

A 1998 SELECTIVE REVIEW OF RESEARCH ON THE ELDERLY

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INTRODUCTION: It is no secret that the life span is increasing. In the year 1900, the average life span of American males was 35.2 years, whereas today it is 77 years. Perhaps more importantly, the 65 years and older segment of our society is the most rapidly increasing segment. With this increase in human longevity comes one very practical concern: quality of life. Is increasing the life span adding quality years to one's life, or is it increasing the years of disease that precede death? One of the earliest scientific investigations of aging began at the University of Chicago in the 1940's with a group of scholars interested in exploring the meaning of personal and social adjustments in old age (Ryff, 1995).

The purpose of this paper is to summarize the pertinent findings of research related to the elderly. Included in this review are studies regarding the following: social, psychological and biological aspects of aging. The present researchers focused their investigation primarily on the biological aspects of aging.

METHODS: A critical computer literature search was performed to identify all pertinent studies performed with aging samples. The search was not limited to, but was primarily focused on the past twenty years of research; however, a few important studies from the past were also included. Over 200 articles were reviewed for study in the following categories: sociological, psychological, and biological aspects of aging. Moreover, pertinent data was collected in our laboratory in the areas of muscular strength and balance. Most investigators used inferential statistics to evaluate their results. With respect to the literature review, no attempt was made to investigate the causes of aging. The primary purpose of the literature review was to summarize the pertinent findings related to physical movement. No attempt was made to evaluate the individual studies or their methodologies used, except to attempt to select the best representative studies for review.

RESULTS: Psychological: Positive psychological functioning in later life has been of interest to gerontologists for nearly half a century (Ryff, 1995). The results of cross sectional studies show incremental changes with age in a variety of psychological aspects. Taken together, the results seem to suggest that some psychological aspects may improve with age (e.g., well-being and autonomy), others seem to decline (e.g., personal growth and purpose in life), whereas still others (e.g., self-acceptance) show no appreciable changes across the age groups. Ryff (1995) concluded however, that longitudinal studies are necessary to clarify and identify these differences. Also a current study has been conducted examining the role of nationalities in affecting certain differences found in aging, including the countries of China, Australia and the United States.

Sociological: Among the most important and impressive research in this area is that documenting an association among health, well-being and social relations (Antonucci & Akiyama, 1987). Substantial evidence has accumulated over the

years indicating that people who have larger social networks, more social supports, and are better integrated into the social fiber of their community are less likely to regress as rapidly. Similar impressive research results have documented the association between social relations and various forms of morbidity including cardiovascular diseases, depression, and successful rehabilitation. Additional evidence suggests that family and friends may function quite differently, although both play an important role in the well-being of the elderly.

Biological: The majority of research reviewed was in the biological area. For the most part, biological aspects of aging are the most obvious to detect. For example, two important biological markers of aging are muscle strength, and balance. Traditionally, muscle strength has been measured under a variety of contractions: isometric, isotonic and isokinetic. In most research studies isokinetic strength was evaluated using a Cybex and/or KinCom isokinetic strength testing machine. Balance, on the other hand, was most routinely studied utilizing force recordings on a force platform.

Under normal conditions, human muscle strength reaches its peak between the ages of 20-30 years, after which time it remains unchanged or decreases only slightly for more than 20 years (Hakinnen, 1994). However with increasing age, especially at the onset of the sixth decade, a steep decline in maximal strength is evident in both sexes (Asmussen, 1980; Heikkinen et al, 1984, Larsson, 1978; Vandervoort et al., 1986; Vandervoort, 1991). Moreover, the loss of muscle strength in the proximal muscles of the lower extremities is greater than that of the upper extremities, presumably due to decreasing use of lower compared to upper limb muscles in the elderly (Frontera et al., 1991). Moreover blood flow to the lower limbs is retarded in the elderly due to lack of exercise. This decrease in maximal strength is due to a large extent to the reduction of muscle mass with relative increases in fat in both men and women, since aging is associated with alterations in hormone balance (Jaffe, 1986). In every case, the research findings supported the concept that training may in fact reverse this process to a degree (Frontera et al., 1986). Moreover in a study conducted in our laboratory by Cooper & Koceja, (1997), the use of therapeutic massage as well as the use of electrical stimulation was shown to be beneficial in some elderly subjects in the execution of maximal muscle contractions.

Another aspect of biological aging is balance. Among the elderly, countless injuries, some resulting in death are the direct result of falls. Perhaps more importantly, falling produces changes in the self-confidence of many elderly individuals. One research report suggests that falls are the leading cause of death from injury among persons aged 65 years and older (Sattin, 1992). Test results show that there is a significant difference between young subjects and elderly subjects in tests of static balance, with no difference found between male and female subjects (Baloh et al., 1994). In our laboratory, it was found that dramatic increases in static postural sway occurs after the age of 65 years, with greater decrements observed when subjects are asked to stand motionless with their eyes closed. More importantly, we have also observed significant differences between young and elderly subjects in their dynamic balance (Cooper & Koceja, 1995). Again, in each of these instances, training programs have been shown to improve postural control and balance in elderly subjects. In another study in our laboratory (Cooper & Koceja, 1996), the reflex system was shown to be important in the

control of balance in elderly individuals, and that those individuals who exercised regularly showed better balance, suggesting a link between physical activity and balance control.

CONCLUSIONS: From this review of published reports it is concluded that elderly subjects experience declines in psychological, sociological and biological functions. With respect to biological functions, elderly subject experience greater balance problems, and are not capable of fully activating voluntary muscle activity. The role of exercise appears to be important. For example, exercise has been shown to have a beneficial effect in all three areas, psychological, sociological and biological.

Future Studies: Future studies that we believe may have an impact on what we know about human aging include the use of hypnosis in the generation of maximal muscle responses of elderly subjects. Also utilizing magnetic therapy may enhance muscular force and strength, and rehabilitation in the elderly. In all of these circumstances, it is important to carefully monitor the sample of elderly individuals used to ensure that it is indeed representative of the aging population as a whole.

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