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**Methods and Didactics of Motor Activities in the Elderly**

by

**Claudio Macchi**

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## INTRODUCTION

*Claudio Macchi*

Over the next 30 years the number of older persons will gradually increase in most countries, along with disabilities, and more attention will be paid to the improvement of quality of life rather than to the increase of life expectancy.

Although aging is an unavoidable process, many diseases and disabilities can be prevented, or at least delayed, through appropriate physical activity programs.

The boundary between the disabilities caused by disease and those associated with functional limitations, often related to incorrect habits and lifestyles, is uncertain. Furthermore, it is also uncertain whether different life expectancy and risk of death depend on environmental differences or on differences in physical activity related to the environment.

Paffenbarger's <sup>1</sup> studies have shown that individuals physically active have a longer life expectancy than sedentary persons. Specifically, the study conducted on 17,000 alumni of the Harvard University <sup>1</sup> has demonstrated that individuals more physically active showed a statistically significant reduction in the relative risk of death from all causes and from cardiovascular diseases and that the magnitude of the effect was directly related to the amount of physical activity. The same study also showed that people who had begun to practice regular physical activity in adulthood or in more advanced age showed the same mortality rate as those who had been active all life long, and that, on the contrary, active individuals who had become sedentary with advancing age showed the same risk of death as those who had been sedentary all life long.

We can therefore say that there are many confirmations of the beneficial effects of an active lifestyle and a moderate physical activity and that good physical fitness has positive effects on longevity as much as a regular physical activity on risk of mortality (particularly from respiratory and vascular causes). However, we should also consider that often those who practice regular physical activity lead healthier lifestyles, get sick less often, rarely smoke, follow a balanced diet, avoid weight gain, and pay more attention to medical controls and disease prevention. This, obviously, might bias the results of some scientific studies: however, the correction for potential confounders often improves the reliability of study results.

We can easily understand why aging “per se” substantially contributes to the increase of medical and social costs. In fact, the fragmentation of families and the economic globalization have led to an excessive institutionalization of older persons and to an abnormal proliferation of nursing homes. As a consequence, older persons experience loneliness, depression, along with reduction of physical activity, disability and renunciation of life.

## CHAPTER I

### AGING AND PHYSICAL ACTIVITY

*Claudio Macchi*

#### **I.1 Aging and lifestyles**

On average, all of us risk to spend about 15% of the duration of our life in a state of disease, with a longer period of disability for women, both because they live longer and because women show a higher prevalence and a higher survival rate in case of chronic diseases.

Previous papers have shown a functional identity between the character of a person and his/her body attitude. Often chronic muscle tension, joint limitations and many other physical changes occur during childhood and then progress throughout adulthood and old age.

Psychology has always preferred everything is evolving, such as childhood and adolescence, but in recent years it has begun to take an interest to adults and older adults.

Demographic data show, in fact, the increase of life expectancy in the population, which already has, and will have in the future, a major impact on both economy of nations and their social organization.

Psychological aspects and intellectual capabilities undergo involution when creativity and operational gestures are less successful than in previous ages, with rare exceptions, even if these last cases show, anyhow, a clear slowdown of intellectual activity, reduced memory, attention and adaptation to any kind of change.

With aging, changes in the emotional sphere are sometimes more pronounced than those in the intellectual sphere. The separation from children, the loss of spouse and the gradual disappearance of relatives and friends, make the elderly more and more alone, less autonomous and dependent on others, even for ordinary acts of everyday life, hence the fear of isolation and depression take place.

One of the most serious social aspects of aging is the changed relationship with sons and daughters. The elderly are often more tolerated than desired, especially when they live together and are no longer able to look after grandchildren or perform housework, though almost always they substantially contribute to the family income with their pension.

With retirement there are radical changes in older persons' lifestyle, to which they are never prepared enough, though often, at least initially, the retirement is considered a well-deserved rest period similar to vacations or holidays. After a pleasant period, which may last more or less long, the discomfort associated with the loss of work and temporal-spatial references, upon which their previous existence had been based, takes place, with depressive or aggressive reactions.

From these brief considerations it is apparent that for every age it is important to preserve its own health and physical shape to protect independence and self-esteem,

which are essential for a good quality of life. The teacher, instructor, personal trainer or whatever you want to call who is involved in the evaluation of the physical and mental health of the subject, in all forms of training to health promotion must be able to advice both on training and on lifestyle, even through a series of motivational stimuli of various kinds.

To do this he/she must be culturally prepared and temperamentally predisposed to human relationships, and understand the psychology characteristic of different stages of life.

## **I.2 Physical activity and mental health in the elderly**

The concept of mental health is almost impossible to define, at least in a sufficiently unique and widely shared way. Even the World Health Organization has avoided on official definitions. It is difficult to refer to a condition called normal, because the absence of mental illness does not necessarily mean mental health, as well as for the definition of the concept of health <sup>2</sup>. This becomes particularly difficult in the elderly, who often suffer from co-morbidities that "per se" cause changes in mood and behavior.

The mental disease in the elderly, is often associated with low self-esteem, sleep disturbances, depressed mood, lifestyles and behaviors unfit for their health.

Undoubtedly we can say that the loss of mental health results in a state of emotional and psychological distress that often prevents the use of one's abilities within the social life and daily activities. In this condition it is difficult to participate in environmental and social changes, to establish satisfactory relations, to preserve one's personality with self-esteem and resolve conflicts <sup>3</sup>.

The relationship between physical activity and mental state at all stages of life is widely shared. Researches in this field include the evaluation of both psychological deterrents, and incentives, for participation in the exercise (motivation) and psychological factors influencing the athletic performance. <sup>4,5</sup>

The positive effects of exercise in the elderly on the psychological sphere may be indirect, through the reduction of symptoms related to weight loss, or direct, through the improvement of anxiety, depression <sup>6</sup> and cognitive performances <sup>7</sup>.

The studies, mainly developed since the 70s, have consistently shown a positive effect of physical activity on psychological wellbeing. Early studies have focused on reducing negative emotions (normal and pathological anxiety, mistrust in oneself), while with time the evidence on physical activity as a promoter of positive feelings, like the sense of energy, has progressively increased. In this regard Thayer <sup>5</sup> showed that a 10-minute walk is more effective in reducing tension and producing a sense of energy than eating a sweet or smoking.

However, the dose-dependent correlation between exercise (frequency, intensity and duration of sessions) and emotional aspects has not yet been clarified: even a single session can produce a feeling of wellbeing lasting several hours.



Although the mechanisms by which exercise produces these effects have also not yet been clarified, the most accredited hypotheses include:

- Distraction - The exercise can distract from everyday worries. The positive effects on the psychological sphere have been demonstrated in some studies while others studies have provided no significant correlations: thus the question is still open.
- Endorphins - endorphins are endogenous opioids released into the circulation in response to various stimuli, including physical activity: some studies have shown that there is a correlation between high circulating levels of endorphins and well-being after a session of exercise, but the biochemical block of their effect *in vivo*, maintained the sensation of well being in some subjects. Therefore, the role of endorphins is not yet precisely defined.
- Thermogenesis - An exercise intense enough to cause an increase in body temperature, through the action of the hypothalamus and the thalamus, is able to stimulate certain brain areas, which in turn induce muscle relaxation. The hypothesis is that this relaxation, producing a reduction of sensory stimulation, has positive effects on the psychological sphere <sup>8,9</sup>.
- Monoamines - Neurotransmitters such as norepinephrine, dopamine and serotonin affect mood by acting on the CNS: physical activity changes intra-cerebral levels of monoamines in animals, and recent studies seem to validate these findings also in humans.
- Cerebral blood flow - a selective increase of cerebral blood flow in the cortex (frontal lobe, parietal and temporal lobes) and gray matter, in which the areas of the emotional control are localized, has been shown in some studies, and it correlated with arousal increase (supervisory level), with cognitive performance and emotional state, probably by modulating the local metabolism of monoamines.

Changes in levels of monoamines and cerebral flow are the biological mechanisms also evoked to explain the benefits of physical activity practiced regularly over time: psychological and social factors play a pivotal role.

The practice of regular physical activity increases both self-esteem (i.e. the evaluative component of self-conception) and self-efficacy (i.e. the confidence in one's ability to follow the best line of action required in different situations). Furthermore, regular physical activity seems to promote a more internal locus of control, by increasing the perception of being able to positively affect life through one's behavior, instead of feeling that life is beyond one's control and determined solely by external agents (external locus of control). These effects have been shown both in younger and in older adults, who often show a reduction of self-efficacy and a turning outside the locus of control.<sup>10, 11</sup> The types of activities need, however, to be further investigated: since first studies both aerobic and resistance exercises have proven to be effective in improving the mood (depression), while only aerobic exercise appears to be effective in reducing anxiety. Surely, even the effects of exercise on physical aspect, as well as on body image, on physical fitness, and in some cases, on symptoms, have a positive impact on the psychological wellbeing of active individuals. Especially in the elderly,

but not only in these, it is likely that the care received during physical activity programs and the socialization in group activities might play a pivotal role. On the contrary, as regards the effect of exercise on major psychiatric diseases (major depression, panic attacks, pathological anxiety, schizophrenia), many studies suggest a possible positive effect of some forms of physical activity in combination with targeted drug therapy, but available evidence is not conclusive.