



Determinants of mobility in populations of older adults: Results from a cross-sectional study in Finland, Poland and Spain[☆]



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ARTICLE INFO

Keywords:

Mobility score
Built environment
Physical activity
Waist risk
Pain
Regression

ABSTRACT

Objective: To identify the determinants of mobility among people aged 50+ from Finland, Spain and Poland.

Study design: Observational cross-sectional population study.

Main outcome measures: A mobility score was based on responses to items referring to body movements, walking, moving around and using transportation. Determinants of mobility were entered in hierarchical regression models in the following order: sociodemographic characteristics, health habits, chronic conditions, description of general state of health, vision and hearing, social networks, built environment.

Results: Complete data were available for 3902 participants (mean age 65.1, SD 9.8). The final model explained 64.7% of the variation in mobility. The most relevant predictors were: pain, age and living in Finland, presence of arthritis, stroke and diabetes, high-risk waist circumference, physical inactivity, and perceiving the neighborhood environment as more exploitable.

Conclusions: Our results provide public health indications that could support concrete actions to address the modifiable determinants of mobility. These include the identification and treatment of pain-related problems, increasing the level of physical activity and the improvement of neighborhood features in terms of presence of general utility places or means of transportation. These factors can be modified with short- to medium-term interventions and such a change could improve the mobility of ageing population, with evident benefits for health.

1. Introduction

The proportion of the European population aged over 60 years has been increasing since the 1990s, and is expected to exceed 20% by 2050 [1]. Such an increase is also associated to a rise in the prevalence and burden of non-communicable diseases, which since the 90s have increased by 55.4% [2]. People live longer, and experience disability for longer periods compared to the last two decades [3]. Problems with mobility are common consequences of the natural ageing process, with

a close association with older age, low physical activity, strength, chronic disease, obesity and underweight [4,5], and are also predictive of mortality, health, depression, hospitalization and admission in nursing homes, and of negative impact on quality of life and disability [6–12]. Therefore, the presence and impact of mobility limitations are relevant endpoints to address ageing outcomes. Mobility limitation is the gap between an individual's physical ability (e.g. muscle strength or balance) and environmental challenges to mobility-related activities (e.g. walking on uneven surfaces) [13]: it is more than the reduced

[☆] The views expressed in this paper are those of the authors, and do not necessarily represent the views or policies of the World Health Organization.

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<https://doi.org/10.1016/j.maturitas.2018.06.018>

Received 10 April 2018; Received in revised form 21 June 2018; Accepted 30 June 2018

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ability in walking or in moving around in other ways, and it encompasses consideration of a person's environment and his or her ability to adapt to it [14]. Mobility limitation is influenced by different factors [4], such as older age, poor socioeconomic status and female gender [15,16]. Mobility limitation and depressed mood are interconnected, with depression being reported as a predictor of mobility limitation [17]. Other commonly reported determinants include smoking and body weight (both obesity and underweight in a U-shaped curve) [5], hypertension, diabetes, arthritis, stroke and hypercholesterolemia [18,19], pain [20] and vision problems [21].

Different components of mobility limitation exist, including walking, moving around with assistive devices, climbing stairs, driving and so on. However, walking has historically been addressed as the main endpoint of research addressing difficulties with mobility [22]. Such an approach to conceiving mobility limitations has the advantage of being easily reproducible and enables a direct appreciation of the relative contribution of specific determinants on mobility. However, it is also partial, since mobility domain includes a broad set of activities, such as carrying objects, changing and maintaining body position or using transportation, as defined in the International Classification of Functioning, Disability and Health (ICF) [23]. As shown in a recent study, measures of mobility capacity, measured with objective tests alone, may not adequately predict real-life difficulties [24]. This suggests that features of neighborhoods and the home environment may be important determinants of mobility especially in older adults [25]. Additionally, the neighborhood environment is also the place of social contacts and relationships: physical and social environments influence quality of life, well-being, health and healthy behaviors [26–28], and vice-versa, i.e. negative social and physical neighborhood environment may limit mobility or impair the recovery from mobility limitation in old adults [29].

In sum, mobility has been separately predicted by health, lifestyle, social and environmental factors. Few population studies included a large number of determinants [16,30–32], and generally relied on walking-based definitions of mobility: an exception to this is the study by Wannamethee and colleagues who addressed mobility problems in terms of difficulties in going up or down stairs, bending down, straightening up, keeping one's balance, going out of the house, and walking 400 yards [31]. The primary consequence of this is that our understanding of the relative contribution of different factors is limited. If most of research does not account for a considerable amount of predictors of mobility, research results carry the risk of producing an inadequate, or at least partially adequate, picture of the different factors that predict mobility. Those predictors that are commonly taken into account will be overrepresented and, if studies do not control for several variables that constitute part of people's "normal" daily living, the magnitude of effect of these known issues will be amplified. This, in turn, limits the possibility to produce indications for the promotion of public health initiatives aimed to address the most important predictors of mobility, with the risk that results are expected to produce a given amount of amelioration based on inadequate estimates.

Therefore, the aims of this paper are to develop a mobility score based on the ICF definition of mobility and to comprehensively identify the determinants of mobility limitation in a large population study sample composed of persons aged 50 or over, relying on a wide set of candidate determinants, such as sociodemographic factors, chronic conditions, health, lifestyle, social networks and the built environment.

2. Methods

2.1. Study design, procedure and sample

Data herein presented were derived from COURAGE in Europe project (Collaborative Research on Ageing in Europe), a cross-sectional survey of the general community dwelling adult population. A sample of respondents from Finland, Poland and Spain was interviewed at their

households between May 2011 and March 2012 using a computer-assisted personal interviewing system. A multi-stage clustered design was used to obtain nationally representative samples. The whole sample comprised 10,800 respondents: of them, 8311 (76.9%) were aged 50 or more [33] and constituted the basis for the present study.

The study was approved by the ethical committee of Neurological Institute Carlo Besta, Milan, Italy, project coordinator; the Ethics Review Committee, National Public Health Institute, Helsinki, Finland; the Bioethical Committee, Jagiellonian University, Krakow, Poland; Ethics Review Committee, Parc Sanitari Sant Joan de Déu, Barcelona, Spain; and Ethics Review Committee, La Princesa University Hospital, Madrid, Spain. Written informed consent from each participant was obtained.

2.2. Measures

2.2.1. Mobility

To assess mobility, participants answered how much of a difficulty they had, over the last 30 days, in the following 15 activities: standing for long periods such as 30 min; climbing one flight of stairs without resting; vigorous activities; sitting for long periods; stooping, kneeling or crouching; picking up things with fingers; extending arms above shoulder level; walking 100 m; walking a long distance such as a kilometer; carrying things; moving around inside home; getting up from lying down; standing up from sitting down; getting where you want to go, using private or public transport if needed; getting out of your home. All items were rated on 5-point scale, ranging from "no problem" to "complete problem/cannot do the activity".

2.2.2. Socio-demographic information

We included country of residence (Finland, Poland, Spain), age, gender, educational level (none, primary or secondary school, high school or higher), marital status (never married, married/cohabiting, separated/divorced or widowed) and location (urban, rural) as variables of interest.

2.2.3. Health habits

Smoking, alcohol consumption, physical activity, as well as body mass index (BMI) and waist circumference (WC) were included as risk factors.

Participants' smoking status was analyzed into three groups: current, past or never smokers.

Individual alcohol consumption patterns, including frequency and quantity of alcohol use were assessed in four groups [34]:

- 1) lifetime abstainers or occasional drinkers (i.e. those who had never consumed an alcoholic beverage or had not consumed alcohol in the last 30 days);
- 2) non-heavy drinkers (i.e. social drinkers who consumed alcohol in the last 30 days);
- 3) infrequent heavy drinkers (i.e. binge drinkers who consumed alcohol on 1-2 days in the past week with 5 or more standard drinks for men and 4 or more standard drinks for women);
- 4) frequent heavy drinkers (those who consumed alcohol on 3 or more days per week with 5 or more standard drinks for men and 4 or more standard drinks for women).

Physical activity was measured with the Global Physical Activity Questionnaire (GPAQ v2) [35]. GPAQ records the frequency (number of days) and duration (minutes or hours) of each activity (work and leisure, recreational and sport-related) undertaken in the last week, and considers the intensity of activity defined as Metabolic Equivalent to Task (MET). Three different profiles were identified [35]:

- a) high physical activity: vigorous-intensity activity on at least 3 days achieving a minimum of at least 1500 MET-minutes per week, or a

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