European Geriatric Medicine 7 (2016) 333–339

Available online at
ScienceDirect
www.sciencedirect.com

Elsevier Masson France
EM|consulte
www.em-consulte.com/en

Research paper

Determinants of the benefits of a short-term personalized intermittent work exercise program (IWEP) among seniors: Results from the CAPS program

P.O. Lang [a,b,*], P.H. Bréchat [c], T. Vogel [d], C. Lebreton [e], M. Bellanger [c], D. Rivière [f], J. Regnard [g], P.M. Leprêtre [h], J. Lonsdorfer [d]

[a] University hospital of Lausanne (CHUV), Geriatric and geriatric rehabilitation division, Lausanne, Switzerland
[b] Anglia Ruskin University, Health and wellbeing academy, Cambridge, United Kingdom
[c] University of Sorbonne Paris-la Cité, Health policies Department, 75006 Paris, France
[d] University hospital of Strasbourg, Gerontology centre, Consultation of Physical Aptitude Assessment for Health, 67091 Strasbourg, France
[e] French school of Public health (EHESP), 35043 Rennes, France
[f] University Hospitals of Toulouse, Division of respiratory functional exploration, 31059 Toulouse, France
[g] University hospitals of Besançon, Division of respiratory functional exploration, 25030 Besançon, France
[h] University of Picardie, UFR des Sciences du Sport, Adaptations Physiologiques à l'Exercice et Réadaptation à l'Effort, EA-3300, 80025 Amiens, France

ARTICLE INFO

Article history:
Received 15 April 2016
Accepted 9 May 2016
Available online 30 May 2016

Keywords:
Physical activity
Healthy ageing
Training program
Adhesion
Cost
Senior

ABSTRACT

To evaluate the efficiency of this structured individualized program in "real life" context and to investigate the association of participation, and regularity and organizational context of participation with socioeconomic status and location from an intermittent work exercise program (IWEP) in seniors, we conducted a longitudinal prospective study in 3 cities in France. The 18-session 9-week IWEP was run on ergometric bicycles. Participants' attitudes and behaviors with respect to IWEP, and quality of life (QoL) were assessed. A total of 232 volunteers (mean age 66.0 ± 6.5 years) were enrolled. For half, maintaining physical fitness was the main motivation to participate; 15.9% were completely sedentary. The programme adherence was 100%. A significant gain was measured in 92.2% of participants. At baseline, QoL scores were already high. After the IWEP, they were further enhanced of 10.0 ± 20.0% on average. In multifactorial analysis, none sociodemographic and financial characteristics were found to be linked with gain in performance. Previously sedentary individuals were those who beneficiate the most of the IWEP, and, this, whatever their health and sociodemographic status. Participants living in a northern urban area (Strasbourg) beneficiated the most from the IWEP compared to southern city (Toulouse) and rural district (Baume-les-Dames). Finally the health status did not influence the impact of the IWEP as well as tobacco and alcohol consumption or the quality of food intakes. This real life study confirmed that the IWEP enhanced endurance capacities and QoL in seniors and gives clues about determinants of the gain of endurance capacities in seniors.

1. Introduction

Evidence shows the importance of promoting physical activity in preventing certain chronic health-conditions and public health guidelines advocate that regular endurance exercise is essential to improve health, physiological well-being and quality of life (QoL), and survival [1,2]. Conversely, being sedentary and/or insufficient aerobic capacity (VO_{2max}) and maximal tolerated power (MTP) negatively impact physiological functioning and contributes to cardiovascular and metabolic diseases, osteoporosis, and all-cause mortality [3,4]. While physiologically VO_{2max} declines with advancing age [5], a minimal level must be maintained for independent physical functioning [6]. Interestingly after aerobic training older individuals might experiment similar increase in their aerobic performance to that measured in their younger counterparts [3,7–9]. Thus, promotion of regular physical training is now becoming one of the main non-pharmaceutical measures to promote healthy ageing [10]. Endurance training has been showed to prevent cognitive decline [11,12], breast and colon cancer, and

* Corresponding author. University hospital of Lausanne (CHUV), Geriatric and geriatric rehabilitation division, Mont Paisible 16 (MP16/04/414), CH-1011 Lausanne, Switzerland. Tel.: +41 0 21 314 37 04; fax: +41 0 21 318 17 20.
E-mail address: Pierre-Olivier.Lang@chuv.ch (P.O. Lang).

http://dx.doi.org/10.1016/j.eurger.2016.05.004
1878-7649/

in oncology to contribute to increase QoL, well-being, and recurrence-free survival [13–15].

Among the different modes of endurance exercise training, cycle ergometer training is particularly attractive compared to walking or jogging and treadmill training. While they have all demonstrated their effectiveness on health in several studies cycle ergometer training is particularly easy and safe, and causes no related injuries. Indeed, cycling is a healthy form of endurance exercise and as a non-weight bearing activity has less impact on the joints and is thus less stressful for the aged body than jogging or other running sports. In addition, it does not require as much as postural control as walking on treadmill and therefore is a good alternative for individuals with poor balance and feasible for frail older individuals [16].

In terms of health-enhancing physical activity, frequency of participation is a key component but it is also important to analyze how the context of participation may impact the benefits. In general, it is believed that socioeconomic status is a critical factor and there are differences in participation patterns according to residential location [17], but little is known about the seniors' situation specifically. The recent extension of a short-term personalized intermittent work exercise program (IWEP) to different regional communities gave us the opportunity for a real life study:

- to evaluate the efficiency of this structured individualized program;
- to investigate the association of participation, and regularity and organizational context of participation with socioeconomic status and location.

The IWEP is a validated program which has already demonstrated its benefits on maximal exercise and maximal cardiorespiratory function and endurance parameters among sedentary aged individuals [18] and in healthy seniors [3] respectively, and on the pulse wave velocity and arterial pressure in healthy aged people [19], and on left ventricle filling function in middle-aged women [20].

2. Material and methods

2.1. Population study

Following a call for research study subject recruitment, seniors aged 50 years or over were recruited to apply a short-term personalized intermittent work exercise program (IWEP) in the frame of the consultation of the Physical Aptitude Assessment for Health (CAPS in French language). The three CAPS centers in France were part of this program: Baume-les-Dames (rural northern area); Strasbourg (urban northern area); and Toulouse (urban southern area).

All volunteers first completed a personal interview and physical examination. A complete review of the current and past health condition and fitness level was conducted. All conditions that contraindicate exercise or predisposed participants to injury were reviewed. During the interview, volunteers received instructions about the IWEP; the informed consent was signed [20]. This study was conducted in accordance with the rules of good clinical practice and was registered to the CNIL (number 1135891).

2.2. Study design

This study was prospective, longitudinal, and multicenter. Volunteers, recruited during the year period (2010–2011) following the pilot phase of the program in Strasbourg [3,4], gave answer to a two-part questionnaire administered before and after the IWEP. In addition, before and after the IWEP was performed an incremental maximal exercise test (IET) (see Fig. 1 as additional file) [20]. All along the program, a medical follow-up was organized to collect exercise-related injuries or adverse events [5]. All the volunteers thus recruited completed a personal interview as well as a questionnaire. An electrocardiogram and a complete physical examination to determine any health-related issue that would limit their ability to exercise or contraindicate their enrolment in the IWEP. Thus was conducted a complete review their current and past health condition including past injuries and current level of fitness. Cardiovascular diseases (including hypertension), diabetes, and abnormalities of the serum lipid profile were specifically recorded because they are the most frequent medical reasons why individuals may be motivated to take up physical training. The physical examination recorded the body weight, resting pulse rate, and blood pressure. In addition to all physical system exploration, a particular attention was given to lower extremities for edema and the presence of arterial pulses along with tests for neurological functions. All conditions that contraindicated exercise of predisposed volunteers to injury such as uncontrolled hypertension, any significant heart valve or symptomatic cardiac/pulmonary diseases, severe autonomic neuropathy, severe peripheral neuropathy and/or any history of foot lesions or orthopedic limitations such as joint or musculotendinous disorders were reviewed. If at least one was present then the concerned volunteers was not enrolled in the IWEP. In addition people with known left ventricle ejection fraction below 50% were not enrolled as well. During the personal interview, the volunteers also received instructions about the training protocol.

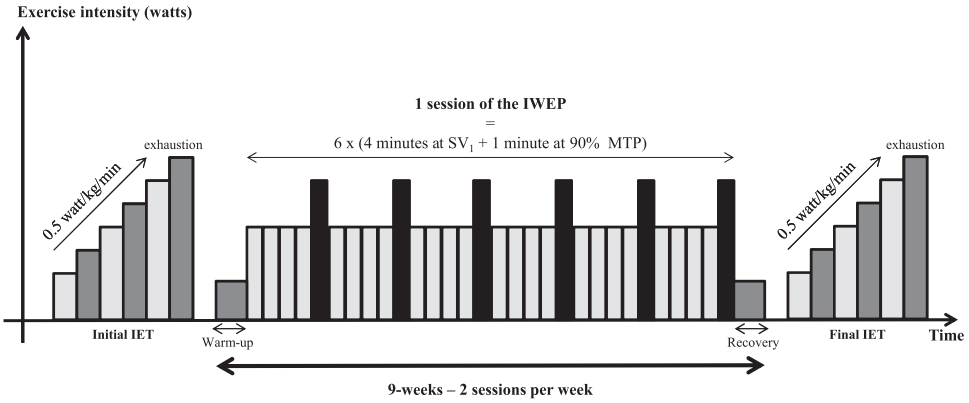

Fig. 1. This figure depicts the intermittent work exercise program (IWEP) protocol design including the final and initial evaluations of maximal cardiorespiratory functions by the incremental exercise test (IET) (VT_1: first ventilatory threshold; MTP: maximal tolerated power).