Effect of Telephone Counseling on Physical Activity for Low-Active Older People in Primary Care: A Randomized, Controlled Trial

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OBJECTIVES: To assess the long-term effectiveness of a telephone counseling intervention on physical activity and health-related quality of life in low-active older adults recruited through their primary care physician.

DESIGN: Randomized, controlled trial.

SETTING: Three primary care practices from different socioeconomic regions of Auckland, New Zealand.

PARTICIPANTS: One hundred and eighty-six low-active adults (aged 65) recruited from their primary care physicians' patient databases.

INTERVENTION: Eight telephone counseling sessions over 12 weeks based on increasing physical activity. Control patients received usual care.

MEASUREMENTS: Change in physical activity (as measured using the Auckland Heart Study Physical Activity Questionnaire) and quality of life (as measured using the Short Form-36 Health Survey (SF-36)) over a 12-month period.

RESULTS: Moderate leisure physical activity increased by 86.8 min/wk more in the intervention group than in the control group ($P = .007$). More participants in the intervention group reached 2.5 hours of moderate or vigorous leisure physical activity per week after 12 months (42% vs 23%, odds ratio = 2.9, 95% confidence interval = 1.33–6.32, $P = .007$). No differences on SF-36 measures were observed between the groups at 12 months.

CONCLUSION: Telephone-based physical activity counseling is effective at increasing physical activity over 12 months in previously low-active older adults. **J Am Geriatr Soc 55:986–992, 2007.**

Key words: physical activity; primary healthcare; randomized, controlled trial; older people

The aging population increases demands on health services because of the disproportionate use and cost of care associated with older age. Physical activity is one way of preventing and optimizing management of a variety of health conditions, with participation in regular moderate activity being linked to lower rates of all-cause mortality[1] and lower risk of several noncommunicable diseases, including coronary heart disease, diabetes mellitus type 2, obesity, and osteoporosis.[2] Participation in physical activity by older adults can improve quality of life, physical function, and psychological function; reduce the risk of dementia; facilitate independent living;[3–5] and reduce the risk of falling.[6]

Despite strong evidence of the benefits of a physically active lifestyle, many older adults are not sufficiently active to confer health benefits.[7] Factors associated with effective physical activity interventions in adults include the use of cognitive and behavioral strategies and provision of ongoing and individualized telephone-based support.[8–11] It has also been shown that involvement of primary care physicians is effective in promoting physical activity in older adults,[12–15] although three systematic reviews on the efficacy of physical activity counseling in primary care settings came to different conclusions.[16–18] In the earliest of these,[16] counseling by primary care physicians led to small, short-term increases in self-reported levels of physical activity. In the second of these reviews,[17] the authors concluded that counseling in a primary care setting was "moderately effective," although these authors did not use study quality as an inclusion criterion and reviewed a range of primary care interventions, in some of which the primary care clinician played no role. The most recent of these reviews[18] concluded that the evidence is inconclusive that counseling

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adults in primary care settings is effective in increasing physical activity. In particular, the authors noted that the studies reviewed did not provide a clear indication of the specific elements of counseling that influence its effectiveness. Studies published since this last review[18] have demonstrated that counseling in primary care settings is effective in increasing physical activity.[13,15] In both of these studies, the intervention involved brief physician-delivered activity counseling followed by telephone support from trained exercise specialists on approximately three occasions over the following 3 months,[13,15] with long-term (12 months) effects being demonstrated.

Despite increasing research on physical activity interventions for older adults, findings must be viewed with caution because of methodological limitations such as small sample size,[8] the omission of a usual-care control groups,[19] limited telephone counseling,[19] and the varied ways in which physical activity has been measured. A recent study examined the effects of extended physical activity counseling (combination of 3 face-to-face and 13 telephone consults over 6 months) on moderate-intensity physical activity in sedentary older primary care patients.[20] The authors demonstrated significantly greater physical activity levels at the mid-point and end of the 6-month intervention in patients who took part in the extended counseling intervention than in those who received only brief physical activity advice from their physician, although it is unknown whether this difference lasted beyond the end of the intervention because no further follow-ups were conducted. Telephone counseling has the attraction of being easily delivered, more economical than face-to-face visits, and acceptable to most people.

The purpose of the present study was to assess the effectiveness of a telephone counseling intervention (TeleWalk) on physical activity and health-related quality of life in low-active older adults recruited through their primary care physician. It was hypothesized that those receiving the TeleWalk intervention would report greater participation in physical activity and greater improvements in health-related quality of life at immediate and long-term follow-up than those in the control group.

METHODS

The methods for this randomized, controlled trial have been described elsewhere.[21] The Auckland Ethics Committee approved the protocol for this trial in 2002. Participants gave informed consent.

Design and Participants

A randomized, controlled trial was used to investigate the effectiveness of a telephone-based counseling intervention aimed at increasing physical activity in low-active older adults. To detect a change of 30% in physical activity or a change of 7.5 units in the Short Form-36 Health Survey (SF-36) with 95% confidence and 80% power, 184 participants needed to be recruited (allowing for 20% dropout). Two research assistants recruited patients through three primary care practices from different socioeconomic regions of Auckland, New Zealand, from June 2003 to March 2004. The primary care physicians identified and screened all those aged 65 and older on the practice databases (from their files). Those for whom physical activity was not contraindicated and were contactable at the address and telephone number on the practice database (N = 831) were invited to participate in the study via a letter from their primary care physician and follow-up telephone call from the practice where necessary. Of those who agreed to participate (333/831), 186 (56%) met the inclusion criteria of having participated in less than 30 minutes of activity on 5 or more days per week for 6 months or longer, had no unstable major health problem (e.g., unstable heart conditions, respiratory conditions) that meant that increased activity would be contraindicated, planned on living in the region for the next 12 months, and had suitable English language ability to participate in telephone counseling. Flow of participants through each stage of the study is seen in Figure 1.

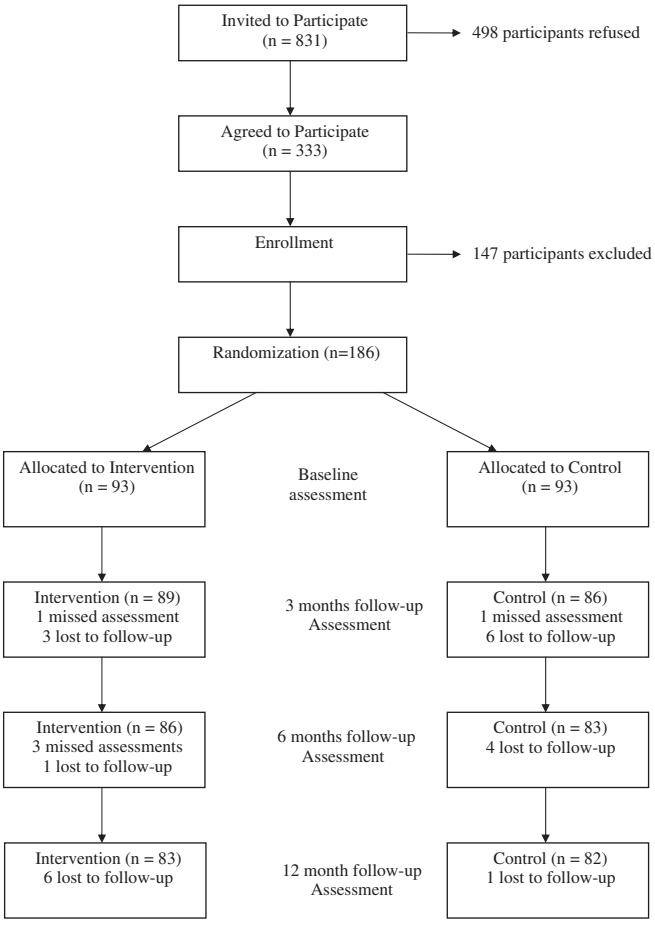

Figure 1. Flow of participants through each stage of the TeleWalk trial.

Measures

The primary outcome measures were assessed using telephone administration at baseline, 3 months (end of intervention), and 6 and 12 months postbaseline. The assessor was blinded to group allocation. Outcome measures were physical activity, measured using the Auckland Heart Study Physical Activity Questionnaire (AHSPAQ),[22] and health-related quality of life, measured using the SF-36.[23] The AHSPAQ is a self-report instrument that prompts partici-

pants for recall of physical activity over 3 months. It has been validated for adults and for use in primary care settings[22,24] and has been used in intervention trials of sedentary adults and older adults.[13,15] The AHSPAQ comprises 12 questions to assess physical activity within domains including leisure physical activity (light, moderate, vigorous), walking (as a subset of leisure physical activity), occupational physical activity (light, moderate, vigorous), other walking (e.g., walking to and from work, nonleisure brisk walking), and domestic physical activity (light, moderate). For the leisure and occupational domains, respondents are requested to list the activities they have undertaken over the previous 3 months, in the context of the number of times per fortnight and number of minutes per time. The walking domain is assessed through reporting the number of minutes and number of days per week. The AHSPAQ outputs include leisure walking within leisure physical activity but with the option of viewing it as a subset for separate description and analysis. For the domestic activities domain, respondents indicate the length of time in an average week they spend on each activity they list. The SF-36 measures health-related quality of life and mental health and physical health along eight dimensions: physical functioning, role physical, bodily pain, general health, vitality, social functioning, role emotional, and mental health.

Information on adverse events (falls and musculoskeletal injuries) was collected over the 3-month intervention period to monitor any changes associated with the intervention. Participants completed monthly diaries to record data on these events, and the researchers collected the data at the end of each month over the intervention period. After baseline assessment, one of the researchers (MO) computer randomized (simple randomization) participants to control or intervention groups. Another researcher (NG) generated the allocation sequence.

Intervention

The TeleWalk intervention comprised eight telephone counseling sessions over a 12-week period: weekly for the first 4 weeks and then every 2 weeks for the remaining 8 weeks of the intervention. The intervention, described in an earlier article,[21] was developed within the framework of the transtheoretical model of behavior change.[25] This approach is based on the premise that individuals progress through various stages of change (precontemplation, contemplation, preparation, action, maintenance) and that interventions aimed at encouraging the eventual desired behavior must be customized to an individual's current stage of change. The phone calls followed specific but flexible scripts that were based on the appropriate stage of change for each individual in relation to adoption of physical activity. The scripts drew on earlier telephone counseling scripts[8] and motivational interviewing techniques such as assisting patients to identify barriers and solutions and discussing positive and negative aspects of participating in more physical activity.[26] The specific strategies employed within the TeleWalk intervention are listed in Table 1. These strategies were aimed at increasing participation in all forms of physical activity, of which walking is a subset. The customized nature of the program allowed the participant to set physical activity goals with the exercise counselor and work toward those goals. For example, for those who came into the program at sedentary levels, walking may have been encouraged as an activity that they could easily incorporate into their activities of daily living. For others who were walking more regularly, other physical activities (e.g., physical activity and exercise classes, dancing) may have been encouraged.

Table 1. Specific Strategies Used in the TeleWalk Intervention

Strategies used in the TeleWalk intervention
Increasing knowledge of the benefits of physical activity
Increasing awareness of the risks of a sedentary lifestyle
Increasing awareness of physical activity opportunities
Identifying motivators
Problem-solving barriers
Recognizing and resolving ambivalence
Identifying discrepancies between behavior and goals (cognitive dissonance)
Improving physical activity self-efficacy
Goal setting and tracking using SMART (specific, measurable, achievable, realistic, time-related) goal principals
Enlisting social support
Using prompts to be active
Reinforcement (internal and external rewards)
Discussing safe methods to exercise
Discussion about relapse prevention and identifying and problem-solving future barriers to physical activity

In addition, supplementary material was mailed to the TeleWalk participants in the form of a walking log and pamphlets to support the counseling approach. This individualized approach was important in light of the variability in physical activity ability, health status, stage of life, and general attitude toward walking and other physical activity. The intervention and its development are described in more detail in an earlier paper.[21] As reported earlier,[21] mean telephone call lengths $\pm$ standard deviation ranged from 10.2 ± 5.3 to 16.5 ± 6.9 minutes.

The control group did not receive any intervention but completed the outcomes assessment as per the intervention group.

Statistical Analyses

The differences between the intervention and control groups in change of outcome variables were analyzed using a repeated-measures mixed model with an unstructured covariance matrix, which analyzed the observed data as incomplete. The models were adjusted for known determinants of physical activity (age and sex), study design effects (clinic of origin), and baseline effects. A generalized estimating equation for binary data with a logit link function was used to model the change in meeting physical activity guidelines from baseline to 12-month follow-up. All analyses were preformed using SAS statistical software, version 9.1.3 (SAS Institute, Inc., Cary, NC).

RESULTS

Table 2 shows that there were no significant differences in demographic characteristics of participants between

Table 2. Demographics of Participants at Baseline (N = 186)

Variables	Control Group (n = 93)	Intervention Group (n = 93)	*P*-Value*
Age, mean ± standard deviation	74.3 ± 5.9	74.1 ± 6.2	.81
Female, n (%)	65 (69.9)	58 (62.4)	.28
New Zealand European, n (%)	89 (95.7)	92 (98.9)	.17
Married or living with partner, n (%)	47 (50.5)	45 (48.4)	.80
Retired, n (%)	78 (83.9)	79 (84.9)	.84
Own and use an automobile, n (%)	72 (77.4)	67 (72.0)	.40
Education level, n (%)			
No qualification	37 (39.8)	34 (36.6)	
High school qualification	12 (12.9)	21 (22.6)	
University qualification	12 (12.9)	11 (11.8)	
Other post–high school qualification	32 (34.4)	27 (29.0)	.28
Clinic, n (%)			
Clinic 1	37 (48.7)	39 (51.3)	
Clinic 2	24 (48.0)	26 (52.0)	
Clinic 3	32 (53.3)	28 (46.7)	.82
Any falls in the 12 months before baseline, n (%)	11 (11.8)	12 (12.9)	.82

* *t* test for age, chi-square for other variables.

groups at baseline. Table 3 demonstrates that some of the baseline assessments of physical activity and quality-of-life measures differed by group; therefore, the repeated-measures mixed model was adjusted for the baseline effects.

For all measures of physical activity, there were greater increases in the intervention group at the conclusion of the intervention period (0–3 months) than in the control group (Table 3). For total leisure time physical activity ($P = .02$), the estimated differential after 3 months was on average 48.9 min/wk standard error (SE) = 21.6) more activity undertaken by intervention group participants. Similarly significant increases were observed in moderate leisure-time physical activity (which included leisure walking) ($P = .04$, estimated differential after 3 months = 42.6 min/wk (SE = 20.8)) and leisure walking activity ($P = .001$, estimated differential after 3 months = 41.3 min/wk (SE = 12.4)).

When the entire 12-month data collection period was examined, the only significant difference between the two groups was the total amount of time per week spent on moderate leisure activity (including leisure walking) ($P = .007$). The difference between the treatment and control groups was estimated at 86.8 minutes more moderate leisure-time physical activity per week for those in the treatment group ($P = .007$). Total leisure activity showed changes that were nonsignificant ($P = .05$) but substantial (estimated at 74.9 more minutes of moderate leisure time physical activity per week for treatment group participants). There was no significant change in leisure walking activity by itself ($P = .68$).

Examination of the participants who completed the 12-month follow-up showed that, at baseline 21 of the 82 (25.6%) control group participants and 24 of the 83 (28.9%) intervention group participants achieved the commonly adopted health-related guidelines of at least 150 minutes of moderate or vigorous leisure physical activity per week. At 12-month follow-up, 19 of the 82 (23.2%) control group participants and 35 of the 83 (42.2%) intervention group participants met the guidelines (odds ratio = 2.90, 95% confidence interval = 1.33–6.32, $P = .007$).

Several SF-36 quality-of-life measures were not analyzed because of moderate to strong ceiling effects. Ceiling effects were observed at baseline for pain (27.4% of participants scored 100%), role physical (60.2%), social functioning (71.0%), and role emotional (89.2%). The SF-36 quality-of-life measures varied over group and time. None of the measures showed statistically significant differential changes between the control and intervention group over the entire 12-month measurement period, although examination of the intervention period only (baseline to 3 months) showed a significant differential between groups for physical functioning ($P = .04$), with those in the treatment group having higher scores. This differential was estimated as 4.44 units (SE = 2.16) over the 3-month intervention period. The quality-of-life measures that did not significantly change over the intervention period were general health ($P = .88$), vitality ($P = .10$), and mental health ($P = .15$).

Participants were asked at baseline and at end of the 12-month follow-up whether there were any falls within the previous 12 months. There was no evidence of more falls in the intervention group than in the control group over the 12-month trial period. In the control group, at baseline, 11 of 93 (11.8%) participants reported falls in the previous 12 months, and at 12-month follow-up, 12 of 82 (14.6%) participants reported falls in the previous 12 months; in the intervention group, at baseline 12 of 93 (12.9%) participants reported falls in the previous 12 months, and at 12-month follow-up, nine of 83 (10.8%) participants reported falls in the previous 12 months. There were no significant differences in falls between the two groups or between the 2 years of interest.

Table 3. Mean (SD) Assessment Measurements of Physical Activity and Quality of Life

Measure	Baseline	3 Months	6 Months	12 Months	*P*-Value[†]		
	Mean ± Standard Deviation				Time	Group	Time × Group
Leisure activity[‡] (min/wk)							
Total							
Control	121.0 ± 172.6	116.5 ± 140.1	119.2 ± 147.7	117.3 ± 138.8	.16	.31	.05
Intervention	165.5 ± 220.4	184.0 ± 172.7	199.1 ± 221.2	244.0 ± 365.7			
Moderate							
Control	88.6 ± 168.2	86.7 ± 122.5	97.4 ± 149.6	83.3 ± 129.9	.03	.54	.007
Intervention	108.6 ± 163.8	138.9 ± 171.9	153.9 ± 203.4	197.7 ± 323.4			
Walking							
Control	59.2 ± 74.6	62.4 ± 84.1	63.9 ± 83.0	63.7 ± 87.7	.50	.02	.68
Intervention	72.4 ± 85.3	107.2 ± 87.9	88.6 ± 88.1	91.4 ± 91.9			
Short Form-36 Health Survey quality of life scores							
Physical functioning							
Control	76.2 ± 20.8	73.8 ± 22.1	78.5 ± 22.3	75.9 ± 21.9	.56	.34	.12
Intervention	71.7 ± 23.1	73.9 ± 19.8	74.0 ± 21.9	74.9 ± 18.4			
Role physical[§]							
Control	74.7 ± 37.3	77.9 ± 36.5	80.1 ± 35.7	82.0 ± 33.2	—	—	—
Intervention	73.7 ± 35.6	78.7 ± 37.2	74.1 ± 38.6	75.0 ± 32.9			
Bodily pain[§]							
Control	72.7 ± 23.0	73.1 ± 22.8	79.3 ± 23.5	78.6 ± 24.9	—	—	—
Intervention	72.4 ± 22.4	72.9 ± 23.4	71.1 ± 26.2	71.2 ± 27.0			
General health							
Control	68.3 ± 20.7	71.6 ± 18.6	75.8 ± 18.7	72.5 ± 21.2	.08	.67	.85
Intervention	70.7 ± 17.5	72.1 ± 15.1	72.6 ± 17.5	72.7 ± 16.5			
Vitality							
Control	63.0 ± 18.7	61.6 ± 21.0	65.9 ± 18.8	65.5 ± 18.5	.72	.36	.30
Intervention	61.3 ± 18.2	64.0 ± 16.9	61.3 ± 18.4	61.6 ± 18.5			
Social functioning[§]							
Control	91.0 ± 18.3	92.9 ± 18.3	92.5 ± 19.2	93.9 ± 16.5	—	—	—
Intervention	89.1 ± 20.6	94.7 ± 13.6	92.6 ± 18.5	94.4 ± 14.9			
Role emotional[§]							
Control	93.9 ± 20.8	95.3 ± 15.5	94.3 ± 21.5	93.9 ± 21.7	—	—	—
Intervention	93.2 ± 20.6	97.8 ± 9.8	91.9 ± 26.0	97.6 ± 11.4			
Mental health							
Control	83.6 ± 14.7	84.0 ± 14.8	84.4 ± 13.2	85.9 ± 13.2	.04	.23	.52
Intervention	83.9 ± 11.8	86.2 ± 11.4	85.5 ± 12.2	86.7 ± 10.0			

[†] Repeated measures mixed model adjusted for age, sex, clinic, and baseline value.
[‡] The three measure of physical activity are nonexclusive. For example, moderate leisure activity includes leisure walking activity, and total leisure activity includes all moderate leisure activity.
[§] Not analyzed because of ceiling effects.

DISCUSSION

TeleWalk, a primary care telephone counseling intervention, was effective at increasing physical activity participation in low-active older adults over a 12-month period, with no evidence of adverse effects on proportion of participants falling. This finding supports that of previous research that included telephone counseling with adult[13] and older adult[15,20] populations. Whereas the earlier studies used initial face-to-face advice from a primary care physician before the telephone counseling, the current study involved only telephone counseling from a trained counselor. Although primary care physicians were not involved directly in providing physical activity advice in this trial, it was important that they made the initial invitations to participants, given that they are seen as a trusted source of such information.[27]

More participants in the intervention group (42% vs 23%) reached the health-related goal of 2.5 hours of moderate or vigorous leisure physical activity per week after 12 months. This is a substantial increase in the proportion of those recruited reaching health-related activity goals. Other

research to investigate this activity threshold in older adults has not demonstrated these differences. For example, the recent Green Prescription trial in New Zealand found that, although older intervention participants increased their moderate-to-vigorous physical activity by 40 minutes more per week than their control counterparts, the increase in proportion of participants reaching the health-related activity goal of 2.5 h/wk was not significantly different between the groups.[15]

The improvements observed for moderate leisure activity after 12 months in this trial were much greater than those observed immediately after intervention completion (3 months). Although a full explanation of this observation is not possible from these data, it is likely to be a real effect of the intervention. Motivational interventions (as the TeleWalk intervention was) have been shown to result in continuing divergence of outcomes in at least two other areas: disability, pain, and working ability in patients with chronic low back pain (5 years)[28] and depression symptoms in spouse–caregivers of patients with Alzheimer's disease (3 years).[29] The intervention in the current study may have achieved similar results, with behavior change being sustained and even increasing over time. More research is needed about the actual form of counseling interventions and their long-term effect (>12 months). It may be that the psychological component of the intervention is integral to sustained behavior change.

Over the course of the intervention (3 months), improvements were seen in the physical functioning domain of quality of life, although no quality-of-life differences were sustained at 12 months. These findings are contrary to those of a previous study[15] that demonstrated changes in the general health and vitality domains of quality of life in older sedentary adults over 12 months. Differences between study findings may be due to differences in the samples recruited (i.e., waiting room vs invitation letter) and lower baseline physical activity levels and less increase in physical activity across the course of the intervention in the previous study.[15] Recruitment of a sample at the time of consulting the primary care physician (waiting room sampling) means that participants may have been at a lower level of health and therefore had more to gain from a modest increase in activity. In addition, higher baseline SF-36 subscale scores in the current trial, possibly due to the telephone mode of administration,[30] likely contributed to the ceiling effects experienced. Although the mechanism by which physical activity improves quality of life is unknown, older people may perceive it more easily if they are starting from a lower level of health.

This trial had two potential limitations. First, it relied on a self-reported physical activity measure that may be subject to social desirability bias. Nevertheless, this measure has been validated against activity diaries and pedometers[24] and has been used in physical activity trials involving telephone counseling.[13,15] Compared with more objective measures of physical activity such as motion sensors, heart rate monitoring, and doubly labeled water, questionnaires have been shown to be practical and valid for epidemiological studies.[31,32] Second, because several of the quality-of-life domains had moderate to strong ceiling effects at baseline, they could not be analyzed with sufficient statistical rigor.

CONCLUSION

In conclusion, previously low-active older adults increased their moderate and vigorous activity by nearly 87 min/wk. This substantial level of behavior change may lead to better cardiovascular and other health outcomes.[33] The intervention tested seems to be well accepted by and suited to older adults.[21]

This study is one of few to investigate telephone counseling to increase physical activity in low-active older adults. Unlike some other studies,[8,19,20] a true control group was used. A particular strength of this study was the involvement of primary care physicians in inviting their patients to participate. This involvement was a likely reason for the relatively high response rate for this type of study (40% of those invited volunteered to participate). A further strength of this study was that the increased physical activity was sustained through to the 12-month follow-up.

Given that the intervention was not grounded in an existing physical activity promotion initiative relevant to a specific healthcare system, the findings should be generalizable to other countries. In addition, the study included socioeconomically diverse groups.

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