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Role of physical activity, physical fitness, and chronic health conditions on the physical independence of community-dwelling older adults over a 5-year period

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ABSTRACT

The variability in the individual characteristics and habits could help determine how older adults maintain independence. The impact of the variability in physical activity, physical fitness, body composition, and chronic health conditions (co-morbidities) on the independence of older adults, especially over time, is seldom examined. This study aims to analyze quantitatively the impact of baseline values and changes in physical activity, physical fitness, body composition, and co-morbidities on the physical independence of community-dwelling, older adults over a 5-year period. Data from 106 and 85 community-dwelling adults (≥60 years) were collected at baseline and after five years, respectively. Linear regression selected the main predictors of changes in physical independence as follows: the baseline physical independence ($\beta = 0.032$, $R^2 = 9.9\%$) and co-morbidities ($\beta = -0.191$, $R^2 = 6.3\%$) and the changes in co-morbidities ($\beta = -0.244$, $R^2 = 10.8\%$), agility ($\beta = -0.288$, $R^2 = 6.7\%$), aerobic endurance ($\beta = 0.007$, $R^2 = 3.2\%$), and walking expenditure ($\beta = 0.001$, $R^2 = 5.1\%$) ($p < 0.05$). In conclusion, baseline physical independence, baseline co-morbidities, and changes in co-morbidities, walking, agility, and aerobic endurance predicted physical independence over five years regardless of age and gender. Gains of up to 8.3% in physical independence were associated with improvements in these variables, which corresponds to regaining independence for performing one or two activities of daily living.

1. Introduction

Life expectancies continue to rise worldwide (WHO, 2014). Consequently, more people are likely to live longer with infirmities and disabilities, and therefore, they are likely to lose their physical independence (Crimmins, Hayward, Hagedorn, Saito, & Brouard, 2009; Seeman, Merkin, Crimmins, & Karlamangla, 2010). Nonetheless, an early diagnosis of poor health conditions for which disability preventive measures are available (Crimmins et al., 2009) may also result in increased disability-free life expectancy (Crimmins et al., 2009; Hashimoto et al., 2010). As educated older adults generally adhere to preventive measures (Van Oyen et al., 2011) physical dependence may in fact decrease (Paterson & Warburton, 2010).

Physical dependence indicates a reduced physical capacity to independently perform common activities of daily living (ADLs). ADLs include the basic activities or self-care activities (BADLs); instrumental activities that allow an individual to function independently in a community (IADLs); and advanced or challenging activities that enrich life such as social, religious, and leisure activities (AADLs) (Fujiwara et al., 2008; Rikli & Jones, 1998, 2013). A functional decline in more demanding ADLs predicts future declines in less demanding ADLs, institutionalization, and death (Fujiwara et al., 2008; Vermeulen, Neyens, van Rossum, Spreeuwenberg, & de Witte, 2011).

Most factors affecting the ability to perform ADLs involve chronic health conditions, physical activity and fitness as well as cognition status in frail and often institutionalized populations (Cahn-Weiner et al., 2007; Fujiwara et al., 2008; Paterson & Warburton, 2010; Vasquez, Batsis, Germain, & Shaw, 2014). These and many other studies that focus on disability and independence and that examine the impact of factors related to aging and physical independence have provided cross-sectional results, largely providing measures of central tendency and normative

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values. Consequently, the variability in the individual characteristics and habits of older adults is seldom examined. However, some studies (Dato et al., 2012; Perruccio, Gandhi, & Rampersaud, 2013) have suggested that by considering individuals from population extremes in addition to intermediate individuals, we may discover helpful information about maintaining health, quality of life, and physical independence in old age.

Several longitudinal studies (Dato et al., 2012; Gill, Gahbauer, Murphy, Han, & Allore, 2012; Huang, Perera, Studenski, & VanSwearingen, 2007; Lee & Park, 2006) have analyzed the predictors of physical independence – such as health and physical fitness – and the impact of these variables on physical independence, athough the extent to which each variable may affect physical independence over time, especially variables dependent on lifestyle (physical activity and fitness), remains poorly documented. Moreover, recent studies (Rikli & Jones, 2013) highlight the need for reference measures and easy-to-use indicators that help older adults prevent physical dependence. Therefore, the aim of this study was to quantitatively analyze the impact of baseline values of physical activity, physical fitness, body composition, and chronic health conditions (co-morbidities), as well as their changes over time, on the physical independence of community-dwelling, older adults over a 5-year period.

2. Material and methods

2.1. Design

This longitudinal observational study included two evaluations: at baseline and after a 5-year follow-up (Fig. 1). The sample was analyzed as a whole and split into two groups according to changes in physical independence over the follow-up period.

2.2. Participants

Participants were recruited in an urban Portuguese area in response to leaflets and posters distributed in pharmacies and community settings (e.g., health centers, universities for seniors, recreational, and cultural centers). Initially, 110 community-dwelling persons (42 men and 68 women) were assessed for eligibility. Inclusion in the study required the absence of cognitive impairment in accordance with the Folstein Mini-Mental State Examination (Folstein, Folstein, & McHugh, 1975), with a cut-off of 24 points and below indicating a cognitive decline (Fujiwara et al., 2008), and a lack of health conditions causing a temporary loss of physical fitness or a temporary disability at any evaluation stage (self-reported). There were 106 eligible participants at the baseline

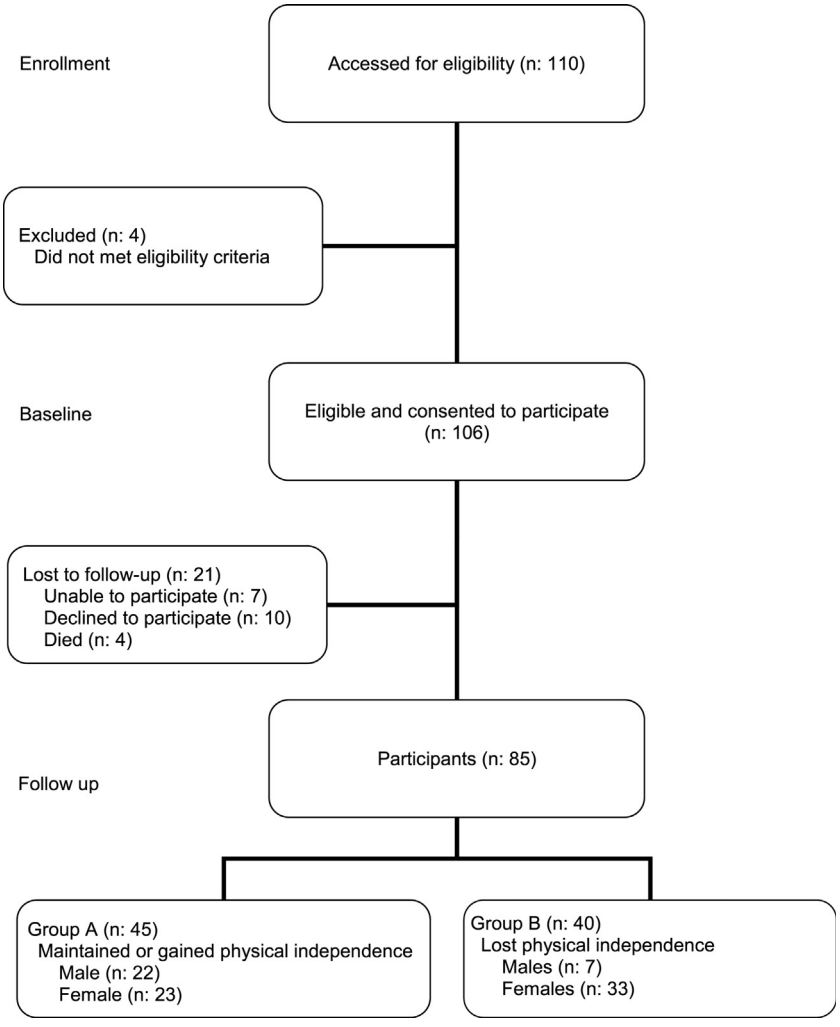

Fig. 1. Flow chart of study participants.