



The Experience of Older Adults in a Walking Program at Individual, Interpersonal, and Environmental Levels

Susana Carrapatoso, Paula Silva, Atchara Purakom, Carina Novais, Paulo Colaço & Joana Carvalho

To cite this article: Susana Carrapatoso, Paula Silva, Atchara Purakom, Carina Novais, Paulo Colaço & Joana Carvalho (2017) The Experience of Older Adults in a Walking Program at Individual, Interpersonal, and Environmental Levels, *Activities, Adaptation & Aging*, 41:1, 72-86, DOI: [10.1080/01924788.2016.1272393](https://doi.org/10.1080/01924788.2016.1272393)

To link to this article: <https://doi.org/10.1080/01924788.2016.1272393>



Published online: 09 Mar 2017.



Submit your article to this journal [↗](#)



Article views: 132



View related articles [↗](#)



View Crossmark data [↗](#)

The Experience of Older Adults in a Walking Program at Individual, Interpersonal, and Environmental Levels

Susana Carrapatoso^a, Paula Silva^a, Atchara Purakom^b, Carina Novais^a, Paulo Colaço^c, and Joana Carvalho^a

^aResearch Centre in Physical Activity, Health and Leisure (CIAFEL), University of Porto, Porto, Portugal;

^bDepartment of Physical Education and Sport, Faculty of Education and Development Science, Kasetsart University, Kamphaeng-Saen Campus, Kamphaeng Saen, Thailand; ^cCentre of Research, Education, Innovation and Intervention in Sport (CIFIZD), University of Porto, Porto, Portugal

ABSTRACT

Walking programs are advocated to mobilize sedentary older adults. Thus, the study of age-specific social ecological walking programs are needed in order to develop interventions that offer best chance for success. The purpose of this study was to analyze the experience of participating in a walking program at individual, interpersonal, and environmental levels in order to identify appropriate strategies for walking interventions to older adults. A 10-month walking program was implemented, three times a week with 19 older adults (mean age = 67,42 ± 2,48). The participants were submitted to a pre and post evaluation of functional fitness, physical activity patterns, and perceptions of their neighborhood environment. After the program, semi-structured interviews were conducted with 12 randomly selected participants. The results highlight the potential of this walking program by enhancing physical and mental health, creating supportive social networks, and a context of walking in nature which was crucial for the promotion of the active lifestyle and functional improvement of older adults participants.

ARTICLE HISTORY

Received 29 June 2015

Accepted 23 May 2016

KEYWORDS

Walking; older adults; socioecologic models; physical activity; functional fitness

A sedentary lifestyle and consequent low levels of fitness in older adults have been described as the determining risk factors for the development of several chronic conditions. Active lifestyles are, therefore, advocated to treat and prevent age-related disability (American College of Sports Medicine et al., 2009). Accumulating 30 minutes of moderate to vigorous intensity physical activity (MVPA) on most days of the week substantially reduces the risk of morbidity and mortality in older adults (Pescatello et al., 2004). Despite strong evidence of the benefits of physical activity (PA) on the health and functionality of the elderly, we still find a lack of implementation of simple, pleasant, and feasible PA/exercise interventions for the welfare of this growing population. Promoting the participation of older adults in regular to moderate-intensity PA is not only a public health priority, but one of the

most effective solutions in the prevention of the rise of health costs (American College of Sports Medicine et al., 2009).

In terms of public health, walking has been indicated as the most relevant form of exercise to increase regular PA at moderate intensity (Owen, Humpel, Leslie, Bauman, & Sallis, 2004). Different intervention studies have given evidence of the health benefits of walking and showed short-term health improvements in previously sedentary adults (Murphy, Nevill, Murtagh, & Holder, 2007). In a systematic review regarding the intervention and promotion of walking programs, Ogilvie et al. (2007) suggested that although these programs have the potential to mobilize sedentary older adults, walking may be influenced by environmental and societal conditions as well as by interventions targeted at individuals. In this way, assessing perceptions of environmental attributes supplemented with physiological and behavioral measures has relevance to explore PA, namely walking (Nasar, 2008). Taking into account that the environmental determinants of walking may be different from other PA modalities, particularly among older adults, there is a need to explore socioecological age-specific models for walking (Gomez et al., 2010).

Ecological models can be used to develop more comprehensive interventions since they provide the framework to understand the multiple and interacting levels of influence of health behaviors (individual, interpersonal, environmental and policy) (Sallis, Owen, & Fisher, 2008). These models are the conceptual basis of inter-relations between individuals and their social and physical environments and help to understand how humans interact with their environments (Sallis et al., 2008). A social ecological perspective tends to turn the attention from individual factors to focus on multilevel variables that are expected to influence a behavior (Sallis et al., 2006).

Physical activity-related models often included individual (biological and psychological), interpersonal (social support and cultural norms), environmental (social, built and natural), and policy levels (national physical activity plans, urban planning and architecture, parks and recreation sector, etc.) (Bauman et al., 2012). However, for the current study, a condensed version of the ecologic model consisting of three levels of influence was utilized (individual, interpersonal, and environmental levels). Social ecological models seem to be crucial in the development of more efficient interventions that could have the potential to change the behaviors of the older adults, because the promotion of PA at the individual level depends on interpersonal and environmental factors (Satariano & McAuley, 2003).

Considering, this study aimed to analyze the experience of participating in a walking program at individual, interpersonal, and environmental levels. Feedback on the program was also sought in order to identify appropriate strategies and preferences of the aged adults. Most of the data collected to address our aims were qualitative; however, some quantitative data were

collected to verify the effects of the walking program on PA, functional fitness and perceptions of the neighborhood environment.

Methods

Intervention and participants

A sample of 19 older adults (mean age = $67,42 \pm 2,48$ years) was recruited to participate in the Portuguese National Walking and Running Program (PNWRP), a project developed by the Portuguese Institute of Sport and Youth, the Portuguese Athletics Federation and the Faculty of Sports of the University of Porto, which aims to mobilize the Portuguese population for the practice of regular walking and running. The PNWRP intends to develop synergies with local government agencies in order to offer regular walking and running training sessions monitored by certified sport technicians in municipal training centers.

To conduct this study, the walking and running municipal center of Lamego (a country town in northern Portugal) created a walking program specifically designed for older adults. This intervention was based on ecological models, whose purpose was to increase the regular practice of walking by intervening at multiple levels of influence including the individual, interpersonal, and environmental (Sallis et al., 2008). The eligible participants were restricted to older adults with the following characteristics: (1) retired; (2) ability to independently exercise at moderate intensity; and (3) medical authorization for the exercise. Exclusion criteria included the following: being active in the preceding year (engaging in at least two days a week for 20 minutes or more of moderate to vigorous physical activities), absence of 20% of the total sessions, absence of more than eight consecutive sessions, uncontrolled hypertension or diabetes, symptomatic cardio respiratory disease, severe renal or hepatic disease, uncontrolled epilepsy, progressive neurological disease, and chronic disabling arthritis.

As reported in [Table 1](#), several strategies were used at the individual level, including monitoring of functional fitness and the delivery of an individual fitness report. The baseline data of the functional fitness of older adults was compared to the normative functional fitness standards for Portuguese older adults (Marques et al., 2014), which allowed us to identify if fitness levels were

Table 1. Intervention ecological strategies.

Ecological level	Intervention strategies
Individual	Individual report of the functional fitness monitoring. Monthly mail with educational materials and schedule of the next month activities.
Interpersonal	Three walking/exercise sessions in group per week. Monthly activity "walking through the villages."
Environmental	Advertising panel with walking routes information.

above or below the recommended standards of fitness according to their age and gender. An individual report was therefore delivered to the participants with an explanation of the results, indicating if their functional fitness level was within the normative values or if improvements were needed. Moreover, educational materials were sent by mail to the participants every month. These materials contained information about walking benefits, suggestions of exercises, active lifestyles, and the schedule of next month's activities.

At the interpersonal level, the two main strategies applied were the weekly walking/exercise sessions in group and the monthly activity "walking through the villages" (Table 1). The three exercise sessions per week included a 10-minute warm-up, including calisthenics exercises, 20–30 minutes of walking at a level of perceived exertion of 12 to 14 on the Borg Rating Perceived Exertion Scale (Borg, 1998) and, at the end of each session, a 10-minute cool-down involving respiratory and stretching exercises. A gradual approach was used to increase the training load (intensity and volume) during 10 months (from October 2012 to July 2013). In order to raise the subject's endurance enabling them to sustain 30 minutes of continuous walking at the targeted intensity, the training load was gradually increased during the first four weeks. The walking duration in the first session was 15 minutes at perceived exertion of 12, and it was increased by five minutes each week until subjects were able to walk continuously for 30 minutes (week 4). Intensity was then gradually increased to the perceived exertion of 13 and 14. Furthermore, the monthly activity "walking through the villages" was organized in different villages of the Lamego district. During the activity, the participants walked along the most important places in the villages and moments of camaraderie were provided to the participants.

An advertising panel with information of the walking routes was the main strategy at the environmental level. The panel contains a map with the trails around the walking and running municipal center of Lamego, the distance and the level of difficulty of the routes and the contact of the certified sport technician.

Data collection

Nineteen older adults were submitted to a pre and post evaluation of functional fitness (senior fitness test—SFT), physical activity (international physical activity questionnaire—IPAQ) and perceptions of the neighborhood environment (European environmental questionnaire—ALPHA). Semi-structured interviews were conducted in the end of the program with 12 participants randomly selected from the entire group to access the perceptions of the participants on individual, interpersonal, and environmental factors. Consistent with the gender distribution in the walking group, 10 of the participants submitted to interviews were women (83.3%) and 2 were men (16.7%). The sample size was determined by data saturation (the point

in data collection when no new or relevant information emerges with respect to the research problem) (Sargeant, 2012). Ethics approval was granted by the Ethics Committee of the Faculty of Sport from the University of Porto (Process CEFAD 27.2013) and data collection was conducted according to the principles expressed in the Declaration of Helsinki and a written informed consent was obtained from the participants.

Individual, interpersonal, and environmental factors

The individual, interpersonal, and environmental perceptions of seniors were assessed by semi-structured individual interviews that, according to Patton (2002), give the respondents the opportunity to express their own personal perspectives. The interviews were conducted after 10 months of attendance to the walking program (July 2013) based on ecologic models (framework approach). The framework method provides a clear structure in order to organize and summarize data supported on the main research questions (Gale, Heath, Cameron, Rashid, & Redwood, 2013). An interview guide was prepared to define the basic topics of the inquiry, which aligns with the main aim of the study: “Analysis the experiences of the older adults on the walking program at individual, interpersonal and environmental levels.” Participants were asked to reflect on their experiences in the walking program based on the five main questions related to individual, interpersonal, and environmental factors:

- (1) How do you feel after 10 months of attending the walking program?
- (2) How do you feel about being part of a group activity?
- (3) What do you think about the places used during the walking sessions?
- (4) Which aspects of the program did you enjoy the most?
- (5) Which aspects did you enjoy least?

Two pilot interviews were conducted with participants who were not part of this sample to refine the questions and define some prompts that might help us to encourage the interviewed participants to talk about specific issues if they do not arise spontaneously. All interviews were conducted by an experienced interviewer who had no contact with the participants beforehand, minimizing the potential for bias based on social desirability. The interviews were digitally recorded with the informed consent of each participant and all recordings were transcribed and rendered anonymous with pseudonyms.

Functional fitness

A senior fitness test battery (Rikli & Jones, 1999) was used to assess the participants' functional fitness. This battery consists of six assessment items and was designed and validated to assess the physiological measures related

with functional mobility in older adults. The test items include the following assessments: lower body muscular endurance (30-second chair stand), upper body muscular endurance (30-second arm curl), aerobic endurance (6-minute walk test), lower body flexibility (chair sit-and-reach), and dynamic balance and agility (the 8-foot up-and-go). All functional fitness tests were completed after a 10-minute warmup. Before each test the instructor gave an explanation and demonstration and the participant had the opportunity to practice. Body weight, height, and waist circumference were also objectively measured with an anthropometric assessment pack (Tanita BF-522), which includes a weight machine, a stadiometer and a tape, to measure each parameter respectively. Body mass index (BMI) was, therefore, calculated using the standard formula: weight (kg)/height² (m).

Daily physical activity

PA was assessed by short form of the international physical activity questionnaire (IPAQ-SF). The IPAQ-SF questionnaire records the activity at four intensity levels: (1) vigorous; (2) moderate; (3) walking; and (4) sitting, and has demonstrated validity and reliability in 12 countries, including Portugal (Craig et al., 2003). As recommended by the authors, the last seven-day recall version was used to assess the PA levels of the participants.

Perceptions of the neighborhood environment

The perceived neighborhood environment was assessed by the European environmental questionnaire—ALPHA (Spittaels et al., 2009). This questionnaire consisted of nine themes about the neighborhood environment: (1) types of residences; (2) distances to local facilities; (3) walking and cycle infrastructure; (4) maintenance of walking and cycle infrastructure; (5) neighborhood safety; (6) pleasantness; (7) cycling and walking network; (8) home environment; and (9) workplace or study environment. We used seven of these nine themes, excluding the eighth and ninth themes, because we were interested in detecting the changes in the perceptions of the outdoor environments. The data was collected and was filled in by the researcher and according to the recommendations of the ALPHA Manual (Spittaels, 2009). The reliability of the instrument was shown by Spittaels et al. (2010) and it was translated from English to Portuguese by an experienced translator using a validation /retroversion methodology.

Data analysis

The data of the interviews were categorized in three main themes which were defined in advance: individual, interpersonal, and environmental representing

the multiple levels of influence of an ecological model (Bauman et al., 2012). The ecological framework defined a structure for data organization and summarization in order to answer to the research questions (Gale et al., 2013). During the analysis process, codes were grouped around similar ideas and concepts. Transcripts of interview were organized according to pseudonyms and the descriptive coding process was analyzed independently by two researchers. The results of this process were compared and discussed until an interpretive consensus was obtained. The patterns and relationships found in each theme were the basis of the interpretative process, where there was an attempt to provide explanations for the findings according to the theoretical framework and the data extracts. Data analysis and interpretation of the results were followed by other researchers in order to promote a comparison with our beliefs, values and biases. The content of the interviews was also made available to each of those interviewed so that they could confirm, explain, or clarify the ideas which they wanted to transmit. According to Patton (2002), these strategies increase the consistency and confidence in data findings.

The Statistical Package for the Social Sciences (SPSS) Version 19.0 was used to analyze the quantitative data (functional fitness, physical activity and perceptions of the neighborhood environment). With the purpose of analyzing pre- and post-differences within the group, paired sample comparisons of continuous variables were performed using *t* tests, except for the few cases in which normality was not verified, and the Wilcoxon test was used as a nonparametric option.

Results

As reported in Table 2, the participants were predominantly women (84.2%), and a higher percentage of our sample is married and lives with a partner (68.4%). The majority of participants is of a lower educational level and reported that they worked mostly as housewives and farmers. All participants are now retired.

The following sections present the perceived experience of the walking program at individual, interpersonal, and environmental levels (qualitative

Table 2. Demographic characteristics of participants ($N = 19$).

Characteristic	Number (%)
Female	16 (84,2)
Male	3 (15,8)
Married	13 (68,4)
Widower	4 (21,1)
Single	1 (5,3)
Divorced	1 (5,3)
Primary Education	13 (68,4)
Secondary Education	5 (26,3)
Tertiary Education	1 (5,3)

data), combined with the calculation of pre-and post-significant differences of physical fitness, anthropometry, physical activity, and perceptions of the neighborhood environment (quantitative data).

Individual level

The qualitative results, which were illustrated by quotes from the interviews, revealed that most of the interviewed participants (67%) reported improvements in the parameters of functional fitness. Participants perceived improvements in their body weight, agility, strength, and flexibility, which was reflected in a greater facility in performing activities in daily living.

“I was very still and I felt heavy. Not now! Now it seems that I can squat and move easily (happy). I used to have difficulties. It was hard to wear underpants. But now I can tighten the laces of my tennis shoes, I can squat, turn and walk.” (I1)

The seniors also revealed improvements in aerobic endurance, translated into less tiredness to walk and climb stairs. After the intervention participants perceived they can walk more and more easily in their daily lives. The participants expressed feelings of being more able to perform functional movements, such as walking, stair climbing, and standing up, suggesting a greater self-efficacy and self-confidence to functional mobility.

“I never thought I would be able to hike at this age. But now I walk around different villages for several kilometers. I never thought that I could walk so much, but yes I can do it!” (I4)

The functional fitness quantitative findings reported in [Table 3](#) support almost all of these perceptions. The scores of the functional fitness tests were significantly better after 10 months of intervention on all tests except back scratching, seat, and reaching, and waist circumference where no significant differences were verified. Some participants also revealed that the walking program was an important contribution to greater joyfulness and openness and, in some cases, they also reported that they came out of states of depression.

“I used to think a lot and I would feel down, get depressed and I had to take tranquilizers. Now I just take one pill to sleep. [It had to do with what?] I guess it has to do with these activities, I’m more relaxed. I didn’t use to speak to anyone and I was very shy and I still am. But the other participants draw me out, and I laugh and keep busy.” (I5)

Interpersonal level

In terms of interpersonal perceptions, “walking in group” as well as “family” and “friends” were reported as being important social supports for the walking practice. All participants cited the walking program as the main

Table 3. Pre and post-test measures for physical fitness, anthropometry, physical activity, and perceptions of the neighborhood environment ($N = 19$).

	Pre Evaluation		Post Evaluation		P
	Mean	SD	Mean	SD	
Functional fitness					
6 minutes (meters)	559,67	66,08	595,67	58,15	0,01*
Chair stand (repetitions)	22,16	4,80	25,11	5,57	0,02*
Arm curl (repetitions)	22,89	3,60	26,89	5,43	0,00*
Seat and reach (centimeters)	5,37	8,60	6,42	8,23	0,37
Back stretch (centimeters)	-12,56	14,20	-7,22	15,35	0,12
Up and go (seconds)	4,54	0,70	4,02	0,64	0,00*
Anthropometry					
Weight (Kg)	67,88	11,98	66,73	11,81	0,00*
Waist circumference (cm)	92,16	9,18	92,26	10,47	0,91
BMI (kg/m ²)	28,18	4,49	27,68	4,30	0,00*
Physical activity					
MVPA (minutes per week)	39,64	63,53	152,14	85,23	0,00*
Walking (minutes per week)	140,77	95,76	245,00	154,37	0,04*
Sedentary time (minutes per day)	270,00	131,56	269,29	104,99	0,98
Perceptions of the neighborhood environment					
Types of residences ^a	2,36	1,34	3,21	1,25	0,01*
Distances to local facilities ^a	2,36	0,50	2,36	1,08	1,00
Walking infrastructure ^a	3,64	0,84	3,29	1,14	0,16
Maintenance of walking infrastructure ^a	3,64	1,15	3,57	1,28	1,00
Neighborhood safety (crime) ^a	3,27	1,16	4,00	0,00	0,06
Neighborhood safety (traffic) ^a	3,13	1,19	4,00	0,00	0,03*
Neighborhood pleasantness ^a	1,79	1,19	2,07	1,38	0,32
Cycling and walking network ^a	2,43	1,22	2,43	1,02	1,00

SD = standard deviation.

* $p < 0.05$.

^apositively scored on a 4-point Likert scale (1–4), ranging from “strongly disagree” to “strongly agree.”

reason to exercise more and to be more active. On the other hand, the participants revealed that when they walk outside of the walking sessions they call upon the support of friends and relatives.

“[Do you restrict your physical activity to the walking sessions?] Yes, because I need to feel committed (...) I knew that there were people who were waiting for me, we have an appointment and the teacher was waiting for me also.” (I4)

The participants also reported that social criticism was raised by some people in the city to the walking group, namely to women, to whom they said: “Don’t you have anything better to do? You should be at home making lunch!” (I12). Despite the criticism raised, most of the participants remained in the group. However, in order to avoid the embarrassment, the group decided to change the walking paths from the city area to more natural surroundings, a decision which proved to be crucial for the welfare and motivation of the group.

Environmental level

In relation to the physical environment the participants reported that they had developed a better physical and cultural knowledge of the Lamego district. The seniors revealed that the monthly activities “walk through the villages” got them outside their living areas and to enjoy vineyards, churches and streets where they had never been before. Participants greatly appreciated these activities and a special emphasis was given by the seniors who were interviewed on this activities.

“[Had you visited these places before?] Some of them said yes, others no. But now I know them in detail. We walked in places where cars do not pass and we have the opportunity to see beautiful places, landscapes and flowers.” (I12)

The participants of the walking group also showed a preference for trails in the nature context. Most of the participants (75%) demonstrated that they appreciate contact with nature, to breathe fresh air, to walk without traffic, and to travel along different trails.

“[Tell me about the journeys of the walking group?] We go to the woods of “Nossa Senhora dos Remédios”, a traffic-free zone. (...) I think it is good; we breathe the fresh air and inhale the aroma of trees.” (I3)

The use of surroundings of their neighborhoods to walk is new for some participants (50%). Most of the respondents reported that they usually choose to walk in downtown area where it is usual to see other people walking at night:

“At night I usually go out for a walk with my wife and my daughter in the city center because there are a lot of people walking around.” (I12)

The findings in the perceived neighborhood environment (Table 3) demonstrated a better PA-related perceptions of the neighborhood after the program, only in 2 themes (types of residences and safety related to traffic). No statistically significant differences were found in the other themes related with the neighborhood environment. However, the results of the comparison of the PA measurements between the baseline and the post evaluation moments (Table 3) showed a statistically significant improvement in the amount of moderate to vigorous physical activity (MVPA) and walking activity per week. No statistically significant differences were found in the sedentary daily time between the baseline and post evaluation.

Discussion

The results of this study reflected the perceived experience of the participants of a walking program at individual, interpersonal, and environmental levels. At the individual level, the participants emphasized improvements in the

parameters of functional fitness. This walking program which promoted walking at moderate intensity as recommended by the American College of Sports Medicine et al. (2009), conferred perceived and objective functional benefits to the older adults participants. It is important to recall the exercise sessions characteristics that include warm-up, calisthenics exercises, walking at moderate intensity and stretching exercises. As the recent guidelines recommend (American College of Sports Medicine et al. (2009)) this program involves endurance, strength, and flexibility exercises, showing a great impact in all functional tests with the exception to flexibility. Probably, stretching only in cool down was not enough to significantly increase the upper and lower flexibility. Other protocol design with stretching in warm-up, cool-down, and in the middle of the walking training session showed positive effects in flexibility (Parkatti, Perttunen, & Wacker, 2012). Nevertheless, as stated by Rikli and Jones (2013), there is insufficient evidence regarding the relationship between flexibility and the functional ability needed to perform everyday activities. Most important, the improvements on the other functional fitness parameters seems to lead to the maintenance of the mobility and functional decline prevention.

The participants also expressed a positive self-perception of being more capable, suggesting a greater self-efficacy and self-confidence to the exercise and PA, which is one of the favorable psychological factors associated with higher levels of PA (Bauman et al., 2012). Some participants also revealed that the walking program was an important contributor to develop a better mood and in some cases to alleviate depressive states. These results were in agreement with a review investigating mental health in older adults (Lautenschlager, Almeida, Flicker, & Janca, 2004), which reported a significant decrease of depressive symptoms among seniors participating in walking and exercise programs.

In accordance with the authors Ogilvie et al. (2007), we also found indicators that older adults can benefit from the social support of a walking group to increase their levels of exercise and PA (MVPA and walking), as well as from neighbors, family, and friends who proved to be crucial for the walking practice outside of the exercise sessions (Weiss, Maantay, & Fahs, 2010). On the other hand, some criticism was raised from some locals to the walking group, which embarrassed some of the participants. This fact could be a barrier to the exercise and PA because people need to be supported and encouraged by their physical and social environments (Giles-Corti & Donovan, 2003). However, to avoid constraints, the group decided to change the paths of walking to more natural surroundings, a fact which proved to be essential for the contentment of all participants.

As considered by Rosenberg, Huang, Simonovich, and Belza (2013) and Santana, Santos, and Nogueira (2009), the participants of the walking group showed a preference for nature trails, which was an important aspect to

improve the motivation to participate in the walking program. Another important strategy of this walking program was the monthly activity “walk through the villages,” which was very appreciated by the participants who reported this activity developed a better physical and cultural knowledge of the Lamego district. This strategy agrees with the views of Satariano and McAuley (2003) who emphasize the importance of developing ecological exercise and PA interventions in rural communities involving social, cultural, and environmental factors. The results also demonstrated that the use of neighborhood surroundings in the walk is new for some participants. Downtown, where the participants reported it was usual to see other people walking at night, proved to be an important context for walking practice outside the walking sessions. Observation and/or interaction with other walkers gives seniors a social and environmental reinforcement to do the same (Nielsen & Hansen, 2007).

Concerning the results of the ALPHA questionnaire, we found that favorable perception of the environment altered after the walking intervention only in the themes of “types of residences” and “neighborhood safety related to traffic.” As reported by Ries, Dunsiger, and Marcus (2009), increasing exposure to the neighborhood environment may result in changes in environmental perceptions related to PA. However, our program was developed outside residence areas, which may not be effective in changing perceptions of the neighborhood environment. Our results suggest the verification in future studies of the influence in perception of the neighborhood environment by walking programs developed in the participants’ residential area. However, the significant improvements on MVPA and walking activity per week reveal positive effects of the program on daily PA for older adults.

Furthermore, this study presents some limitations:

- (1) there is no control group to compare the quantitative results of the intervention (change in the outcomes cannot be fully attributed to the walking intervention); nevertheless, despite the importance of the suggested group, as the study intends to observe quantitative as well as qualitative, this last methodology does not usually include a control group;
- (2) self-reported physical activity is a subjective measure that may have been influenced by cognitive status;
- (3) small sample size may have been insufficient to achieve statistical power when analyzing quantitative data; and
- (4) generalization of the results is limited, because the study was just conducted in a small country town and results could differ for walking programs developed in other geographical areas of Portugal.

In spite of these limitations, a key strength is that to our knowledge, this is one of the few studies that simultaneously uses subjective and objective measures to better understand the older adults experience, improvements, and preferences in a walking program. Moreover, the use of an ecological model also helped us to explore multiple levels of the influence of walking, which provided a more comprehensive analysis.

Conclusions

This study demonstrated the seniors' experience in a walking program at individual, interpersonal, and environmental levels. This study suggests that this walking program, promoting good health (physical and mental), supporting social networks, and walking in nature, was crucial for increasing levels of MVPA and walking of older adult participants. Moreover, the aged adults emphasized the interpersonal strategies applied, showing the importance of the social level to create supportive interventions to promote walking in this specific population.

The results of this study are important to inform the technicians of the Portuguese National Walking and Running Program about the benefits of this walking program targeted for seniors, revealing the appropriate strategies and preferences to promote walking in later life. Walking promotion should center around improving the confidence of seniors by increasing fitness levels and PA as well as promoting group walks and nature walks, which proved to be effective for the intervention success.

References

- American College of Sports Medicine, Chodzko-Zajko, W. J., Proctor, D. N., Fiatarone Singh, M. A., Minson, C. T., Nigg, C. R., & Skinner, J. S. (2009). American College of Sports Medicine position stand. Exercise and physical activity for older adults. *Medicine & Science in Sports & Exercise*, 41(7), 1510–1530. doi:10.1249/MSS.0b013e3181a0c95c
- Bauman, A. E., Reis, R. S., Sallis, J. F., Wells, J. C., Loos, R. J., & Martin, B. W. (2012). Correlates of physical activity: Why are some people physically active and others not? *The Lancet*, 380, 258–271. doi:10.1016/S0140-6736(12)60735-1
- Borg, G. (1998). *Perceived exertion and pain scales*. Champaign, IL: Human Kinetics.
- Craig, C. L., Marshall, A. L., Sjostrom, M., Bauman, A. E., Booth, M. L., Ainsworth, B. E., Pratt, M., Ekelund, U., Yngve, A., Sallis, J. F., & Oja, P. (2003). International physical activity questionnaire: 12-country reliability and validity. *Med Sci Sports Exerc*, 35(8), 1381–1395. doi:10.1249/01.MSS.0000078924.61453.FB
- Gale, N. K., Heath, G., Cameron, E., Rashid, S., & Redwood, S. (2013). Using the framework method for the analysis of qualitative data in multi-disciplinary health research. *BMC Medical Research Methodology*, 13, 117. doi:10.1186/1471-2288-13-117
- Giles-Corti, B., & Donovan, R. J. (2003). Relative influences of individual, social environmental, and physical environmental correlates of walking. *American Journal of Public Health*, 93(9), 1583–1589. doi:10.2105/AJPH.93.9.1583

- Gomez, L. F., Parra, D. C., Buchner, D., Brownson, R. C., Sarmiento, O. L., Pinzon, J. D., ... Lobelo, F. (2010). Built environment attributes and walking patterns among the elderly population in Bogota. *American Journal of Preventive Medicine*, 38(6), 592–599. doi:10.1016/j.amepre.2010.02.005
- Lautenschlager, N. T., Almeida, O. P., Flicker, L., & Janca, A. (2004). Can physical activity improve the mental health of older adults? *Annals of General Hospital Psychiatry*, 3, 12–12. doi:10.1186/1475-2832-3-12
- Marques, E. A., Baptista, F., Santos, R., Vale, S., Santos, D. A., Silva, A. M., ... Sardinha, L. B. (2014). Normative functional fitness standards and trends of Portuguese older adults: Cross-cultural comparisons. *Journal of Aging and Physical Activity*, 22(1), 126–137. doi:10.1123/japa.2012-0203
- Murphy, M. H., Nevill, A. M., Murtagh, E. M., & Holder, R. L. (2007). The effect of walking on fitness, fatness and resting blood pressure: A meta-analysis of randomised, controlled trials. *Journal of Preventive Medicine*, 44(5), 377–385. doi:10.1016/j.ypmed.2006.12.008
- Nasar, J. L. (2008). Assessing perceptions of environments for active living. *American Journal of Preventive Medicine*, 34(4), 357–363. doi:10.1016/j.amepre.2008.01.013
- Nielsen, T. S., & Hansen, K. B. (2007). Do green areas affect health? Results from a Danish survey on the use of green areas and health indicators. *Health & Place*, 13(4), 839–850. doi:10.1016/j.healthplace.2007.02.001
- Ogilvie, D., Foster, C. E., Rothnie, H., Cavill, N., Hamilton, V., Fitzsimons, C. F., & Mutrie, N. (2007). Interventions to promote walking: Systematic review. *British Medical Journal*, 334 (7605), 1204. doi:10.1136/bmj.39198.722720.BE
- Owen, N., Humpel, N., Leslie, E., Bauman, A., & Sallis, J. F. (2004). Understanding environmental influences on walking: Review and research agenda. *American Journal of Preventive Medicine*, 27(1), 67–76. doi:10.1016/j.amepre.2004.03.006
- Parkatti, T., Perttunen, J., & Wacker, P. (2012). Improvements in functional capacity from Nordic walking: A randomized-controlled trial among elderly people. *Journal of Aging and Physical Activity*, 20(1), 93–105. doi:10.1123/japa.20.1.93
- Patton, M. (2002). *Qualitative research and evaluation methods*. Thousand Oaks, CA: Sage.
- Pescatello, L. S., Franklin, B. A., Fagard, R., Farquhar, W. B., Kelley, G. A., & Ray, C. A. (2004). American College of Sports Medicine position stand. Exercise and hypertension. *Medicine & Science in Sports & Exercise*, 36(3), 533–553. doi:10.1249/01.MSS.0000115224.88514.3A
- Ries, A. V., Dunsiger, S., & Marcus, B. H. (2009). Physical activity interventions and changes in perceived home and facility environments. *Preventive Medicine*, 49(6), 515–517. doi:10.1016/j.ypmed.2009.10.009
- Rikli, R. E., & Jones, C. J. (1999). Development and validation of a functional fitness test for community-residing older adults. *Journal of Aging and Physical Activity*, 7(2), 129–161. doi:10.1123/japa.7.2.129
- Rikli, R. E., & Jones, C. J. (2013). Development and validation of criterion-referenced clinically relevant fitness standards for maintaining physical independence in later years. *The Gerontologist*, 53(2), 255–267. doi:10.1093/geront/gns071
- Rosenberg, D. E., Huang, D. L., Simonovich, S. D., & Belza, B. (2013). Outdoor built environment barriers and facilitators to activity among midlife and older adults with mobility disabilities. *The Gerontologist*, 53, 268–279. doi:10.1093/geront/gns119
- Sallis, J. F., Cervero, R. B., Ascher, W., Henderson, K. A., Kraft, M. K., & Kerr, J. (2006). An ecological approach to creating active living communities. *Annu Rev Public Health*, 27, 297–322. doi:0.1146/annurev.publhealth.27.021405.102100

- Sallis, J. F., Owen, N., & Fisher, E. B. (2008). Ecological models of health behavior. In K. Glanz, B. K. Rimer, & K. Viswanath (Eds.), *Health behavior and health education: Theory, research, and practice* (4th ed.). San Francisco, CA: Jossey-Bass.
- Santana, P., Santos, R., & Nogueira, H. (2009). The link between local environment and obesity: A multilevel analysis in the Lisbon Metropolitan Area, Portugal. *Social Science & Medicine*, 68(4), 601–609. doi:[10.1016/j.socscimed.2008.11.033](https://doi.org/10.1016/j.socscimed.2008.11.033)
- Sargeant, J. (2012). Qualitative research part II: Participants, analysis, and quality assurance. *Journal of Graduate Medical Education*, 4(1), 1–3. doi:[10.4300/JGME-D-11-00307.1](https://doi.org/10.4300/JGME-D-11-00307.1)
- Satariano, W. A., & McAuley, E. (2003). Promoting physical activity among older adults: From ecology to the individual. *American Journal of Preventive Medicine*, 25(3, Supplement 2), 184–192. doi:[10.1016/S0749-3797\(03\)00183-1](https://doi.org/10.1016/S0749-3797(03)00183-1)
- Spittaels, H. E. A. (2009). *ALPHA environmental questionnaire manual*. ALPHA environmental questionnaire manual. Sweden: The Unit for Preventive Nutrition, Department of Biosciences and Nutrition at Novum Karolinska Institute.
- Spittaels, H., Foster, C., Oppert, J. M., Rutter, H., Oja, P., Sjostrom, M., & De Bourdeaudhuij, I. (2009). Assessment of environmental correlates of physical activity: Development of a European questionnaire. *International Journal of Behavioral Nutrition and Physical Activity*, 6(1), 39. doi:[10.1186/1479-5868-6-39](https://doi.org/10.1186/1479-5868-6-39)
- Spittaels, H., Verloigne, M., Gidlow, C., Gloanec, J., Titze, S., Foster, C., ... De Bourdeaudhuij, I. (2010). Measuring physical activity-related environmental factors: Reliability and predictive validity of the European environmental questionnaire ALPHA. *International Journal of Behavioral Nutrition and Physical Activity*, 7(1), 48. doi:[10.1186/1479-5868-7-48](https://doi.org/10.1186/1479-5868-7-48)
- Weiss, R. L., Maantay, J. A., & Fahs, M. (2010). Promoting active urban aging: A measurement approach to neighborhood walkability for older adults. *Cities and the Environment*, 3(1), 1–17. doi:[10.15365/cate](https://doi.org/10.15365/cate)