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Be Well: Results of a Nutrition, Exercise, and Weight Management Intervention Among At-Risk Older Adults

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Abstract

The objective of this article is to test the effectiveness of a multifaceted exercise and nutritional education intervention for chronically ill, community-dwelling older adults. A pre/post cohort design was implemented with measures of physical activity, fitness, depression, and anthropometry collected via 4-month in-person interview and telephone follow-up. The study was conducted at two community-based senior centers in the Los Angeles area and participants ($n=62$) were older adults aged 60 or older, with multiple chronic conditions, with one or more emergency department visits or hospital admissions in the previous 6 months, and at nutritionally moderate to high risk. The intervention was a fitness program providing nutritional counseling, low-impact exercise, and weight management. Results revealed significant improvements for hours of weekly exercise ($Z = -4.3$, $p < .001$), daily walking distance ($Z = -5.7$, $p < .001$), performance on fitness tests, depression ($Z = 3.9$, $p < .001$), and body measurements were observed. Findings speak to the healthy benefits of exercise and good nutrition as possible alternatives or adjuncts to pharmacotherapy for weight loss and depression.

Keywords

older adults; exercise; nutrition; weight loss; education

Introduction

Exercise and physical activity are well documented to improve physical and emotional well-being among older adults (Carey et al., 2008; Villareal, Banks, Sinacore, Siener, & Klein,

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Declaration of Conflicting Interests

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2006; Wieckowski & Simmons, 2006). However, studies on physical activity have been primarily conducted among healthy, higher functioning older adults (Wieckowski & Simmons, 2006). Few studies have targeted nutritionally compromised older adults with frequent medical service utilization. Among those who have studied such samples of older adults, none incorporated multifaceted interventions combining physical activity, nutritional counseling, socialization, and peer support. As the older adult population continues to grow and live longer with chronic conditions (Crews, 2003; Crews & Zavotka, 2006), it is imperative to develop interventions aimed at reducing the effects of- and increased risk for- declining physical health.

Older adults with physical impairments often have compromised emotional health, with risk of depression up to four times greater than older adults without impairments (Strawbridge, Deleger, Roberts, & Kaplan, 2002). Obese older adults are associated with even poorer emotional health (Gum, McDougal, McIlvane, & Mingo, 2010; Markowitz, Friedman, & Arent, 2008; Plow, Allen, & Resnik, 2010). Exercise has been found to have a moderating and protective effect on depression among older adults, which may supersede or enhance pharmacological treatments and counseling (Babyak et al., 2000; Strawbridge et al., 2002) while prompting numerous other physical health benefits such as weight loss. Since physical impairment and disability generally increase with age, physical activity interventions deserve special attention among this population.

This study presents findings from *Be Well*, a multifaceted exercise and nutritional education intervention for community-dwelling older adults with multiple chronic conditions. The hypotheses are as follows:

Hypothesis 1: Be Well participants will demonstrate improved health outcomes following the program as measured by physical body measurements (circumference measures, weight, body mass index [BMI], and body fat percentage), physical activity, and fitness performance.

Hypothesis 2: Be Well participants will demonstrate lower depression levels following the intervention.

Method

Study Design

A cohort design was employed with baseline measures collected at enrollment and again 4 months later at the conclusion of the intervention. Institutional Review Board approval was obtained from both the managed care organization (MCO) and nonprofit research institution evaluating the intervention.

Study Eligibility

Initial eligibility criteria included those aged 60 years or older, diagnosed with two or more chronic conditions, and having had one or more emergency department visits or hospital admissions in the previous 6 months. Those meeting these criteria were contacted by telephone and assessed for nutritional risk. A total of 318 individuals meeting initial criteria were contacted and 62 agreed to participate.

Recruitment Strategies

Participants were recruited from two primary care MCO offices. A list of potential participants was obtained from the MCO's electronic patient medical records and patients were contacted via telephone and screened for nutritional risk using the Nutrition Screening Initiative (NSI; Dwyer, 1991). Scores of six or more out of the possible 21, indicating high nutritional risk, were eligible for *Be Well* and received an explanation of the study. Individuals agreeing to participate were sent to their primary care physician where they received medical clearance to participate and signed an informed consent document.

Intervention

Be Well was delivered in the local community with the endorsement of patients' primary care physician. Over a consecutive 16-week period, classes met biweekly for 2 hours, totaling 32 sessions. Each session consisted of 1 hour low-impact physical activity followed by an hour of nutrition education. Registered dietitians and certified exercise specialists conducted the classes. The fitness class was progressive, starting with seated exercises before moving to standing, low impact movements. Nutrition education emphasized good nutritional intake for managing chronic conditions (specifically hypertension and diabetes) and included meal planning, training in reading food labels, and portion guidance, among other topics. Subjects received a personalized course manual. In the first week of the program, a single one-on-one counseling session with the dietitian was held with each participant and addressed the individual's specific needs respective of their conditions, medications, and household influences, and assisted the participant with personal goal setting. Participants were encouraged to exercise on their own or with a partner between *Be Well* sessions. Participants received no monetary compensation for involvement although they did receive small items such as water bottles and pedometers.

Data Collection Measures

Baseline data were collected via in-person interviews and included self-reports of physical activity and depression, and body and fitness measurements collected by project specialists. Follow-up data were collected through in-person assessments (body and fitness measurements) during the last *Be Well* session and via telephone (physical activity and depression).

Physical activity—Physical activity measures consisted of three nonvalidated self-report items: average miles walked throughout a typical day, weekly hours spent exercising, and current level of physical activity measured on a 5-point scale (ranging from *not engaging in physical activity* to *regularly physically active*).

Depression—Depression was assessed using the validated nine-item Patient Health Questionnaire (PHQ-9; Kroenke, Spitzer, & Williams, 2001), which has been used extensively among older adults (Arean, Hegel, Vannoy, Fan, & Unutzer, 2008; Connor et al., 2010; Unutzer et al., 2008). A score under 5 indicates minimal to no depression and scores of 5 or higher indicates mild to severe depression.

Fitness—Participants' fitness level was determined by performance on seven tests specifically designed for older adults that measure flexibility, strength, and stamina. Tests include a 30-second chair stand, arm curls, steps taken on a 6-min walk, 2-min step-in-place, sit-and-reach, back scratch, and 8-ft up-and-go (Rikli & Jones, 2001). Project exercise specialists demonstrated each fitness test and participants were given the opportunity to practice the movements 1 to 3 times before performance was measured.

Body measurements—Body measurements consisted of circumference dimensions for waist, hips, chest, and single leg and arm, and participants' body weight, body fat percentage (via a bioelectrical impedance device), and BMI was calculated from these.

Analysis

Descriptive statistics were conducted to describe the overall sample and paired samples nonparametric tests (Wilcoxon Signed Ranks and chi-square) were conducted to determine change from baseline to follow-up. Statistical software SPSS version 15.0 (SPSS Inc., 2001) was used in all analyses.

Results

Participants

From October 2006 through June 2008, 62 older adults were enrolled in *Be Well*. Participants' ages ranged from 60 to 90 years, with an average age of 73.5 ($SD = 7.7$). Most were single (39%) females (63%) residing in their own homes (84%). Over half (66%) were African American, 23% White, and 11% Latino. Nearly two thirds (58%) of participants reported their annual income level at US\$39,999 or less, however, educational levels were high, with 68% having attended some college. About 74% had three or fewer chronic conditions and 26% had four to six chronic conditions. More than 50% of participants attended 26 or more *Be Well* sessions with a mean attendance of 21.7 classes ($SD = 9.64$). See Table 1.

Physical Activity

Improvements on physical activity measures were observed from baseline to follow-up. Participants significantly increased weekly exercise by 3.3 hr ($Z = -4.3$; $p < .001$) and the distance walked throughout the day by 1.56 miles ($Z = -5.7$ $p < .001$). Responses for distance walked throughout an average day revealed that while the majority of participants (57.7%) did not walk at all at baseline, nearly all (95.1%) reported engaging in some walking following *Be Well*. See Table 2.

Depression

Depression level improved following *Be Well* participation. Analysis revealed a significant reduction ($Z = -3.9$; $p < .001$) from baseline (mean = 5.5, $SD = 5.4$) to follow-up (mean = 2.8, $SD = 4.4$), with baseline depression scores indicating that 45.2% of participants were mild to severely depressed, decreasing to 16.4% at follow-up ($\chi^2 = 5.6$, $p = .018$). At the end of the intervention, 83.6% of participants reported minor or no depression. See Table 2.

Fitness

Results of fitness tests revealed significant improvements in six of the seven measures. Participants added 1.6 repetitions to their 30-second chair stand ($Z = -3.1$; $p = .002$), 2.0 repetitions to their maximum number of arm curls ($Z = -2.7$; $p = .007$), 26 steps to a 2-min step-in-place ($Z = -4.4$; $p < .001$), stretched 1.3 more inches on the sit-and-reach ($Z = -1.993$; $p = .046$), sped up their 8-ft up-and-go by 3.0 seconds ($Z = -2.979$; $p = .003$), and reduced the gap between their reaching fingers by 6.0 inches on the back scratch ($Z = -3.7$, $p < .001$). No change was found for the 6-min walk ($Z = -0.4$; $p = .694$). See Table 3.

Body Measurements

Body measurements, indicators of health, revealed that participants significantly reduced five circumference measures (waist, hips, arm, chest, and leg), decreased weight by 7 pounds ($Z = -3.9$; $p < .001$), reduced BMI by 2 kg/m² ($Z = -3.9$; $p < .001$), and lowered body fat percentage ($Z = -4.0$; $p < .001$). On average, participants were considered obese (BMI = 30) prior to participating in *Be Well* and were at the threshold following the intervention (pre: 32.1 kg/m², post: 30.2 kg/m², $p < .001$). A reduction in body measurements among participants is considered positive as reductions indicate decreased fat mass among the overweight participants. See Table 2 and Figure 1.

Discussion

Participation in *Be Well* was associated with physical and emotional health improvements among participants. Nearly half the sample exhibited depressive symptomatology at baseline, which decreased by 64% at follow-up. This reduction in depression may be attributed to several aspects of the intervention. Physical activity, in addition to producing reductions in BMI, has been found to reduce levels of depression among older adults (Strawbridge et al., 2002; Wieckowski & Simmons, 2006; Yan, Wilber, Aguirre, & Trejo, 2009). In addition, the group program promoted social interaction, another factor associated with reduced depression (Strawbridge et al., 2002; Wieckowski & Simmons, 2006). Anecdotal evidence from participants suggested that participants teamed up with one another to exercise on their own, independent of the *Be Well* classes, with several participants noting a newly established commitment to their health goals and *Be Well* attendance arising from new friendships developed in classes. Previous studies have identified social support from a spouse/partner and from family/friends as predictors of commitment among older, ethnically diverse females in physical activity programs (Eyler et al., 2002). In addition, others have noted the importance of social networks for women in reducing attrition (Belza, Shumway-Cook, Phelan, Williams, & Snyder, 2006; Belza & Warms, 2004; Gallant & Dorn, 2001). Considering the female majority in the present study, many of whom reported being single, divorced, or widowed, the social interaction and peer support arising from the *Be Well* dynamic may have contributed to the success experienced by participants and the level of program adherence. Future studies measuring social interaction are needed.

Be Well is unique in that it incorporates exercise and nutrition education with peer support. Participation was associated with significant reductions in body measurements after the 4-

month program and may provide suggestive evidence for beneficial, short-term physical effects. While other studies have also observed improved depression (Lin et al., 2009; Strawbridge et al., 2002) and healthier physical measures (Steyn, Lambert, & Tabana, 2009; Wellman, Kamp, Kirk-Sanchez, & Johnson, 2007) as a product of exercise or nutrition interventions, *Be Well* is the only study that has incorporated a multifaceted approach of exercise and nutrition among racially diverse, at-risk older adults in a community setting. Jarosz and Bellar (2009) point out that multidisciplinary approaches to resolve sarcopenia (decreased muscle mass) and obesity (excess adipose tissue) are key in addressing the underlying issues of health and disability among older adults.

Limitations

Several study limitations exist and include design confines such as a lack of comparison group, which limits the ability to draw conclusions about the effects of the intervention. Also, a lack of longitudinal data limits the ability to determine long-term adherence. Using the NSI as part of the inclusion criteria for this study may be limiting as it has not been validated, however, the availability of a better nutritional risk measure is questionable. In addition, the low sample size could limit results. However, the overwhelming positive findings support the need for rigorous trials to further test this intervention.

Conclusion

Be Well successfully engaged and retained older adults with multiple chronic conditions in a community-based physical activity and nutrition program to achieve significant improvements in physical and emotional health. The significant findings may speak to the benefits of exercise and good nutrition as a possible adjunct or alternative to pharmacological interventions for weight loss and depression. In addition, the success of this program may inform future interventions among high-risk populations.

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Bonita Hart, RD, developed the BE WELL program after working on inner city and Los Angeles County Area Agency on Aging service grants that identified the health disparities for high risk, poor and minority seniors. Currently in its 15th pilot, BE WELL has served over 500 seniors. She is the author of *The Clinical Diet Manual*, now in its 16th edition used by many healthcare organizations nationwide and is President of Food and Nutrition Management Services, Inc., a healthcare consulting firm.

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Figure 1.
Changes in participants' body measurements.
* $p < .05$. ** $p < .01$. *** $p < .001$.

Table 1Participant Demographic Characteristics ($n = 62$).

	Frequency	Percentage
Age ^a	73.5 ± 7.7	
Gender ^b		
Female	39	63.0%
Ethnic background ^b		
African American	41	66.1%
Latino	7	11.3%
White	14	22.6%
Highest education ^b		
Less than high school	4	6.5%
High school graduate	18	29.0%
Some college	20	32.3%
College graduate	11	17.7%
Postgraduate school	4	6.5%
Doctorate	1	1.6%
Did not specify	4	6.5%
Marital status ^b		
Married	16	25.8%
Single	24	38.7%
Widowed	14	22.6%
Divorced	6	9.7%
Did not specify	2	3.2%
Annual Income ^b		
Under US\$10,000-US\$19,999	15	24.2%
US\$20,000-US\$29,999	14	22.6%
US\$30,000-US\$39,999	7	11.3%
US\$40,000 or more	12	19.4%
Did not specify	14	22.6%
Living arrangement ^b		
Own home/apartment	52	83.8%
Family member's house	3	4.8%
Senior living	3	4.8%
Did not specify	4	6.5%
Chronic conditions ^b		
0-3	46	74.2%
4-6	14	22.6%
missing	2	3.2%
Attendance ^a (sessions)	21.7 ± 9.64	

^aChi-square test.

^b_t test.

*
 $p < .05$.

**
 $p < .01$.

 $p < .001$.

Table 2

Participants' Depression, Nutrition, and Self-reported Exercise Levels.

	<u>Baseline</u>	<u>Follow-up</u>	
	Mean (SD)	Mean (SD)	Z-value
PHQ-9 depression screening	(n = 61)		
	5.5 (5.4)	2.8 (4.4)	-3.9***
Hours of exercise per week	(n = 57)		
	2.6 (3.9)	5.9 (7.3)	-4.3***
Miles of walking each day	(n = 51)		
	0.34 (0.58)	1.9 (1.4)	-5.7***

*
 $p < .05$.**
 $p < .01$.***
 $p < .001$.

Table 3

Fitness Test Results ($n = 62$).

	Baseline	Follow-up	Z-value	Unit of measurement
	Mean (SD)			
30-s chair stand	11.7 (4.0) ($n = 34$)	13.2 (5.2) ($n = 30$)	-3.1 **	No. of repetitions
Bicep curl	15.7 (3.4) ($n = 33$)	17.9 (5.4) ($n = 33$)	-2.7 **	No. of repetitions
6-min walk	591.7 (207.5) ($n = 33$)	635.7 (167.0) ($n = 33$)	-0.4	No. of steps
2-min step-in-place	68.2 (28.4) ($n = 32$)	94.2 (27.6) ($n = 32$)	-4.4 ***	No. of repetitions
Sit-and-reach	1.2 (2.4) ($n = 31$)	2.5 (4.1) ($n = 31$)	-2.0 *	inches
Back scratch	6.7 (4.2) ($n = 32$)	0.7 (4.6) ($n = 32$)	-3.7 ***	inches
8-ft up-and-go	11.9 (12.1)	8.9 (4.6)	-3.0 **	seconds

* $p < .05$.** $p < .01$.*** $p < .001$.