Preventive Medicine 67 (2014) 106–111

Contents lists available at ScienceDirect

Preventive Medicine

journal homepage: www.elsevier.com/locate/ypmed

Barriers to outdoor physical activity and unmet physical activity need in older adults

Johanna Eronen *, Mikaela B. von Bonsdorff, Timo Törmäkangas, Merja Rantakokko, Erja Portegijs, Anne Viljanen, Taina Rantanen

Gerontology Research Center, Department of Health Sciences, P.O. Box 35 (VIV), FI-40014 University of Jyväskylä, Finland

ARTICLE INFO

Available online 18 July 2014

Keywords:
Aging
Mobility
Outdoor environment

ABSTRACT

Objective. To profile participants based on reported outdoor physical activity barriers using a data-driven approach, describe the profiles and study their association with unmet physical activity need.

Method. Cross-sectional analyses of 848 community-dwelling men and women aged 75–90 living in Central Finland in 2012. Barriers to outdoor physical activity and unmet physical activity need were enquired with a questionnaire. The latent profiles were identified by profiling participants into latent groups using a mixture modeling technique on the multivariate set of indicators of outdoor physical activity barriers. A path model was used to study the associations of the profiles with unmet physical activity need.

Results. Five barrier profiles were identified. Profile A was characterized with minor barriers, profile B with weather barriers, profile C with health and weather barriers, profile D with barriers concerning insecurity, health and weather; and profile E with mobility and health barriers. The participants in the profiles differed in the proportion of individual and environmental barriers. The risk for unmet physical activity need was highest among people whose severe mobility difficulties restricted their outdoor physical activity.

Conclusion. Outdoor physical activity barriers reflect the imbalance in person–environment fit among older people, manifested as unmet physical activity need.

Introduction

Unmet physical activity need is the feeling of the level of physical activity being inadequate, meaning that one would like to be more active than what he or she is capable of (Rantakokko et al., 2010a). It is unwanted and potentially impairs the quality of life (Rantakokko et al., 2010b). It can also indicate a misfit between the capabilities of a person and the demands of the environment (Lawton and Nahemow, 1973; Rantakokko et al., 2010b). In a Finnish study, unmet physical activity need was reported by 14% of community-dwelling ambulatory older adults; however it is only recently identified and thus not widely recognized (Rantakokko et al., 2010a). In our previous studies we have found that individual risk factors, such as mobility limitations and low socioeconomic status (Eronen et al., 2012), and environmental barriers, such as hills, lack of resting places and dangerous crossroads were associated with unmet physical activity need in old age (Rantakokko et al., 2010a).

Outdoor physical activity, such as walking, is popular among older adults (Lim and Taylor, 2005) and beneficial for health and functioning (Simonsick et al., 2005). However, many older people face physical activity barriers in their everyday lives. Barriers can be either person-related, such as illnesses and mobility difficulties, or environmental, such as hilly terrains or lack of walking paths (Hovbrandt et al., 2007). Poor health is the most commonly reported barrier to physical activity (Cohen-Mansfield et al., 2003; Newson and Kemps, 2007; Rasinaho et al., 2007; Schutzer and Graves, 2004). Other frequently reported barriers are lack of company, lack of interest, lack of time and various environmental barriers (Dawson et al., 2007; Kowal and Fortier, 2007).

Age, gender and socioeconomic differences as well as obesity, depression, mobility limitations and chronic health conditions influence the nature of physical activity barriers that older people experience (Patel et al., 2013; Rasinaho et al., 2007; Rosqvist et al., 2009; Sallinen et al., 2009). We anticipated that a data-driven latent class model (Magidson and Vermunt, 2004) could reveal associations which are difficult to identify with a traditional risk analysis. The aim of the study was to identify latent profiles based on clustering of older people's perceived outdoor physical activity barriers, to characterize these groups in terms of their health, mobility and other personal resources, and further to see how the latent profiles relate to unmet physical activity need.

* Corresponding author. Tel.: +358 40 805 3550.
E-mail addresses: johanna.eronen@jyu.fi (J. Eronen), mikaela.vonbonsdorff@jyu.fi (M.B. von Bonsdorff), timo.tormakangas@jyu.fi (T. Törmäkangas), merja.rantakokko@jyu.fi (M. Rantakokko), erja.portegijs@jyu.fi (E. Portegijs), anne.viljanen@jyu.fi (A. Viljanen), taina.rantanen@jyu.fi (T. Rantanen).

http://dx.doi.org/10.1016/j.ypmed.2014.07.020
0091-7435/

Materials and methods

Data for this cross-sectional study come from the baseline of the Life-Space Mobility in Old Age (LISPE) project, which is a 2-year prospective cohort study of individual and environmental factors underlying the life space of community-dwelling older people in Finland, described elsewhere (Rantanen et al., 2012). Briefly, the target population of the study comprised 75 to 90-year-old community-dwelling people who were able to communicate and willing to participate. A random sample of 2550 people was drawn from the national population register of whom 848 people participated and were interviewed in their homes between January and June 2012. The LISPE project was approved by the Ethical Committee of the University of Jyväskylä, Finland. All participants signed an informed consent.

To assess the barriers to outdoor physical activity, we used the Barriers to Outdoor Physical Activity Questionnaire (BOPA), which was developed by an expert panel for our previous study (Rasinaho et al., 2007) and further modified for the present study (Rantanen et al., 2012). The participants were asked: "What are the reasons that hinder or prevent you from outdoor physical activity, such as walking for fitness or walking to a store? Select all that apply from the list". This was followed by a list of 17 items, with each item rated as present or absent: 1) Pain and illnesses are barriers for outdoor walking; 2) I'm too tired, poor mobility is a barrier for outdoor walking; 3) Poor vision is a barrier for outdoor walking; 4) Hearing problems are a barrier for outdoor walking; 5) I'm afraid of falling when I'm outdoors; 6) I'm afraid of falling victim to crime; 7) I feel insecure when I'm outdoors; 8) I'm afraid of getting hit by a car; 9) I have no one to go out with; 10) Poor weather is a barrier for outdoor walking; 11) Slippery roads are a barrier for outdoor walking; 12) Darkness is a barrier for outdoor walking; 13) The environment around my home is not suitable for outdoor walking; 14) I'm not interested in outdoor activities; 15) Health care personnel or relatives have told me not to go walking outdoors; 16) I'm too old for outdoor walking and 17) I'm not used to outdoor activities. For descriptive purposes, the items were summed to a scale ranging from 0 to 17, with 0 indicating no barriers and 17 barriers in all items. Internal consistency of the BOPA was found to be acceptable (Cronbach alpha = 0.705). The physical activity barrier questionnaire has shown good reliability (κ 0.417–1.000) (Leinonen et al., 2007).

Unmet physical activity need was assessed with two questions: "Would you like to increase your level of outdoor physical activity" and "Do you feel that you would have the opportunity to increase your level of outdoor physical activity if someone recommended you to do so?" and response options were "yes" and "no". Participants who felt that they had no opportunity to increase their physical activity level, even though they were willing to do so were defined as experiencing unmet physical activity need (Rantakokko et al., 2010a).

Background variables included age, gender, number of chronic diseases, length of education (years), perceived difficulties in walking 0.5 km (no difficulties/difficulties) and living alone or with someone. Level of physical activity was assessed using a seven point scale combining frequency and intensity of common physical activities (Grimby, 1986; Rantanen et al., 2012). Participants were categorized into physically inactive (at most light housework or gardening and short walks once or twice a week) and physically active (at least moderate physical activity ≥3 h a week). Cognitive status was assessed using the Mini-Mental State Examination (MMSE) (Folstein et al., 1975) and depressive symptoms with the Center for Epidemiologic Studies Depression Scale (CES-D) (Radloff, 1977). Information about the frequency of going outdoors was assessed using the University of Alabama at Birmingham Study of Aging Life-Space Assessment (LSA) (Baker et al., 2003). The time of the year when the interview was conducted was dichotomized into winter (from January 1 to March 31st) and spring/summer (from April 1st to June 30th).

Statistical analyses

The latent profile structure was identified from all 17 outdoor physical activity barrier (BOPA) variables by profiling participants into profile groups using latent class analysis. The latent class model is similar to a factor model with the exception that the latent variable is assumed to be categorical rather than continuous. An example of applying a similar latent class model is given in Magidson and Vermunt (2004, see example 10.2.1.1). We used the model shown in Fig. 1 to estimate the parameters of the latent class model and, more importantly, to obtain the latent class membership of the subjects. The latter is similar to obtaining factor scores in factor analysis.

The number of latent profiles was based on model information criteria (Akaike information criterion, AIC, Bayesian information criterion, BIC, and sample size adjusted, aBIC) and salience of the configuration obtained. BIC indicated two subgroups, while aBIC indicated five subgroups (Table 1). Based on the average group membership probability and the interpretability of the barrier clustering in the groups, we decided to further examine the characteristics of five groups.

Subsequent to latent class model we constructed the conceptual path model shown in Fig. 2 to assess the association between the barrier-based groupings and unmet physical activity need. In the actual path model the categorical membership variable was represented by four dummy variables with group A (minor barriers) as the reference category. Those with no unmet physical activity need formed the reference group. Each dummy variable was permitted to have a unique path coefficient in a logistic regression on the unmet physical activity need variable. The path model was adjusted by gender with men as the reference category and age, so that the adjusting variables had both direct and indirect effects on the unmet physical activity need variable.

The descriptive statistics on the impact of individual covariate measurements on the profiles was investigated separately for the background variables. Differences in the distribution of reported barriers between the profiles were compared with Kruskal–Wallis-tests for continuous variables and Chi square tests for categorized variables. Pairwise comparison p-values were corrected with the Dunn-Šidák correction. The analyses were performed with Mplus version 7.0 (Muthén & Muthén 1998–2009) and IBM SPSS Statistics version 20.0. (Armonk, NY: IBM Corp.).

Results

Mean age of all participants (n = 848) was 80.1 (SD 4.3) years, 62% were women and 53.3% lived alone, see Table 2. Participants had completed on average 9.6 years of education, their mean MMSE score was 26.2 (SD 2.8), mean CES-D score 9.6 (SD 6.8) and mean number of diseases 4.4 (SD 2.4). 36.1% of all participants were categorized as physically inactive and 25.6% reported difficulties in walking 0.5 km. The majority of the participants (84.6%) went out of their homes every day. Unmet physical activity need was reported by 13.6% of all participants.

Barrier profiles

Table 3 describes the five identified profiles of outdoor barriers. Almost half of the participants (46.5%) reported practically no barriers for outdoor physical activity (mean number of barriers 0.5 (SD 0.6)) and their profile was named *Minor barriers*. Every fourth participant (26.5%) belonged to the barrier profile named *Ambient conditions*. These people reported on average 2.4 (SD 0.9) barriers, concerning mostly poor weather (68.9%) and slippery roads (82.2%). Barrier profile *Poor health* included 15.9% of the participants, who predominantly reported pain and illnesses (95.6%), slippery roads (97.0%), poor weather (75.6%) and fear of falling (54.8%) as barriers for outdoor physical activity. Their average number of barriers was 4.7 (SD 1.1). The highest number of barriers (mean 7.4, SD 1.6) including darkness (89.7%), fear of falling (87.2%), slippery roads (87.2%), poor weather (76.9%), pain and illnesses (69.2%), poor mobility (64.1%) fear of crime (59.0%) feelings of insecurity (56.4%), was reported by the participants whose barrier profile was named *Insecurity*. The fifth profile, covering 6.5% of the participants, was called *Mobility limitations*. The participants belonging to this profile reported on average 3.4 barriers (SD 1.2), which included mainly pain and illnesses (89.1%), poor mobility (78.2%) and fear of falling (43.6%). Participants who were profiled under *Minor Barriers*-profile were active outdoors and had good mobility (Table 2). People in *Ambient conditions*-profile were also active and most of them did not have mobility difficulties, but they had some concern for poor weather. In the remaining three profiles the participants were characterized by walking difficulties and inactivity. Most of the people in *Insecurity* and *Poor health*-profiles were inactive and had reduced mobility. The number of outdoor physical activity barriers differed statistically significantly between all profiles, being the lowest among people in *Minor Barriers*-profile and highest among people in *Insecurity*-profile. Compared with *Ambient conditions*, *Poor Health* and *Insecurity*-profiles, the smaller