The Effectiveness of a Walking Booster Program for Seniors

Jonine M Jancey, PhD [(1)] ; Andy H Lee, PhD [(1)] ; Peter A. Howat, PhD [(1)] ; Linda Burke, MHP [(1)] ; Choon C. Leong, PhD; Trevor Shilton, MSc [(2)]

Curtin University, School of Public Health [(1)]
National Heart Foundation (WA Branch) [(2)]

ABSTRACT

Purpose: To determine the effectiveness of a 3-month home-based booster program for seniors to increase walking.
Design: A longitudinal prospective study.
Setting: Perth, Western Australia.
Subjects: Of the 177(/260) program participants and 236(/313) controls who initially completed the neighborhood walking intervention, 114 (64%) and 134 (57%) were available for the booster, and 100 and 131 participants completed the entire program, respectively.
Intervention: A 6-month neighborhood walking intervention was followed 12-months later by a 3-month home-based booster program comprised of print-based materials, a pedometer, and two motivational phone calls.
Measures: A self-reported questionnaire was administered at four time points; original intervention: baseline (t1), 6-months (t2); booster: 18-months (t3), 21-months (t4). Physical activity levels were measured using the International Physical Activity Questionnaire. Personal and demographic information was collected.
Analysis: Descriptive statistics and repeated measures ANOVA.
Results: The intervention group mean time spent walking for recreation and mean time spent walking for errands per week showed significant increases between t1 and t2, but the weekly mean time walking for recreation dropped by 52 minutes from t2 to t3. Significant increases were evident from t3 to t4 as a result of the booster. Walking levels for the control group remained stable over the study period.
Conclusion: Physical activity levels of seniors revert once an intervention concludes. A home-based booster program can reactivate physical activity levels. Hence program planners should include booster sessions for program sustainability.
Key words: Behavioral, Local Community, Physical Activity, Walking, Seniors
Indexing key words: Format: research; Research purpose: intervention testing/program evaluation; Study design: quasi-experimental; Outcome measure: behavioral; Setting: local community; Health focus: physical activity; Strategy: skill building/behavior change; Target population age: seniors; Target population circumstances: education, geographic location.

PURPOSE

The health benefits of physical activity are well documented in relation to weight management and the prevention of chronic illnesses, as well as improving mental health and cognitive function.[1] However, our knowledge of the benefits of physical activity is not matched by our understanding of how to get people active and maintain activity.[2]

There is a need for developing and trialing strategies for older people (65 years and above) to include physical activity into their lifestyle.[3] These interventions need to be systematic, robust and longer-term incorporating different methods of engaging this population.[3, 4]

Many factors influence physical activity behavior, yet there is limited evidence of the effectiveness of strategies to increase physical activity.[2-4] This is the case particularly in regard to booster programs, even though the little specific data available on physical activity booster programs are generally positive. [5, 6] Interestingly, lessons may be learnt from the obesity treatment area, which has made significant gains in terms of promoting and improving long-term behavior change.[7, 8]

The purpose of the neighborhood-based intervention (0 to 6-months) was to increase older adult's physical activity levels. The 3-month minimal intervention home-based booster program, conducted at 18 to 21-months, aimed to address the expected drop-off in physical activity levels post-intervention. This paper describes the impact of the home-based booster program delivered 12-months after the initial intervention on physical activity levels of older adults.

METHODOLOGY

Design

This longitudinal, prospective cohort study recruited 573 older adults aged 65 to 74 years into a 21-month physical activity program at baseline (t1), which comprised a 6-month neighborhood walking program (intervention group n = 260; control group n = 313), and followed-up 12-months later by a 3-month minimal intervention home-based booster program.

Sample

Participants resided in the Perth metropolitan area, the capital of Western Australia. Selection criteria were: (a) the neighborhood be comprised of at least 11% of 65 year olds and above, reflecting the State average and; (b) the neighborhood contained at least 100 people aged 65 years and over, to ensure a large enough sample size for telephone matching. Neighborhoods were matched for low, medium and high levels of socio-economic status. The 60 neighborhoods were then randomly assigned to the intervention

group (n = 30) or control group (n = 30). Full details of the methodology are reported elsewhere.[9]

At the conclusion of the first intervention (t2), participants were asked if they would be willing to participate in a follow-up physical activity program. Those who indicated the affirmative took part in the booster program. Of the original cohort, 413 (intervention: 177; control: 236) participants completed the 6-month program at t2. Twelve months later (t3) 248 (intervention: 114; control: 134) participants were available for the booster. Finally, 231 (intervention: 100; control: 131) participants completed the 3-month booster program (t4). A washout period of 12 months between interventions was considered optimal to determine the impact of the booster.

Measures

A structured self-completed questionnaire was developed to collect data at baseline (t1), post-intervention (6-months; t2), pre-booster (18-months; t3) and post-booster (21-months; t4). The International Physical Activity Questionnaire (IPAQ) measured frequency and duration of walking for recreation and walking for errands. The IPAQ has acceptable measurement properties for use in population studies of physical activity participation.[10] The intra class correlation of IPAQ was found to be moderate (.58 to .94), and no significant differences were evident between test re-test results (t-test p = .051 to .595).[11] In addition to physical activity measurements, personal and demographic information was collected. These variables include gender, age (years), relationship status (with partner; without partner), country of birth (Australia; elsewhere), and educational attainment (primary school; secondary school; university).

Intervention

In brief, the 3-month home-based booster intervention provided participants with an interactive physical activity booklet; a pedometer; two motivational phone calls; and a call centre for feedback and advice. Due to space limitations descriptions of the neighborhood based intervention and the home-based booster are contained in the Appendix.

Statistical Analysis

Statistical analyses were undertaken using the SPSS package version 16. Univariate statistics were applied to compare the intervention group with the control group. Repeated measures ANOVA was then carried out to determine (i) if significant changes had occurred in the amount of walking by seniors over the four time points, t1 to t4 of data collection; and (ii) whether significant differences in walking activity arose between seniors in the intervention and those in the control group. Two types of walking were

assessed: walking for recreation and walking for errands. Analysis was limited to participants and controls with complete data at all four time points.

RESULTS

Over the course of the intervention there was a drop out of 57% for the control group (from n = 313 at t1 to n = 134 at t3) and 56% for the intervention group (from n = 260 at t1 to n = 114 at t3).

Characteristics of Sample

Table 1 shows the demographic profile of the intervention and control participants at baseline (t1) and at the commencement of the booster program (t3). The subjects were aged between 65 and 74 years. The majority of participants were female, born in Australia, lived with a partner and had achieved secondary education. Characteristics of the study population at t1 were compared with those at t3. No statistical significant differences were found between them for both groups. Similarly, demographic characteristics of drop-outs were analyzed. Again, no significant differences were evident in comparison to the original cohort and program completers.

Table 1. Demographics of intervention and control groups at baseline (t1) and commencement of booster (t3)

Variable	Control t1 (N = 313)	Intervention t1 (N = 260)	Control t3 (N = 134)	Intervention t3 (N = 114)
Gender				
Male	127 (41%)	86 (33%)	48 (36%)	38 (33%)
Female	186 (59%)	174 (67%)	86 (63%)	76 (67%)
Age				
60s	160 (51%)	130 (50%)	26 (20%)	24 (21%)
70s	153 (49%)	130 (50%)	108 (80%)	90 (79%)
Relationship Status				
Partner	223 (71%)	173 (67%)	89 (66%)	72 (63%)
No Partner	90 (29%)	87 (33%)	45 (33%)	42 (37%)
Country of Birth				
Australian Born	185 (59%)	174 (67%)	89 (66%)	80 (70%)
Non-Australian Born	128 (41%)	86 (33%)	45 (33%)	34 (30%)
Education Level				
Primary	40 (13%)	30 (12%)	14 (10%)	10 (9%)
Secondary	195 (62%)	153 (59%)	80 (60%)	63 (55%)
Tertiary	78 (25%)	77 (29%)	40 (30%)	41 (36%)

Walking for Recreation

Table 2 (a) compares the time spent walking between the two groups over the four time-points. For the intervention group, the mean time spent walking for recreation increased by 92.54 minutes at the completion of the 21-month program from t1 to t4 ($p < .001$). The control group remained relatively stable over the 21-month period albeit their mean weekly time increased by 10.32 minutes ($p > .05$). From t1 to t2 the intervention group significantly increased their mean weekly time spent walking for recreation by 106.4 minutes ($p < .01$), whereas the control group remained relatively stable, even though an increase of 21.68 minutes ($p > .05$) was observed. The interval between the two interventions (t2 and t3) resulted in a decline of 51.92 minutes for the intervention group and 4.38 minutes for the control group. However, from t3 when the booster program commenced, a significant increase of 38.06 minutes ($p < .01$) in walking for recreation was again evident in the intervention group but a decline of 6.98 minutes was recorded in the control group over the same period.

A repeated measures ANOVA of the data indicated a significant main effect for time spent walking for recreation, F (3, 214) = 23.39, $p < .001$, as well as for group, F (1, 216) = 7.26, $p < .001$. The time main effect was qualified by a significant interaction between time and group, F (3, 214) = 10.03, $p < .001$. This suggested that the four time points displayed significant changes in walking for recreation. In particular, increases occurred from t1 to t2 and from t3 to t4. This held truer for the intervention group than the control group.

Walking for Errands

Table 2 (b) showed that the intervention group had a larger increase of 49.37 minutes ($p < .05$) than the control group of 4.55 minutes between t1 and t2 in weekly time spent walking for errands. A similar pattern was repeated for the booster program period (t3 to t4), during which an average increase of 9.36 minutes was recorded for the intervention group compared to a mean increase of 4.9 minutes for the control group. However, these changes were not significant ($p > .05$).

The repeated measures ANOVA showed a significant main effect for time spent walking for errands, F (3, 211) = 12.23, $p < .001$ but not for interaction between time and group, F (3, 211) = 2.40, $p > .05$. The main effect for group was not significant, F (1, 213) = 2.38, $p > .05$. In respect of the significant main effect of time, pairwise comparisons showed that only differences between baseline t1 and each of the three subsequent time points were statistically significant ($p < .001$). Comparisons among the three later time points (t2 and t3, t2 and t4, t3 and t4) yielded non-significant differences ($p > .05$). Therefore, the initial intervention, as well as the booster program, resulted in some increases in walking for errands but such increases were not statistically significant.

Table 2. Mean time (min per week) spent walking for recreation and walking for errands

	Walking for recreation		Walking for errands		Total walking	
Time point	intervention	control	intervention	control	intervention	control
t1	55.06	81.66	70.21	104.77	125.27	186.43
(0-months)	(SE 6.15)	(SE 7.74)	(SE 8.77)	(SE 10.62)	(SE 7.46)	(SE 9.18)
t2	161.46	103.34	119.58	109.32	281.04	212.66
(6-months)	(SE 9.16)	(SE 8.66)	(SE 9.96)	(SE 8.64)	(SE 9.56)	(SE 8.65)
t3	109.54	98.96	116.14	95	225.68	193.96
(18-months)	(SE 8.63)	(SE 11.0)	(SE 12.25)	(SE 11.26)	(SE 10.44)	(SE 11.13)
t4	147.6	91.98	125.5	99.9	273.1	191.88
(21-months)	(SE 13.64)	(SE 10.0)	(SE 17.93)	(SE 15.89)	(SE 15.78)	(SE 12.95)

DISCUSSION

This report examined the effectiveness of implementing a 3-month booster program, 12-months after a 6-month neighborhood physical activity intervention. The study investigated two domains, namely, walking for recreation and walking for errands. It was expected that the intervention program would have a greater impact on walking for recreation, however, as information was also provided on walking for errands (or incidental walking) this was assessed separately. It was of interest to determine whether the intervention would impact on walking for errands, because the high level of errand walking at baseline probably imposed limitations on further gains, i.e. ceiling effect.

Booster Program

The booster program was successful in raising the mean time spent walking for recreation by 38 minutes per week in the intervention group, whereas the control group remained stable. The intervention group's mean time spent walking for errands also increased by 9 minutes. Moreover, the drop off in levels of walking 12 months after the original neighborhood-based intervention was remedied by the booster. It demonstrated the value of the booster program to reactivate and maintain levels of activity.

The booster program provided various resources: a booklet containing guidelines and instructions for participants to set their own physical activity goals; a pedometer to use as an incentive; messages that reinforced increasing physical activity; and two motivational phone calls to give tailored advice and support. In this sense, the program was flexible and participants could adapt it to their lifestyle and ability. The opportunity for semi-tailoring the program was provided in recognition that one type of program does not fit all.[2]

The provision of ongoing contact, reinforcement and support for individuals are recognized in the literature as important components of effective health interventions.[2-4, 6] The literature has also identified the role of professional guidance and the opportunity for self-monitoring.[2] This minimal intervention home-based booster program supported these documented findings and illustrated how these important program components can be incorporated in an acceptable manner. The longer term follow-up approach was similar to strategies adopted in the obesity treatment and weight management literature to enhance behavior change.[7, 8]

Considering that less than 50% of adults in Australia, Canada and the US achieve the recommended levels of physical activity for health benefits,[2, 10] the findings are very encouraging. Walking as a physical activity intervention has substantial potential and is the most reported leisure activity across all socio-economic groups. Walking is recognized as being suitable for any age group, especially for older adults who prefer this type of lower intensity exercise.[2, 12]

Summary

The findings demonstrated the benefits of a minimal intervention booster program to maintain and reactivate levels of physical activity. Participants entering the intervention were relatively active and this may indicate a need for more intensive interventions for lower level exercisers. It is recommended that further studies be conducted to determine the long term impact and optimal periodicity for delivering physical activity booster programs. In addition, the relatively small increases in walking for errands indicated an opportunity for programs to enhance this aspect of physical activity for both positive health and environmental outcomes.

Limitations

Evaluation of this intervention program was based on self reported physical activity levels which may result in overestimation.[10] Nevertheless, self-report data have been found to be sufficiently reliable for monitoring changes in activity levels over time.[10] Self-selection bias is another issue of concern because all subjects were voluntary

participants. Such bias was minimized through the study design and the procedure adopted to recruit participants.[9] As with other similar interventions there was also significant attrition over the course of the 21-month program. [9]

Significance

The booster intervention was successful in raising levels of walking for recreation and errands. It presented an example of the role that minimal intervention home-based booster programs can play in reactivating and maintaining levels of physical activity, and provided a useful guide for health promotion practitioners intending to implement similar interventions.

ACKNOWLEDGEMENTS

The Western Australian Health Promotion Foundation and the ATN Universities Centre for Metabolic Fitness provided funding and support. The Human Research Ethics Committee of the researchers' institution approved this study (approval number HR 69 2002).

References

1. World Health Organization. *Global strategy on diet, physical activity and health.* Geneva: WHO; 2004.

2. Ogilvie D, Foster C, Rothnie H, et al. Interventions to promote walking: systematic review. *BMJ.* 2007;334(7605):1204.

3. Kroeze W, Werkman A, Brug J. A systematic review of randomized trials on the effectiveness of computer tailored education on physical activity and dietary behaviour. *Ann Behav Med.* 2006;31(3):205-223.

4. Eakin E, Lawler S, Vandelanotte C, Owen N. Telephone interventions for physical activity and dietary behavior change. *Am J Prev Med.* 2007;32(5):419-434.

5. Pisters F, Veenhof C, Van Meeteren N, et al. Long-term effectiveness of exercise therapy in patients with Osteoarthritis of the hip or knee: a systematic review. *Arthritis & Rheumatism-Arthritis Care & Research.* Oct 2007;57(7):1245-1253.

6. Muller-Riemenschneider F, Reinhold T, Nocon M, Willich S. Long-term effectiveness of interventions promoting physical activity: a systematic review. *Prev Med.* 2008;47:354-368.

7. Perri M, Limacher M, Durning P, et al. Extended-care programs for weight management in rural communities: the treatment of obesity in underserved settings (TOURS) randomized trial. *Arch Intern Med.* 2008;168(21):2347-2354.

8. Wing R, Tate D, Gorin A, Raynor H, Fava J. A self-regulation program for maintenance of weight loss. *New Eng J Med*. 2006; 355: 1563-1571.

9. Jancey J, Howat P, Lee A, et al. Effective recruitment and retention of older adults in physical activity research: PALS study. *Am J Health Behav.* 2006;30(6):626-635.

10. Craig C, Marshall M, Sjostrom,A, et al. International physical activity questionnaire: 12 country reliability and validity. *Med Sci Sports Exerc.* 2003;35(8):1381-1395.

11. Jancey J, Lee A, Howat P, Clarke A, Wang K, Shilton T. The effectiveness of a physical activity intervention for seniors. *Am J Health Promot.* 2008;22(5):318-321.

12. Jancey J, Clarke A, Howat P, Lee A, Shilton T. A physical activity program to mobilize older people: a practical and sustainable approach. *Gerontologist.* 2008;48(2):251-257.

Appendix

Neighborhood Based Intervention

The neighborhood based 6-month prescriptive physical activity intervention was designed by an exercise gerontologist, commencing at a very low level and providing a graduated and standardized program for the previously inactive older adults. Trained walk leaders supervised walking groups twice weekly. The participants were provided with a progressive weekly exercise program, which contained written information on the appropriate length for walking, and illustrations for stretching and strength exercises. The graduated physical activity program started with 10 minutes of low intensity walking and two stretching exercises, building up to 45 minutes of walking and increasing intensity level over the 6 month period, plus flexibility and ball drills. This range of activities aimed to improve endurance, balance and flexibility.

The walk leaders were able to modify the prescribed program to suit the needs of the individuals within their group. For example, the less able participants were provided with walking short-cuts, whereas the more able participants were encouraged to walk further and complete a greater number of exercises. This tailored approach was possible due to the walk leaders having undergone training, interacting closely with each of the walkers, and monitoring their behavior. Further details of the intervention are described elsewhere.[12]

Home-based Booster

The 3-month low cost (AUS$18,000 – estimated to be $150.00 per enrollee) home-based booster intervention was also designed by physical activity specialists. The participants received an interactive booklet which was developed after consultation with the target group. The booklet advised the participants of the benefits of being active, the recommended levels of physical activity and suggested opportunities for increasing physical activity, especially walking. It provided an opportunity for goal setting and for recording and monitoring daily physical activity progress.

A brief questionnaire was mailed to each participant to assess the suitability and appropriateness of the booklet. It was part of the strategies to encourage the participants to read the booklet carefully and to increase their participation in the program. The majority of the participants (n = 90) completed and returned the questionnaire indicating that they had read the booklet. Most respondents found the booklet interesting with useful advice in an easy-to-read and informative manner. Three quarters (76%) reported the materials as ‘motivating and increased their awareness of physical activity’.

This booklet was accompanied by printed materials on healthy lifestyle (available upon request) and supported by motivational phone calls. There were two motivational phone

calls to each participant of approximately 8 to 10 minutes in duration. The phone calls were regarded as a critical part of the intervention as they helped clarify the goals set by the participants and provided encouragement and positive reinforcement of the intervention. The cost of the phone calls was minimal as only participants in the intervention group were contacted (n =114).

There was also opportunity for questions and feedback about the program throughout the 3-month period. In addition, a pedometer was provided to encourage each participant to adhere to regular walking. It served as an incentive and its use was optional.

The control subjects received no program materials. They completed the questionnaires at the same time points as the intervention subjects and were similarly provided with small incentives for questionnaire completion. All participants (control and intervention) went into a draw for six $50 grocery store vouchers after completion of the questionnaire.

So What? Implications for Health Promotion Practice

This study seems to indicate that a minimal intervention program can be successful in reactivating and raising levels of walking for recreation and errands. If this assertion holds true then health promotion practitioners should find such home-based booster programs useful for maintaining levels of physical activity in older adults.