Occupational Therapy for Independent-Living Older Adults

A Randomized Controlled Trial

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Context.—Preventive health programs may mitigate against the health risks of older adulthood.

Objective.—To evaluate the effectiveness of preventive occupational therapy (OT) services specifically tailored for multiethnic, independent-living older adults.

Design.—A randomized controlled trial.

Setting.—Two government subsidized apartment complexes for independent-living older adults.

Subjects.—A total of 361 culturally diverse volunteers aged 60 years or older.

Intervention.—An OT group, a social activity control group, and a nontreatment control group. The period of treatment was 9 months.

Main Outcome Measures.—A battery of self-administered questionnaires designed to measure physical and social function, self-rated health, life satisfaction, and depressive symptoms.

Results.—Benefit attributable to OT treatment was found for the quality of interaction scale on the Functional Status Questionnaire (P=.03), Life Satisfaction Index-Z (P=.03), Medical Outcomes Study Health Perception Survey (P=.05), and for 7 of 8 scales on the RAND 36-Item Health Status Survey, Short Form: bodily pain (P=.03), physical functioning (P=.008), role limitations attributable to health problems (P=.02), vitality (P=.004), social functioning (P=.05), role limitations attributable to emotional problems (P=.05), and general mental health (P=.02).

Conclusions.—Significant benefits for the OT preventive treatment group were found across various health, function, and quality-of-life domains. Because the control groups tended to decline over the study interval, our results suggest that preventive health programs based on OT may mitigate against the health risks of older adulthood.

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THE NUMBER OF Americans aged 65 years or older has risen dramatically from 3.1 million persons (4% of the US population) in the early 1900s to over 33 million persons (nearly 13% of the population) in 1995.[1] It is projected that over 17% of the American population will be elderly by the year 2020, that 42% of this group will be older than 75 years, and that the "oldest old" group (aged 85 years or older) will more than double in size by 2030 and will nearly double again by 2050.[2] If present trends persist, it can be expected that longer life spans will be marked by poorer health-related quality of life.[3,4]

Health-related quality of life is generally thought of as "those aspects of self-perceived well-being that are related to or affected by the presence of disease or treatment,"[5(p1348)] encompassing such dimensions as physical and social functioning, bodily pain, and vitality.[5,6] While aging, per se, may account for certain losses, its role has generally been overstated.[4,7] For example, chronic disease has become the most severe health problem among older adults and often leads to chronic disability.[8,9] Older adults are also presented with unique psychological stressors (eg, financial hardship, death of a spouse, retirement) that can contribute to psychiatric disorders such as depression, paranoia, or anxiety and lead to substance abuse.[7,10-12] In addition, older individuals are confronted with social stressors (eg, changes in roles, difficulty interacting with the surrounding environment, and logistical problems performing daily activities) that may lead them to discontinue lifelong pursuits and experience a decrease in life satisfaction.[12,13]

Studies of what is now referred to as "successful aging" reveal that considerations extrinsic to aging or disease such as diet, lifestyle and daily routine, degree of social support, amount of exercise, and sense of autonomy and control play a strong positive role in enabling older individuals to maintain their health and independence.[9,14-16] Research has shown that remaining active and productive is a key component of successful aging.[14,15] Such findings offer hope for the potential to design effective activity-based interventions capable of enhancing the lives of elderly individuals. However, given the diversity of challenges faced by older adults, the complexity of interlocking physical, psychological, economic, and social factors must be taken into account.

In response to this need, we conducted between 1994 and 1996 a randomized controlled trial, the Well Elderly Study, to evaluate the effectiveness of preventive OT specifically targeted for urban, multiethnic, independent-living older adults. Typically, OT is provided to older individuals to facilitate independence after catastrophic illness or accidents when significant functional impairment or disability is present.[9,17-19] However, we reasoned that many of the principles of OT intervention, given their focus on fostering productive and meaningful activity (occupation), maximizing independence, and enhancing function, constituted a potentially effective approach to preventing ill-

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ness and disability and promoting health in this vulnerable population.[20] We hypothesized that mere participation in a social activity program does not affect the physical health, daily functioning, or psychosocial well-being of well elderly individuals; and compared with participation in a social activity program or an absence of any treatment, preventive OT positively affects the physical health, daily functioning, and psychosocial well-being of well elderly individuals (1-sided alternative).

METHODS

Study Subjects

The planned study population was independent-living, culturally diverse men and women, aged 60 years or older, who had the capacity to benefit in multiple outcome areas from involvement with OT. Subjects were excluded if they were unable to live independently or if they exhibited marked dementia. In response to the need to accrue study subjects and to assess the effectiveness of OT among a non–English-speaking population, the study population was augmented to include Mandarin-speaking subjects. Inclusion of Mandarin-speaking subjects required the cultural adaptation and translation of the research protocol and testing instruments into Mandarin and use of Mandarin-speaking occupational therapists and social activity control group leaders during all phases of the study.

Subjects were recruited from residents of Angelus Plaza (a large government-subsidized apartment complex for independent-living seniors in Los Angeles, Calif), from residents in private homes or other facilities in the surrounding areas who used the Angelus Plaza Senior Citizen facilities, or from residents of Pilgrim Tower (a government-subsidized apartment complex in Pasadena, Calif). To maximize the resources at the Angelus Plaza and Pilgrim Tower facilities (the evaluation and treatment sites), to reduce the effects of seasonal changes on the study, and to minimize the effects of subject interaction, subjects were recruited at different times in 2 cohorts, with the second cohort completing each study phase approximately 16 months after the first cohort. Methods of recruitment included staffed recruitment tables placed in facility lobbies and at on-site functions such as dances and coffee hours, flyers, articles in the residence newsletter, presentations at regular meetings such as the Senior Citizens Club, and letters placed under residents' doors. All study volunteers signed an institutionally approved informed consent form prior to study enrollment.

A questionnaire was used to collect information on subjects' sex, age, ethnicity, medical conditions, number of current medications, disabilities, marital status, education level, number of children, languages spoken, and length of residence at Angelus Plaza or Pilgrim Tower (where applicable). An occupational therapist administered the Tinetti Balance Examination[21] to each subject. A physician trained in geriatric medicine conducted a medical history, performed a physical examination, and evaluated the health status of each subject using standardized instruments including the Modified Mini-Mental State Examination (MMSE),[22] the (self-reported) Geriatric Depression Scale,[23] and the LaRue Global Assessment.[24]

Randomization and Treatment

Using a completely randomized design with computer-generated random numbers and a blocking factor of 6, we assigned eligible subjects to 1 of 3 treatment groups within strata defined by language of testing: an OT group, a generalized group activity ("social") control group, or a nontreatment control group. Subjects in the OT group were encouraged to attend all treatment sessions and to refrain from discussing their treatment experience with other subjects. Subjects in the social control group were encouraged to participate in all activity sessions and to refrain from discussing their activities with subjects from other groups. The period of treatment was 9 months.

The central theme of the OT program was health through occupation, with occupation defined not in the conventional sense of type of employment, but more broadly as regularly performed activities such as grooming, exercising, and shopping. Findings from 2 previous studies,[25,26] principles extracted from the occupational science literature,[27-31] and approaches conventionally used in OT[18,20] were drawn on to design the OT protocol. The key intent of the treatment was to help the participants better appreciate the importance of meaningful activity in their lives, as well as to impart specific knowledge about how to select or perform activities so as to achieve a healthy and satisfying lifestyle.[32] The therapeutic approach entailed exposing the subjects to both didactic teaching and direct experience with a broad range of activities. Concurrent with this exposure, each subject was asked to analyze the role of each activity in affecting health and well-being in his or her personal life. Modular programmatic units centered on such topics as home and community safety, transportation utilization, joint protection, adaptive equipment, energy conservation, exercise, and nutrition. (Details of the OT protocol are available from the authors.)

Subjects randomized to the OT group received 2 hours per week of group OT and a total of 9 hours of individual OT during the 9-month treatment period. Up to 10 seniors were assigned to each group. Group sessions were individually administered by registered occupational therapists trained in working with elderly populations. Four therapists (2 per cohort) were involved in administering treatments; each therapist received a minimum of 10 hours of instruction on the specific study intervention and was blind to the study hypotheses.

The social control program focused on activities designed to encourage social interaction among members of the group. During the generalized activity sessions, subjects went on community outings, worked on craft projects, viewed films, played games, and attended dances. The subject matter covered in these sessions was tailored to the interests of the participants. Subjects randomized to the social control group followed a meeting schedule similar to that of the OT group. Up to 10 seniors were assigned to each group session. Group sessions were administered by nonprofessionals who were blind to the study hypotheses. Because individual sessions were not held for the subjects in the social control group, the weekly group sessions were extended to 2.25 hours to ensure that the total number of treatment hours experienced per subject in the social control and OT groups were similar.

No intervention was applied to subjects assigned to the nontreatment control group.

Primary Outcome Measures

To evaluate the effectiveness of the treatments, testing was performed both at baseline and at the end of the 9-month treatment period. Subjects were tested using self-administered questionnaires designed to measure physical and social function, self-rated health, life satisfaction, and depressive symptoms. Testing was overseen by paid research assistants, blind to group assignment and study hypotheses. Subjects were instructed not to interact with each other during testing. Large-print versions of the forms were used, and subjects were assisted if they were unable to complete the forms independently.

The primary outcome variables assessed in the study were derived from the following battery of 5 questionnaires:

1. Functional Status Questionnaire.—The Functional Status Questionnaire assesses potential functional disabilities or disruptions of daily activities in physical and social domains.[33] Physical function was measured using 2 subscales: basic activities of daily living (B-ADL) and instrumental activities of daily living

(I-ADL), which assess such activities as walking and preparing meals. Social function was measured using 2 subscales: social activity and quality of interaction, which assess the subjects' social role performance and affective quality of interactions with others. All subscales were converted into a percentage scale ranging from 0 to 100, with a score of 100 indicating no functional disability.

2. Life Satisfaction Index-Z.—The Life Satisfaction Index-Z is a 13-item questionnaire designed to measure life satisfaction in older populations[34] and has been used as an indicator of health-related quality of life.[35,36] Participants rated items such as "I am just as happy now as when I was younger" on a scale from 0 to 2. Summary scores range from 0 (low satisfaction) to 26 (high satisfaction).

3. Center for Epidemiologic Studies (CES) Depression Scale.—The CES-Depression Scale consists of 20 questions designed to determine the frequency with which participants experienced depressive symptoms within the previous week.[37] Questions addressed symptoms such as depressed mood, loss of appetite, and feelings of hopelessness. Summary scores range from 0 (no depressive symptoms) to 60 (many symptoms).

4. Medical Outcomes Study (MOS) Short Form General Health Survey.—The MOS Health Perception scale administered in this study is a subset of the MOS Short Form General Health Survey.[38] This scale consists of 5 questions that assess subjects' perceptions of their own general health. Subjects rated questions such as "My health is excellent" on a 5-point scale. Final scores reflect a percentage scale from 0 (poor) to 100 (good).

5. RAND 36-Item Health Status Survey, Short Form-36 (RAND SF-36).—The RAND SF-36 measures a range of physical and mental health-related dimensions.[39,40] It specifically addresses 8 health domains: bodily pain, physical functioning, role limitations attributable to health problems, general health, vitality (energy and fatigue), social functioning, role limitations attributable to emotional problems, and general mental health. One final item asks participants to rate how much their general health has changed in the past year. All subscales are scored on a 0 (low) to 100 (high) percentage scale. This instrument was administered only to the second cohort of subjects as part of a decision to broaden the study.

Statistical Analysis

Summary scores for each of the instruments were calculated by adding the scores for all answered questions on the particular instrument and converting to a percentage scale where appropriate. Items missing a response were either assigned a value computed by published algorithms based on the responses to the subject's completed questions or assigned the average value of the questions answered by the subject if such algorithms were unavailable. For each study variable, including demographic and control variables, χ^2 analyses and analyses of variance were performed to test for differences at baseline across the 3 treatment groups.

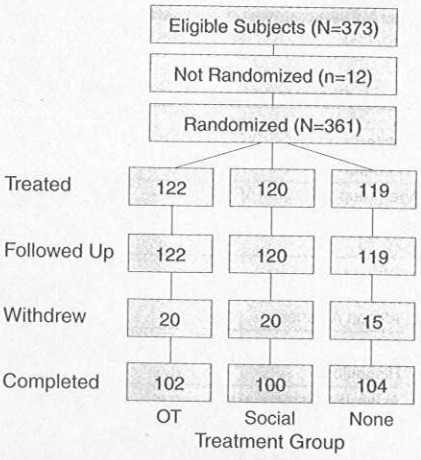
For each outcome variable, treatment effects were examined by calculating signed change scores (posttreatment score minus pretreatment score). Analyses of variance were performed to determine demographic factors related to the change scores independent of treatment groups. Factors found to be significant were used as covariates in subsequent analyses. Analyses of covariance were then conducted using the change scores for each variable to test for equivalency between the social and nontreatment control groups, and to test for differences between the OT group and an overall control group consisting of the combination of the social and nontreatment groups. Statistical testing was carried out at the .05 level, using 2-tailed assessments to test for equivalency between the social and nontreatment control groups and 1-tailed assessments to examine whether the OT group produced more positive mean change outcomes. In the later case, the direction of difference was specified on an a priori basis before the outset of the trial.

Assuming a 20% attrition of subjects over 9 months and conducting testing of hypotheses at the .05 level (1-tailed), a projected sample size of 360 (with a 2:1 allocation ratio) permitted a degree of power equal to 80% in detecting a moderate population effect size ($\geq$0.3) attributable to the OT treatment.[41] For the RAND SF-36, which was administered to the second cohort, a projected sample size of 220 permitted 80% power in detecting a population effect size of 0.4 or greater.[41]

RESULTS

Baseline Characteristics

A total of 373 volunteers were eligible for the study. Of these, 12 withdrew prior to randomization for personal reasons (unwilling to make the time commitment). Of the 361 volunteers (97%) who were randomized (143 in cohort 1 and 218 in cohort 2), 216 (60%) were residents of Angelus Plaza, 74 (20%) used the Angelus Plaza Senior Citizen facilities but resided in private homes or other facilities in the surrounding areas, and 71 (20%) were residents of Pilgrim Tower. Randomization resulted in the assignment of 122 subjects to the OT group, 120 subjects to the social control group, and 119 subjects to the nontreatment control group (Figure).



Profile for the Well Elderly Study. OT indicates occupational therapy group; Social, social control group; and None, nontreatment control group. Unwillingness to make the time commitment was the primary reason subjects were not randomized. Primary reasons for withdrawal were death (8), illness (3), relocation (13), personal matters (11), and loss to follow-up (20).

No significant differences in demographic characteristics were found across treatment groups (Table 1). The mean (SD) age was 74.4 (7.4) years, and 65% of the subjects were female. Ethnic group representations were Asian (47%), white (23%), African American (17%), and Hispanic (11%). In the Asian group, 66% were tested in Mandarin. The majority (73%) of subjects lived alone, and 27% of the subjects reported at least 1 disability.

No significant differences were found across treatment groups in baseline medical history and physical examination results (Table 2). Overall, 77% of the subjects had good or excellent balance on the Tinetti, 89% of the subjects scored normal on the MMSE, 75% of the subjects were regarded as normal according to the Geriatric Depression Scale, and 80% of the subjects had fair or better health according to the LaRue Global Assessment. The median number of medications taken was 3 per day.

In general there were no treatment group differences in pretest means on any of the questionnaire-based outcome variables (data not shown in tables). However, the nontreatment control group had a lower average RAND SF-36 vitality score than did either the social control group or the OT group, both P values $\leq$.05.

Follow-up and Compliance

Of the 361 subjects, 306 (85%) were evaluable at 9 months: 102 (84%) in the OT group, 100 (83%) in the social control group, and 104 (87%) in the nontreatment control group (P=.62) (Figure). For the 55 unevaluable subjects, the reasons

Table 1.—Self-reported Demographic Characteristics by Treatment Condition*

Characteristics	Control: Nontreatment (n=119)	Control: Social (n=120)	OT (n=122)	P Value
Sex				
Male	43 (36)	39 (33)	44 (36)	.80
Female	76 (64)	81 (67)	78 (64)	
Age group, y				
<70	28 (23)	39 (33)	29 (24)	.38
70-79	59 (50)	57 (47)	59 (48)	
≥80	32 (27)	24 (20)	34 (28)	
Ethnicity				
African American	22 (18)	20 (17)	19 (16)	.60
White	24 (20)	30 (25)	29 (24)	
Hispanic	15 (13)	15 (13)	9 (7)	
Asian (English speaking)	17 (14)	14 (12)	27 (22)	
Asian (Mandarin only speaking)	38 (32)	37 (31)	36 (30)	
Other	3 (3)	4 (3)	2 (2)	
Living alone	88 (74)	85 (71)	90 (74)	.83
Disabled	30 (25)	35 (30)	34 (28)	.78
No. of disabilities, mean (range)	0.4 (0-7)	0.4 (0-4)	0.4 (0-4)	.74

*Values are frequency (column percent). OT indicates occupational therapy.

Table 2.—History and Physical Examination Results by Treatment Condition*

Characteristics (Score Range)	Control: Nontreatment (n=119)	Control: Social (n=120)	OT (n=122)	P Value
Tinetti Balance Examination (1-18)				
≤16 (Fair)	30 (26)	25 (21)	26 (22)	.70
17 (Good)	16 (14)	21 (18)	15 (12)	
18 (Excellent)	71 (60)	73 (61)	80 (66)	
Mini-Mental State Examination (0-30)				
≤23 (Impaired)	17 (14)	13 (11)	9 (8)	.23
>23 (Unimpaired)	101 (86)	106 (89)	111 (92)	
Geriatric Depression Scale (0-15)				
≤5 (Normal)	90 (76)	87 (73)	93 (76)	.74
>5 (Depressed)	28 (24)	33 (27)	29 (24)	
LaRue Global Assessment of Overall Health (1-4)				
1 (Poor)	30 (25)	22 (19)	20 (16)	.77
2 (Fair)	54 (46)	58 (49)	63 (52)	
3 (Good)	21 (18)	23 (20)	24 (20)	
4 (Excellent)	13 (11)	15 (12)	15 (12)	
No. of medications, median (range)	3 (0-9)	3 (0-9)	3 (0-9)	.79

*Values are frequency (column percent). OT indicates occupational therapy.

for discontinuation were the following: 8 died, 3 became ill, 13 relocated, 11 active participants were unavailable for posttesting for personal reasons, and 20 were lost to follow-up. Except for quality of interaction on the Functional Status Questionnaire, there were no significant differences at baseline between evaluable and unevaluable subjects on either the demographic or the primary response measures. Compared with unevaluable subjects, evaluable subjects had a significantly greater mean quality of interaction score at baseline (82.7 vs 77.7, $P=.02$). Sixty-five percent of the subjects randomized to the OT group attended at least half of the sessions (average percentage of sessions attended by subjects in the OT group=60%). Sixty-two percent of the subjects randomized to the social activity control group attended at least half of the sessions (average percentage of sessions attended by subjects in the social control group, 61%).

Baseline Factors Related to Outcome

Analyses of variance were performed to determine baseline factors related to outcome variable change scores independent of treatment groups. Demographic factors found to be significantly related to 1 or more change score variables were sex, age group, disability status, and living status (all P values $<.05$). In addition, for each outcome measure, the baseline scores were significantly negatively related to the corresponding change scores (all P values $<.001$). Based on these results, all subsequent covariance analyses adjusted for these factors.

Equivalency of Control Groups

Analyses of covariance were conducted to compare outcomes between the 2 control groups (social vs nontreatment). Except for the RAND SF-36 vitality scale, in which case the social control group fared worse than the nontreatment control group (social control mean change=−6.3 vs nontreatment control mean change=4.1, $P=.007$; $P=.04$ after adjusting for baseline differences), no significant differences were found. Because of these findings, the 2 control groups were combined for subsequent analyses.

Intent-to-Treat Analysis

Table 3 summarizes the results of the intent-to-treat analysis for subjects who completed the study. Shown are the mean pretest and posttest scores for each outcome variable, along with the unadjusted and adjusted mean change scores. Analyses of covariance revealed a significant benefit attributable to OT treatment for Functional Status Questionnaire: quality of interaction ($P=.03$), Life Satisfaction Index-Z ($P=.03$), and MOS Health Perception ($P=.05$), and for 7 of 8 measures on the RAND SF-36: bodily pain ($P=.03$), physical functioning ($P=.008$), role limitations attributable to health problems ($P=.02$), vitality ($P=.004$), social functioning ($P=.05$), role limitations attributable to emotional problems ($P=.05$), and general mental health ($P=.02$). General health was marginally significant ($P=.06$). Benefit attributable to OT treatment was maintained on the RAND SF-36 after adjusting for vitality, the single domain found to be significantly different at baseline across treatment groups. Analyses of outcomes within the OT group revealed that, compared with other ethnic groups, Asians (non-Mandarin speaking) showed greater improvement as measured by the Life Satisfaction Index-Z ($P=.01$), CES-Depression scale ($P=.03$), and the MOS Health Perception Index ($P=.04$). Finally, compared with other ethnic groups, Hispanics showed greater improvement attributable to OT treatment on the RAND SF-36: general health ($P=.01$).

COMMENT

The Well Elderly Study provides the most comprehensive test to date of the effectiveness of OT. Although a limited number of prior investigations have examined the effects of OT on older adults, the Well Elderly Study goes beyond previous studies in that it included a much larger sample size, incorporated a wider range of outcome domains, and included a greater degree of experimental control.

Significant benefits for the OT treatment were found across various health, function, and quality-of-life domains. In cases where a significant finding was present, the control groups tended to decline over the study interval, whereas the OT group either improved or exhibited a

Table 3.—Outcome at 9 Months*

Response	Condition	Pretest Mean (SD)	Posttest Mean (SD)	Change, Mean (SEM)	Adjusted Change (SEM)	*P* Value† (1-Tailed)
Functional Status, Life Satisfaction, Depression, Health Perception						
B-ADL	OT (n=101)	94.2 (12.2)	90.1 (19.6)	−4.1 (1.8)	−2.3 (1.6)	.31
	Controls (n=202)	90.6 (18.6)	90.1 (16.9)	−0.5 (1.3)	−1.3 (1.1)	
I-ADL	OT (n=102)	78.7 (25.9)	79.1 (26.5)	0.4 (2.0)	0.9 (1.8)	.28
	Controls (n=202)	77.8 (25.1)	77.6 (22.8)	−0.2 (1.5)	−0.4 (1.3)	
Social activities	OT (n=100)	87.9 (24.7)	84.7 (28.2)	−3.2 (2.9)	−1.0 (2.4)	.38
	Controls (n=203)	83.6 (28.3)	82.8 (27.1)	−0.8 (2.0)	−1.9 (1.7)	
Quality of interaction	OT (n=102)	83.8 (12.1)	85.4 (12.2)	1.6 (1.3)	2.1 (1.1)	.03
	Controls (n=203)	82.2 (14.9)	81.9 (13.3)	−0.3 (1.0)	−0.6 (0.8)	
Life Satisfaction Index-Z	OT (n=102)	17.5 (5.9)	18.8 (5.3)	1.3 (0.4)	1.6 (0.4)	.03
	Controls (n=203)	16.4 (6.1)	17.3 (5.9)	0.9 (0.3)	0.7 (0.3)	
CES-Depression	OT (n=101)	10.9 (8.9)	10.8 (8.2)	−0.1 (0.7)	−0.8 (0.8)	.16
	Controls (n=203)	13.8 (9.8)	13.6 (9.8)	−0.2 (0.7)	0.2 (0.5)	
MOS Health Perception	OT (n=102)	60.6 (22.8)	62.2 (23.5)	1.6 (1.9)	2.4 (1.9)	.05
	Controls (n=204)	57.5 (23.7)	56.4 (25.5)	−1.1 (1.5)	−1.5 (1.4)	
RAND SF-36						
Bodily pain	OT (n=48)	74.7 (19.1)	70.8 (20.1)	−3.9 (3.1)	−0.9 (2.7)	.03
	Controls (n=111)	65.8 (23.6)	60.2 (22.2)	−5.6 (2.1)	−6.9 (1.7)	
Physical functioning	OT (n=48)	77.0 (25.4)	72.9 (27.9)	−4.1 (2.9)	−3.2 (2.8)	.008
	Controls (n=110)	72.8 (23.3)	61.7 (25.7)	−11.1 (2.0)	−11.5 (1.9)	
Role functioning‡	OT (n=49)	75.5 (34.8)	71.9 (39.4)	−3.6 (6.0)	0.6 (5.4)	.02
	Controls (n=110)	62.5 (39.2)	51.8 (43.2)	−10.7 (4.0)	−12.5 (3.6)	
General health	OT (n=49)	73.3 (19.7)	72.8 (19.6)	−0.5 (2.1)	1.1 (2.3)	.06
	Controls (n=110)	64.6 (22.7)	62.0 (23.2)	−2.6 (1.7)	−3.3 (1.5)	
Vitality	OT (n=48)	66.0 (18.4)	70.1 (20.3)	4.1 (2.2)	6.2 (2.4)	.004
	Controls (n=111)	59.2 (23.0)	58.4 (20.9)	−0.8 (1.9)	−1.7 (1.6)	
Social functioning	OT (n=49)	86.0 (20.7)	85.5 (18.8)	−0.5 (3.2)	0.6 (2.7)	.05
	Controls (n=111)	81.3 (23.2)	77.1 (22.7)	−4.2 (2.1)	−4.7 (1.8)	
Role emotional§	OT (n=49)	83.0 (31.3)	77.6 (35.0)	−5.4 (6.0)	−3.6 (5.2)	.05
	Controls (n=111)	77.2 (37.9)	64.3 (39.6)	−12.9 (4.2)	−13.7 (3.4)	
General mental health	OT (n=48)	84.4 (15.5)	83.5 (12.7)	−0.9 (2.5)	1.1 (2.1)	.02
	Controls (n=111)	78.3 (20.7)	74.7 (18.4)	−3.6 (1.7)	−4.5 (1.4)	

*B-ADL indicates basic activities of daily living; OT, occupational therapy; I-ADL, instrumental activities of daily living; CES, Center for Epidemiologic Studies; MOS, Medical Outcomes Study; and RAND SF-36, RAND 36-Item Health Status Survey, Short Form-36.
†Analysis of variance performed with baseline, sex, age group, disability status, and living status as covariates. *P* values are given for adjusted change scores.
‡Role functioning refers to role limitations attributable to health problems.
§Role emotional refers to role limitations attributable to emotional problems.

relative reduction in the extent of decline. Further, in a statistical analysis across all 3 treatment groups of the 11 significant outcome variables in Table 3, we found that the direction of effect favored the OT group in all 11 comparisons with the social control group and in 10 of the 11 comparisons with the nontreatment control group. Results of the present study therefore suggest that preventive OT programs may mitigate against the health risks of older adulthood.

Ory and Cox[4] suggest that health professionals have been reluctant to target older adults in preventive programs, assuming that this population would fail to benefit significantly from such efforts; however, results of the present study demonstrate that preventive programs designed for older adults can be effective. Moreover, a recent study by Ware et al[42] reported that older adults show more health-related decline in managed care programs than both other clientele within the same programs and adults comparable in age and socioeconomic status who used fee-for-service systems. Again, the current findings suggest that preventive OT programs could be used in conjunction with other services to proactively manage health care and either generate health improvements or at least slow decline.

The finding that only 5 of the 15 outcome measures that were studied failed to demonstrate a significant gain for the OT group relative to controls provides solid evidence of the comprehensive positive effects of the OT intervention. Examination of the structure of the CES-D and the I-ADL, B-ADL, and social activity subscales of the Functional Status Questionnaire (ie, the variables that were not at least marginally significant) suggests that, because they have low ceilings, these tools are relatively insensitive to detect changes among the well elderly. In contrast, the RAND SF-36 subscales, which in general proved to be the most sensitive to treatment effects, had high ceilings and were therefore capable of detecting upward changes among well individuals.

The design of this study provided a rigorous test of the relative effectiveness of a nonprofessionally led activity group (the social control group) and a professionally designed program based on OT principles. Because both programs involved subjects with activity, our findings call into question the cliché that "keeping busy keeps you healthy." Conversely, it appears that simply being regularly engaged in activity through the social control program was no more effective in promoting health than receiving no treatment.

How then might one account for the superior outcomes of the OT intervention? First, activities were chosen based on principles from the OT field that pertain to the relationship of occupation to health. Through the systematic application of such principles, the OT program enabled subjects to construct daily routines that were health promoting and meaningful given the context of their lives. Fuhrer[43] has suggested that people experience elevated health and subjective well-being

when they are engaged in activities that they view as health promoting.

Second, in contrast to the social control intervention, the OT program was highly individualized, even though it occurred in a group context. As part of the treatment plan, participants were asked to apply the content to their own everyday experiences. This requirement is likely to have made the treatment activity sessions personally meaningful and effective within the participants' daily lives.

Third, the OT program included specific instruction on how to overcome barriers to successful daily living, an important consideration given that the participants had limited incomes and resources. For example, emphasis was placed on activities that required no financial outlay, and time was spent assisting subjects in learning to master public transportation systems. Through this approach, subjects were provided with the supports they needed to confront obstacles, take risks, and experience self-efficacy and personal control while participating in daily activity. Research outcomes have demonstrated the crucial role that such factors play in giving one a sense of forward progression rather than stasis.[9,12,14-16,43]

It is important to stress that the social control group was included in the study to rule out mere participation in group-based activities as an alternate explanation for the effects of OT, and not to simulate any type of professional intervention. Consequently, no attempt should be made to equate the social control condition with alternate treatment approaches, such as recreation therapy, that use involvement in activity as a treatment focus, but that require trained personnel to administer.

Programs such as the currently studied OT intervention that focus on everyday practices of people are sometimes viewed as neither requiring the expertise of a professional to administer nor being sufficiently effective to warrant large scale studies of their effectiveness. However, our study results demonstrate that superior outcomes can be expected when an activity-centered intervention is administered by professional therapists as opposed to being conducted by nonprofessionals. Further, our results suggest the need to perform more studies of this kind that may uncover additional positive effects of occupation-based treatment approaches. We believe that future research must also be directed toward uncovering the factors associated with activity, in general, that promote health and well-being. Finally, data on programmatic and medical costs obtained from questionnaires and telephone interviews with study subjects have been collected. A complete cost-benefit analysis is the subject of the next facet of the study.

Limitations of the current research are that the results may not generalize to older adults in different living situations (eg, single-family dwellers, nursing home residents) or of different socioeconomic status. On the other hand, a significant strength of the current research is that the outcomes can be extended to older adults of varying ethnicities. Future research is needed to replicate the positive effects of this preventive OT intervention for older adults in different living situations as well as to understand the mechanisms that underlie the positive effects found in the present study.

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