martínez-García, Molinero, & Márquez, 2011). Major depression often leads to suicidal tendencies, which increases the risk of death (Huang et al., 2011). Huang et al. (2011) reported the prevalence of depression in older adults to be between 11.2% and 13.3% in industrialized countries. In Malaysia, the overall prevalence of depression ranges from 3.9% to 46% (Mukhtar & Oei, 2011).
The exact pathological causes for depression are ambiguous. Most studies show that changes in the brain are the main cause of depression, with these changes related to certain hormone levels, such as serotonin, norepinephrine, and dopamine (Gwenn, 2008; Tsopelas et al., 2011). It is believed that these hormones are related to mood and motivation in an individual. Some individuals have associated behavioral problems, such as smoking, excessive alcohol consumption, and decreased physical activity with depressive symptoms (Maglione et al., 2012; Win et al., 2011). Depression can also be categorized with problematic behavioral–environmental relationships. Depression is associated with low levels of positive reinforcement and high levels of aversive control (Lazarus, 1968). Clinical depression can be diagnosed by a cluster of symptoms that persist for more than 2 weeks, which include feelings of unbearable sadness and loss of pleasure, sleep disturbance, lack of energy, inability to concentrate, feelings of worthlessness, and thoughts of suicide (Fitzgerald, Laird, Maller, & Daskalakis, 2008).

A previous study claimed that psychosocial interventions were effective in managing stress-related disorders, specifically depression, by improving perceived social support, facilitating problem-focused coping, and changing cognitive appraisals (Schneiderman, Ironson, & Siegel, 2005). Recently, behavioral activation has been shown to be an effective strategy for reducing depression severity in older adults (Polenick & Flora, 2013). Exercise has been shown to enhance positive mood and cognitive function in older adults with depression (Langlois et al., 2013). A longitudinal study by van Gool et al. (2003) reported that depression in older adults is associated with a decline in physical activity and change from an active to sedentary lifestyle, with a relative risk ratio of 1.62. Exercise has been shown to compare favorably with standard care approaches to depression in some studies that have evaluated its feasibility and efficacy (Blake, Mo, Malik, & Thomas, 2009; Brenes et al., 2007). One study found that aerobic training (most effective) and resistance training (effective) appear to improve depressive symptoms comparable to pharmacotherapy and psychotherapy (Blumenthal, Smith, & Hoffman, 2012). This finding is supported by a recent systematic review that highlighted behavior as the primary factor, playing an important role in the reduction of stress and minimizing depressive severity, thus providing a better HRQOL (Park, Han, & Kang, 2014).

Exercise training has been clinically proven to prevent and reduce depressive symptoms in healthy, aged populations and as an alternative treatment for depression (Mortazavi et al., 2012). Others hypothesized that depression might be related to a chemical imbalance within the brain (Helmich et al., 2010). Depressive conditions can also be improved with medication, such as antidepressant drugs, which may correct these imbalances (Wiese, 2011). In contrast, the effects of exercise have also been shown to significantly increase the hippocampal neurogenesis with similar results as taking antidepressant drugs by increasing the synthesis of new neurons in the brain, approximately two- to three-fold in the hippocampal region, level of β-endorphins, vascular endothelial growth factor (VEGF), brain-derived neurotrophic factors (BDNF), and serotonin (5-HT) (Ernst, Olson, Pinel, Lam, & Christie, 2006). This mechanism works by enhancing growth of new neurons in the dentate gyrus by the action of β-endorphins and prolonging their survival through the activation of VEGF and BDNF, whereas 5-HT increases cellular proliferation and enhances neurogenesis (Craft & Perna, 2004; Ernst et al., 2006).
Based on previous literature, the current researchers believe that behavioral intervention may have the potential to improve mood, motivation, and self-esteem, and can be further enhanced with the combination of an exercise program. However, limited studies have reported the effects of such combined interventions. For this reason, the current study aimed to investigate the effects of a behavioral program combined with exercise training on depression and HRQOL (i.e., physical and mental components) among community-dwelling older adults. The researchers hypothesized that combining behavioral intervention with exercise training would provide superior effects on depression and HRQOL compared to exercise training alone.

METHOD

Participants

Participants in this 12-week, quasi-experimental, controlled study were recruited from three different villages in Malaysia: (a) Kampung Bukit Cherakah, (b) Kampung Felda Cherakah, and (c) Kampung Telok Gadong. Participants were divided into three groups according to their villages: (a) exercise and behavioral program group (EBG; n = 18), (b) exercise only group (EG; n = 23), and (c) control group (CG; n = 22).

The sample size was calculated through G-Power software version 3.0.10. To detect a difference between depressive severity using the Malay version of the Geriatric Depression Scale (GDS; Nyunt, Fonse, Niti, & Ng, 2009) and HRQOL, with 90% power and an estimated 30% dropout rate, a minimum of 17 participants was required for each group. The selected villages were based on their homogeneity, and all participants were Malaysian. Most participants had a primary school education, performed nontechnical work, had access to community infrastructures (e.g., community halls and community clinic), and the same level of physical activities. It was important to select participants from a homogenous background for a quasi-experimental study to minimize the influence of behavioral factors as well as to avoid communication bias among participants in different groups, which may occur in a typical non-randomized population. Participants with significant differences in demographic status may have different levels of physical and psychological health, especially in relation to the level of education and vice versa (Schöllgen, Huxhold, & Schmiedek, 2012).

Inclusion criteria were: (a) age 60 and older, (b) able to perform activities of daily living (ADLs), (c) able to understand English and/or Malay, (d) residence in close proximity of the study setting, and (e) no cognitive impairment based on the Mini-Mental State Examination (MMSE; Folstein, Folstein, & McHugh, 1975) (i.e., score <24). Exclusion criteria were based on individuals who reported one or more chronic illnesses that limited their exercise participation and (a) presented with a chronic musculoskeletal problem, (b) had dementia or a neurological disorder, (c) had severe hearing and visual impairment, and (d) had mobility limitations.

At the time of recruitment, 73 participants met the inclusion criteria. However, 10 participants were excluded from the data analysis due to withdrawal or attendance of less than 80% of the intervention classes. Among the reasons for study dropout were lack of transportation to the study site, time constraints, and weather problems.

The Ethics Committee of the university approved the protocol for the current study. The purpose and procedure of the study were explained to participants, and they were required to complete an informed consent form by ensuring the confidentiality and option to withdraw at any time from the study without penalty.

Procedure

EBG participants performed the exercise training for 6 weeks. Once the exercise training was stopped, participants continued with the behavioral program for 5 weeks. EG participants performed only the exercise training for 6 weeks. There was no intervention administered to CG participants, but they were advised to continue with their normal routines. They also attended a one-time session to discuss the importance of physical activity and exercise. CG participants benefitted from the intervention, as they were given a behavioral manual, which contained types of exercises, how to perform correct exercises, and the expected effects of exercise. However, they lacked supervision and encouragement from the researchers because after the first session they had no further contact with the researchers.

The demographic data comprised age (years), weight (kg), height (m), body mass index (BMI; kg/m²), and health history, which were recorded at baseline for all participants. The outcomes of the intervention included the level of depression, measured by the 15-item GDS, and HRQOL as well as the SF-12 health survey at baseline, Week 12, and Week 24.

Exercise Program. In the current study, a group-based exercise program was adapted from Justine, Hamid, Mohan, and Jagannathan (2012) and supplemented with additional movement focusing on locomotor training, mainly aimed at increasing mobility of community-dwelling older adults. The exercise program comprised three sessions per week for 1 hour, which were supervised by a trained physiotherapist (the researcher, A.A.) along with three research assistants (graduates with a Diploma in Physiotherapy) who were appointed to assist in the implementation of the exercise. The tasks of the research assistants were to help the main researcher as spotters (i.e., assist participants with exercise if needed), check for any danger signs from participants (e.g., fatigue, falls/postural instability, shortness of breath), and correct the posi-
Exercise programs for older adults should include cardiorespiratory endurance, strength, balance, and flexibility training (Nelson et al., 2007). The exercise program was conducted on alternate days, with a 1-hour duration to avoid lengthy sessions and prevent any exhaustion or risk of injury to participants (Nelson et al., 2007). The program comprised a 5- to 10-minute warm-up; 20 to 30 minutes of strength, flexibility, balance, endurance, and locomotor training; and 5 to 10 minutes of cool down exercises. The exercise program was accompanied by music for expressing feelings, promoting relaxation, and enhancing enjoyment among participants. According to Murrock and Higgins (2009), music helps interrupt the stress response during exercise and has a significant role in the communications that may result in improved social well-being, sense of belonging, and improved HRQOL.

**Behavioral Program.** The behavioral program was designed by incorporating the Transtheoretical Model (TTM) of change, a theory originally described by Prochaska and Velicer (1997) involving five phases that describe alterations in individuals’ health behaviors. The protocol of the behavioral program has previously shown beneficial effects on increasing motivation in older adults at different stages of the behavior process (Azizan, Justine, & Kuan, 2013). Each participant completed the validated instrument for assessing the stage of change (Marcus et al., 1992) at baseline (i.e., 1 week prior to the execution of the program). Based on the assessments, participants reported that they were in the stage of change (stages 1 to 5) for physical activity and current exercise behavior. Individuals who reported higher stages of change (i.e., 3, 4, or 5) might have already been active, thus they were excluded from

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**TABLE 1**

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<th>Strategy</th>
<th>Explanation</th>
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| Behavior analysis | • Verbal prompts: Every Monday and Wednesday for 2 weeks, a verbal prompt was given to participants to create awareness of the activity materials available in the center. The following statement was made by the researcher: "If anyone wishes to use any of the tools at the center, feel free to do so any time you would like. Simply take the equipment you need and give your name to the physical therapists in charge."  
• Poster prompt: A poster listing the various activities and instructions was placed on the clinic’s notice boards for a 2-week period in addition to the verbal prompt.  
• A behavior analysis sheet was also used. |
| Behavioral contract | • The researcher used a behavioral contract for every participant. The contract specified the exercise goals and consequences of reaching and not reaching set goals. |
| Behavioral manual | • Every participant received a behavioral manual, which provided the benefits of exercising and served as a reminder for participants to continue exercising at home. |
| Social support | • Participants were encouraged to enlist social support for their exercise program from family, friends, exercise classmates, and fitness instructors. |
| Self-efficacy via ESE scales and role model session | • Aimed to (a) increase participant self-efficacy by ensuring that their goals are realistic and can be met, (b) provide peer role models, (c) offer encouragement, and (d) provide instruction to decrease anxiety and self-consciousness. The self-efficacy intervention was conducted in a class with a presentation and viewing of a scene from a movie. "Modeling" was noted as a process of comparison between oneself and another individual (i.e., a successful peer). |
| Positive self-talk | • Participants were encouraged to replace unhelpful (i.e., discouraging) thoughts with more productive thoughts in positive self-talk sessions. A worksheet was given to participants and the researcher supervised its completion. |
| Group discussion, counseling, and face-to-face interview | • Group discussion with the researcher (A.A.) included motivators and barriers to exercise. Counseling sessions involved a group of participants who completed a short interview with the researcher about strategies to increase ESE. Face-to-face interview involved a one-on-one session with the researcher and study participant regarding exercise determinants. |

Note. ESE = exercise self-efficacy.
the study. This instrument was adopted in the program as an inclusion guideline to maintain homogeneity. Knowing the level of readiness of participants to change their exercise behavior is relevant because it enhances the adoption and adherence to exercise.

Several researchers have reported that the behavioral foundation is an important component that has been successfully used in depression prevention studies (Fiske et al., 2009; Marcus et al., 1992; McLaughlin & McFarland, 2011). The program was conducted two times per week for a period of 5 weeks. Participants were aware of the main outcomes of this program, which included: (a) promoting health behavior changes, especially exercise participation; (b) motivating older adults to adhere to exercise; (c) managing stress and depressive symptoms; and (d) promoting social interactions and improving HRQOL. Several behavioral strategies were included in the program (Table 1).

### Outcome Measures
**Level of Depression.** The level of depression was measured using the 15-item Malay version of the GDS (Nyunt et al., 2009). According to Nyunt et al. (2009), the GDS-15 is a reliable and valid screening tool for major depressive disorder across different ages, genders, ethnicities, and chronic illnesses in community-dwelling and institutionalized older adults. The GDS-15 had an overall Cronbach’s alpha of 0.80, with an intraclass coefficient test–retest reliability over 2 weeks of 0.83 and interrater reliability of 0.94 (Nyunt et al., 2009). This measure was administered prior to the intervention and at Weeks 12 and 24 following completion of the program. Participants answered simple questions relating to psychological aspects, such as life satisfaction, happiness, and the state of memory. The higher the score, the higher the level of depression; maximum scores range from 12 to 15, indicating severe depression.

**Health-Related Quality of Life.** HRQOL was measured using the SF-12 Health Survey (Liang & Wu, 2014) at baseline and Weeks 12 and 24. Items in the SF-12 instrument were used to calculate two scales, namely the Physical Component Summary (PCS) and Mental Component Summary (MCS). Total scores range from 0 to 100, with higher scores indicating better mental health, physical health, and general health perception.

### Data Analysis
Statistical analysis was performed using SPSS 20.0 in which statistical significance was assessed using an alpha level of 0.05. Analysis of covariance (ANCOVA) was used to examine differences in posttest scores of depression and HRQOL among the three groups (i.e., EBG, EG, and CG), while controlling for baseline scores of the two dependent variables. All assumptions for ANCOVA were met, and preliminary analyses were conducted to evaluate the

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**TABLE 2**

**BASELINE CHARACTERISTICS OF STUDY PARTICIPANTS (N = 63)**

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Exercise and Behavior Group (n = 18)</th>
<th>Exercise Group (n = 23)</th>
<th>Control Group (n = 22)</th>
<th>Two-Way ANOVA</th>
<th>p Value</th>
</tr>
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<tbody>
<tr>
<td>Gender (n, %)</td>
<td></td>
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</tr>
<tr>
<td>Female</td>
<td>8 (44.4)</td>
<td>15 (65.2)</td>
<td>12 (54.5)</td>
<td>0.52</td>
<td>0.872</td>
</tr>
<tr>
<td>Male</td>
<td>10 (55.6)</td>
<td>8 (38.4)</td>
<td>10 (45.5)</td>
<td>3.94</td>
<td>0.025*</td>
</tr>
<tr>
<td>Age (years)</td>
<td>66.1 (6.21)</td>
<td>63.5 (3.39)</td>
<td>62.3 (3.07)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Body weight (kg)</td>
<td>60.79 (13.94)</td>
<td>65.73 (9.93)</td>
<td>64.28 (8.12)</td>
<td>1.08</td>
<td>0.347</td>
</tr>
<tr>
<td>Height (m)</td>
<td>1.53 (0.14)</td>
<td>1.56 (0.08)</td>
<td>1.57 (0.1)</td>
<td>0.49</td>
<td>0.618</td>
</tr>
<tr>
<td>BMI (kg/m²)</td>
<td>26.16 (6.76)</td>
<td>26.97 (3.02)</td>
<td>26.32 (3.73)</td>
<td>0.19</td>
<td>0.829</td>
</tr>
<tr>
<td>Depression*</td>
<td>1.65 (0.79)</td>
<td>1.83 (1.15)</td>
<td>3.09 (1.27)</td>
<td>10.44</td>
<td>0.001*</td>
</tr>
<tr>
<td>HRQOLb</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Physical component</td>
<td>43.85 (3.36)</td>
<td>50.92 (5.3)</td>
<td>42.81 (4.12)</td>
<td>21.93</td>
<td>0.001*</td>
</tr>
<tr>
<td>Mental component</td>
<td>48.91 (2.27)</td>
<td>45.86 (5.14)</td>
<td>50.9 (5.76)</td>
<td>6.28</td>
<td>0.003*</td>
</tr>
</tbody>
</table>

Note. ANOVA = analysis of variance; BMI = body mass index; HRQOL = health-related quality of life. All values are mean (SD), unless otherwise noted.
* Measured using the Malay version of the Geriatric Depression Screening.
b Measured using the SF-12 Health Survey.
*p < 0.05.
The baseline characteristics of the participants are shown in Table 2. Analysis of variance was used to test the baseline comparison in which no significant differences were found among groups with respect to age, height, weight, and BMI (all \( p > 0.05 \)). However, there were significant differences in the level of depression, PCS, and MCS among the three groups at baseline \(( p < 0.05)\).

A preliminary analysis of evaluating the homogeneity-of-regression (slopes) assumption indicated that the relationship between the covariate and dependent variable did not differ significantly as a function of the independent variable \((F(2, 56) = 0.13, p = 0.881)\). A significant main effect was only found in the level of depression among the three groups \((F(2, 58) = 33.49, p < 0.001, \eta^2 = 0.54)\) on the completion of the program. ANCOVA for PCS at baseline (covariant) did not differ significantly as a function of the independent variable \((F(2, 56) = 2.709, p = 0.075)\). A significant main effect was found.
on the PCS among the three groups ($F(2, 58) = 5.330, p = 0.007, \eta^2 = 0.16$) following completion of the program. For MCS, the ANCOVA analysis also showed no significant differences among the three groups ($F(2, 56) = 0.246, p = 0.783$) at baseline. Following completion of the program, a significant main intervention effect on MCS was found ($F(2, 58) = 4.082, p = 0.022, \eta^2 = 0.12$). Table 3 shows the results of the pairwise comparisons for all outcomes among the three groups.

**DISCUSSION**

Based on the findings, EBG participants showed the least level of depression and better HRQOL at the end of the study period. EBG participants were given additional behavioral interventions, which may have increased their level of motivation to engage in long-term exercises as compared to EG participants who may have discontinued their exercise training on termination of the exercise program. The improvement in EBG participants was evident during interviews conducted by the researcher. The researcher implemented a motivational interviewing technique using a worksheet containing barriers and motivation to exercise. Participants were interviewed individually, which identified factors contributing to exercise adherence. Participants’ intrinsic motivation to change their behaviors may have been enhanced by resolving contradictory feelings or depressed mood about exercise by developing a personal sense of responsibility to continue exercising. Participants felt comfortable with the program, as it was a client-centered approach and did not rely on learning new mental skills or reshaping cognitions. The exercise training may have affected depressed mood through several neurobiological effects.

The current study supports the finding that exercise leads to neural alterations that increase brain function and mental health (Helmich et al., 2010). However, these alterations may depend on the levels of physical activity (i.e., the higher the levels of physical activity, the more changes in endorphin and monoamine levels and lower levels of the stress hormone, cortisol) (Helmich et al., 2010). A previous study also revealed that an exercise program may significantly trigger dendritic remodeling and promote hippocampal neurogenesis in the brain (Yau et al., 2011). Hence, it is possible that EBG and EG participants may have experienced neurogenesis as early as 3 days after the start of the training program (Craft & Perna, 2004). CG participants did not receive exercise training and stress management classes according to the designed behavioral program. Thus, individuals who experience stress may be less likely to gain neurogenesis and more likely to have increased release of hormones, such as cortisol and epinephrine, that may cause stress and anxiety (Swaab, Bao, & Lucassen, 2005). The stress-induced hormones released from the adrenal gland can affect neurogenesis of the hippocampus (Ernst et al., 2006). A previous study (Ernst et al., 2006) revealed that too much exposure to stress can result in immune dysfunction, depressed mood, and changes in the brain structure.

The improvement in the level of depression and HRQOL in EBG participants is directly associated with the training duration. According to Mura and Carta (2013), 150 minutes per week of moderate intensity exercise or a minimum of 75 minutes of vigorous intensity exercise per week, over 3 to 5 days, could promote better mental health. Therefore, to improve overall physical function and promote better HRQOL among participants in the current study, a 6-week duration of the exercise program was considered feasible. This duration corroborates the findings of Locks et al. (2012) who investigated the positive effects of strength on functional performance of healthy older adults. Furthermore, another study suggested that sedentary older adults may be more likely to adhere to exercise training if the program is initially less challenging (i.e., intermittent bouts) but gradually becomes more physically demanding (i.e., sustained bouts) (Murphy, Nevill, Neville, Biddle, & Hardman, 2002). Hence, the current researchers recommend a shorter and intermittent 6-week exercise duration to reduce the rates of attrition and improve HRQOL.

EBG participants had extended exercise duration due to the reinforcement they gained from the behavioral intervention. As supported in a review by Manos, Kanter, and Busch (2010), the Behavioral Ac-
tivation Model of Depression, a psychopathology model, involved relationships between four major components that actively affect an individual’s behavior: reinforcement, mood, behavior, and depression. For example, an active older adult who participates in a neighborhood exercise program who recently lost his wife/husband or job may have low positive reinforcement and increased depressed mood. In response, he/she may stop socializing or exercising, which has the unfavorable effect of further decreasing positive social reinforcement and increasing depressed mood. This cycle of behavioral changes in turn may lead to more changes in the reinforcement contingencies, which may increase depressed mood and the likelihood that the behavior continues, possibly resulting in severe chronic depression. Contrary to this model, Netz, Wu, Becker, and Tenenbaum (2005) reported that a longer exercise duration is less beneficial under several types of psychological aspects. They suggested that when individuals, especially those with depressive symptoms, perform a short exercise duration, they will have better sense of self-control and general well-being, as they may realize the increased weight they can lift or the increased distance they can walk. However, others believe that the effects of exercise on depressive symptoms are not expected in the short term, but can be achieved over the long term when older adults are empowered to continue exercising on their own accord (Brenes et al., 2007).

EBG participants had better exposure to the importance of exercise compared to other groups. During the behavioral classes, the value of exercise was emphasized. Thus, they acquired the ability to recall and continue performing these exercises on their own time. In addition, the frequent deep breathing exercises in the program have been shown to effectively reduce depressive symptoms by increasing heart rate variability and parasympathetic activity (Chung et al., 2010). For example, when performing deep and slow breathing, the relaxation response is elicited, which is characterized by decreased arousal, oxygen consumption, heart rate, and blood pressure; reduced sympathetic nervous system responses; and increased respiratory stability.

EG participants seemed to realize the importance and benefits of exercising, but they did not have the capabilities to adhere to the program. One reason may be due to the effect of the group-based exercise. Participants may have preferred to exercise in a group rather than independently. When participants in this group performed an exercise, their bodies released the chemicals that boosted their sense of well-being and suppressed hormones that caused stress and anxiety (Salmon, 2001). However, when they suddenly stopped the exercise training, their bodies adapted to the cessation of exercise. One study has shown that after age 40, individuals may lose nerve tissue, which results in memory loss and may reduce the ability for memory recall (Peters, 2006). Exercise training may produce new nerve tissue and dendrite connections may increase, which can lead to further increased memory and stored information (Rokade, 2011). In addition, EG participants did not receive as much social support as EBG participants. Social support and community involvement in an exercise program seem to provide promising effects in enhancing exercise participation. According to a recent study by Abolfathi Mouttaz, Ibrahim, and Hamid (2014), the impact of providing support to older adults as a form of generative behavior results in stronger connections with others and enhances the self-esteem of participants. Thus, it shows that giving support to participants is important as it may facilitate satisfaction of basic psychological well-being and quality of life.

The current findings are also consistent with other studies in which behavioral factors have been shown to significantly reduce depression, with the inclusion of the following elements in the interventions: behavioral activations, such as positive reinforcement, task-focused goals, and reducing avoidance (Soucy Chartier & Provencher, 2013); cognitive-behavioral therapy, including problem-solving techniques (Wilkinson, 2013); and psychoeducation, cognitive restructuring, and activity scheduling (Wuthrich & Rapee, 2013). As suggested in the current study, the combination of exercise training and behavioral strategies holds potential for producing synergistic effects on depression.

In terms of physical and mental health components of HRQOL, EBG participants demonstrated significant improvement in their physical and mental states as compared to EG and CG participants. For physical components, EBG participants showed better perception in physical function compared to EG and CG participants because they managed to engage in exercise for an extended period of time. Brown et al. (2003) explained that physical activity may influence assessment of cognitive abilities, such as self-efficacy during exercise. Thus, individuals who have higher self-efficacy would have tended to adhere to the exercise program for an extended period of time. In addition, the behavioral program delivered in the current study may have provided a positive environment for participants to continue the exercise, either at home (i.e., alone) or in a group session. These factors included the walking friendliness of the neighborhood, green space (approximately 500 m), and exercise equipment (e.g., resistance bands, pedometers). Kerr, Rosenberg, and Frank (2012) reported that by designing community facilities, participants would be more motivated to exercise.

Compared to EBG participants, CG participants were at a disadvantage because they did not receive any
exercise program or stress management classes. Therefore, barriers to exercise seem to encourage negative thoughts about exercising. Similar to EG participants, CG participants lacked exposure to community activities. Thus, they were not given the opportunity to learn of the importance of activity engagement and sense of well-being, leading to decreased levels of HRQOL.

LIMITATIONS

There were a number of limitations in the current study, which require special consideration when interpreting the results. First, the possible influence of attention and support from the therapeutic alliances (i.e., the beneficial change relationship between the researcher and participants) may have occurred among EBG participants. These differences need to be highlighted, and future studies should focus on regulating the amount of exposure in a controlled environment. Second, the current study used convenience sampling, which is the weakest sampling approach acceptable in quantitative research. Last, the current study included a relatively homogeneous sample with a similar background. Thus, caution must be taken when interpreting the results, as these findings may not be generalizable in other countries, populations, or contexts.

CONCLUSION

A 6-week exercise training program combined with a 5-week behavioral program implemented after completion of the exercise portion provided positive benefits toward the level of depression and HRQOL in Malaysian community-dwelling older adults. The findings of the current study can guide other health care professionals and individuals to promote healthy aging by delivering effective interventions to older adults in terms of regular participation in physical activity and exercise, as well as via the behavioral change approach.

REFERENCES


Marcus, B.H., Banspach, S.W., Lefebvre, R.C.,...


ABOUT THE AUTHORS
Ms. Azizan is PhD Student, and Dr. Justine is Senior Lecturer and Head, Centre for Postgraduate Studies, Faculty of Health Sciences, Universiti Teknologi MARA, Selangor, Malaysia.

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Address correspondence to Maria Justine, PhD, Senior Lecturer and Head, Centre for Postgraduate Studies, Faculty of Health Sciences, Universiti Teknologi MARA Selangor, Puncak Alam Campus, 42300 Puncak Alam, Selangor, Malaysia; e-mail: mara205@salam.utm.my.

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