Anthropometric and Ergonomic Approach to the Ageing: the Importance of the Multidisciplinary Study in the Act on Ageing Project (Piedmont Region)

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Introduction

The population progressive ageing requests to identify interventions to prevent mental and physical functional decline and to promote the maintenance of autonomy in elderly.
As reported in several international studies, regular physical or memory activities can help prevent biological ageing and preserve a good quality of life.
The *Act on Ageing project, a potential way to face demographic sustainability – a research-intervention on the relationship among physical activity, memory and ability of daily living in senior citizens* (www.actonageing.eu, Coord. Prof. S. Ciairano) (2010-2012), aims to evaluate the potential effect of physical and cognitive training programs on the ability to perform activities of daily living.

The project aim and approach

The research, characterized by a multidisciplinary collaboration between psychosocial, anthropological and physical activities sciences, focuses on the study of 400 elderly (65 years and older) in their living contest (private or residential homes). The participants will be tested before (step called F0) and after (step called F1) a 16-weeks course including cognitive and physical exercises, conducted respectively by psychologists and experts in physical activities, with 6-month follow up. Furthermore, the present research aims to investigate the relationship between home environment and older people analysing how the affective and cognitive aspects mediate older people risk perception and attitude toward home modifications. For the affective aspects we refer to Proshansky (1983) place-identity theory, for the cognitive ones to Norman (1988) mental models. In order to promote the quality of life and to increase autonomy and well-being, the project aims to examine both the physical and functional characteristics, and the social, cognitive and emotional aspects of the elderly interaction with the domestic environment, within a multidisciplinary approach. The research of the *Laboratorio di Antropometria ed Ergonomia* follows two different lines: the first one in collaboration with LIDEA (InterDepartimental Laboratory of Applied Ergonomics), the second one in collaboration with SUISM (University School of Motor & Sport Sciences). The research with LIDEA provides an ergonomic analysis of home hazards. Semi-structured interviews are conducted by a psychologist, to point out the sources of risk perceived by the elderly and their attitude toward home modifications. Using an observation checklist, an observer trained in physical ergonomics carries out an objective analysis of environmental hazards. In this step are involved just 30 women of the 400 participants to the project.
The aim of the semi-structured interview and the observation checklist is to identify and compare the potential hazards perceived by the elderly with those observed and really present at home. The research about physical and functional characteristics of the elderly provides quantitative measurements of anthropometric data (stature, tibial length, weight, and waist circumference measured according to ISO 7250-1/2008 standard) (Fig. 1) and of hand grip strength which is considered the best indicator of autonomy (Coldham *et al.*, 2006; Michel-Pellegrino *et al.*, 2009). The purpose is to realize a database of anthropometric and biomechanical parameters of Piedmont elderly and to evaluate the physical training effect on weight, postural and strength conditions. The set of activities is specifically designed for the research. As advised by the American College of Sports Medicine (2007), the intervention protocol focuses on three specific objectives: mobility, balance and resistance strength.
The exercises, designed with a gradual increase of the parameters of work intensity and complexity, are performed by small groups of older people and the session are conducted by instructors, graduated in physical education and specialized in physical fitness training for older people.

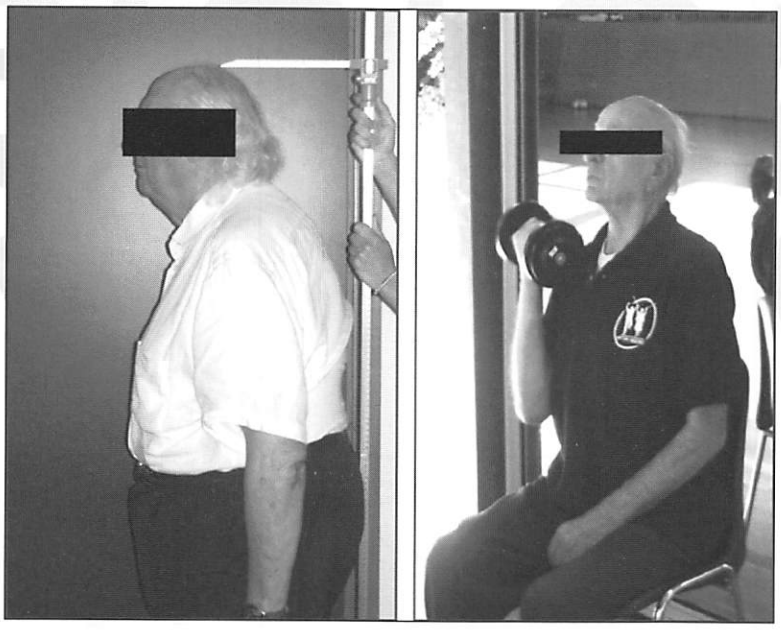

Fig.1. *Different phases of the research: anthropometric survey and physical training.*

Partial preliminary results

Currently about 250 participants were tested and150 were recruited to perform the cognitive or physical activities. We can report here just the first results regarding the anthropometric aspects and the hand strength of the tested sample.

The anthropometric data recorded until now show an high incidence of weight excess, especially in females, with a consequential high exposure to health risks. Employing Douketis's *et al.* (2005) matrix based on the relationship among BMI, waist circumference and risk level to develop chronic illness (cfr. Lorè *et al.* in this volume), we found that just 20% of males and 17.6% of females are in the least health risk category. We are now delving deeper into this aspect with a more specific survey on fat mass through the measure of the bioelectric impedance. The research on the hand grip strength is highlighting gender differences in the decrease of this variable with age: male decrease is steeper, especially for the older age class (+70-75 years), in which male and female strength becomes comparable (Fig. 2).

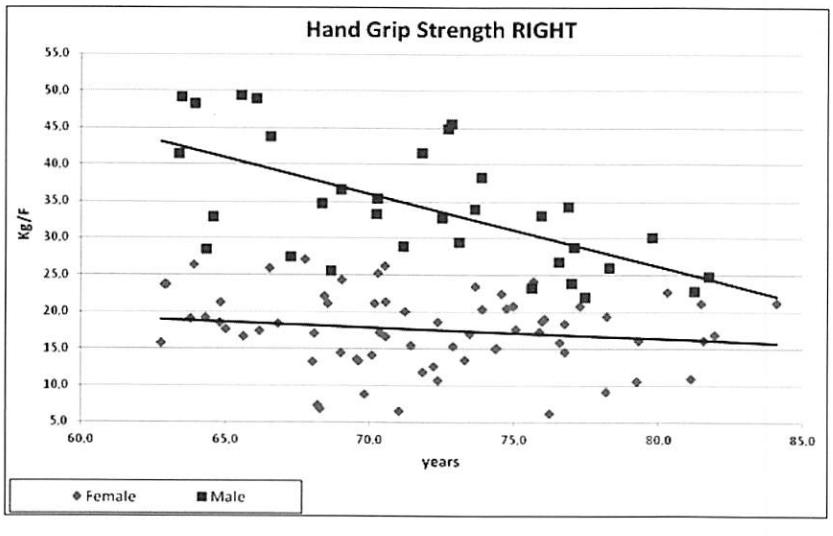

Fig. 2. *Gender differences in the decrease of right hand strength with age.*

Conclusions

It's well known that parameters like balance, strength and mobility are influenced by ageing and lifestyle. A physical program adapted to the elderly can help to maintain a good level of independence, avoiding physical ailment due to a high sedentary lifestyle. The study of anthropometric and functional aspects let us to know elderly physical and dimensional characteristics, to observe the physiological changes due to the ageing and to monitor the advantages due to a program of physical activity. The observation of the home setting allows to compare the elderly perception of their home with the real and objective physical home characteristics. It is important to consider the interaction between subjective evaluation and objective conditions, but it is not possible to introduce home modifications to improve safety without considering the cognitive and affective links with the environment; disproportioned changes may not be successful and can lead to a decrease in autonomy and environmental competence.

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