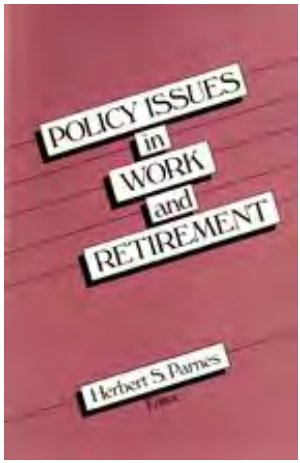
# Aging, Health, and Work

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# Chapter 3
# Aging, Health, and Work

Leon F. Koyl

## *Introduction*

Man's life span has not changed significantly, but individuals are moving closer to achieving the potential number of years in that span. As people live longer they face the problem of sustaining themselves, which raises the question whether more years should be spent at work. However, this choice between work and leisure remains free only if man's physical condition at an advanced age allows work. The overwhelming majority of persons are able to work beyond the conventional retirement age. Increases in work life are entirely feasible provided we react intelligently to the types of ailments that are associated with aging and recognize that work adjustments may be needed throughout working life to maximize the potential inherent in the labor force.

## *Life Span and Life Expectancy*

Evidence for a fixed life span is strong and comes from the diverse fields of anthropology, demography, physiology, cell biology, subcellular biology, and biochemistry as well as from medicine. No social, medical, or public health measure should be expected to modify the intrinsic life span of the human being. There is no good evidence for the existence of an extremely long-lived population. Age $113 \pm 2$ seems to be the limit to date.[1]

Modern medicine has succeeded in changing the life expectancy of human beings.[2] Health measures, especially sanitation, have reduced premature mortality and morbidity and have thus increased life expectancy. Early acute deaths have been partly exchanged for slower later deaths; as man lives longer, a larger percentage of the life span may be spent in poor health. Consequently, it becomes necessary to reduce the risks of obstructive lung disease, emphysema, lung cancer, stroke, myocardial infarction, and cirrhosis, to name some important ones. Reducing the risks of thes diseases becomes a practical method of improving the quality of life whether or not it adds years to life expectancy.

It is well to recognize the epidemiological importance of psycho-social factors on longevity. For example, it has been shown that socioeconomic status essentially explains away most of the ethnic differences in aging; black-white differences in age-oriented behavior are minimized if differences in socioeconomic status are taken into account.[3]

At any rate, the expectation of life in the United States is at a new high.[4] It reached 73.8 years in 1979, an increase of a half year over 1978 and of 3.1 years since 1970 as compared with a gain of only 0.8 years in the 1960s. These figures are the average of both whites and nonwhites and of males and females. Women have longer expectation of life than men; whites do better than blacks, although the gap is being closed. To the present, almost all of the improvement in life expectancy has been produced by prevention of infant mortality, although in the last few years noticeable improvements have been made in the control of risk factors for chronic diseases, thus improving expectancy of life at older ages.

### *Physiological Aspects of Aging*

With increasing life expectancy and the consequent increase in the number of older persons in the population, con-

siderable attention has been given to the physiological aspects of aging. Blood pressure is a good example of the rapid change both in our knowledge and in our attitudes. In 1940, it was "known" that normal systolic blood pressure increased 1 mg. of mercury for each year over age 25. We now believe that healthy 70 year olds should have the same blood pressure they had at 25. As long as fit people continue age-adjusted exercise and remain fit, their pulse and blood pressure patterns will remain constant. In 1940, blood pressures under 170 systolic and 120 diastolic were seldom treated. Now it has become recognized that statistically significant improvements in mortality are gained if pressures above 140 systolic and 90 diastolic are treated.

### *Data Problems*

Almost all people deteriorate and eventually die from disease, but usually people withdraw from the labor force prior to the onset of these illnesses. Thus if the general population is used as the population base, age standardized mortality ratios (SMRs) will understate the total mortality experience of the *employed* population.[5] The latter is composed of individuals who are necessarily healthy enough to be at work and therefore have a lower mortality risk. The "healthy worker effect" is due not only to the initial selection of healthy workers, but also to the fact that only the healthy cohort remains at work. The phenomenon also depends on the length of time the population has been followed.[6] For example, the mortality rate within five years of entry to a group exposed to vinyl chloride monomer was shown in one study to be as low as 37 percent of expected. However, there was a progressive increase in the SMR with the length of time since entry, so that the healthy worker effect had almost disappeared after 15 years. By classifying men who had survived 15 years after entering the industry according to whether or not they were still with the industry,

the survival effect could be separated from the selection effect: The standardized mortality ratio of those who left the industry was some 50 percent higher than that of workers still employed in the industry. Similar patterns were found among workers of all ages between 25 and 74 and for all causes studied.

It is difficult to find competent epidemiological evidence about aging. The Framingham Disability Study is a new addition to the well-known heart disease epidemiological study in Framingham, Massachusetts.[7] From September 1976 to November 1978, 2,654 surviving individuals age 55 to 84 years from the original Framingham cohort (nearly 30 years of data collection) were interviewed. This is one of the few good studies of the noninstitutionalized elderly. It demonstrates that life after 60 is not a period inexorably marked by massive physical deterioration. On the contrary, the majority of the Framingham elders retained substantial physical ability in their later years. It is true that advancing age is accompanied by increased risk of physical disability. Women seem to have higher physical disability rates than men, and this is not an artifact produced by the higher proportion of women who live into old old-age.

### *Atherosclerosis*

Cardiovascular disease is the most common cause of death in the elderly.[8] In fact 72 percent of cardiovascular deaths in the United States occur in persons 65 years of age or older. The vast majority of these deaths are due to coronary artery disease, either sudden death or myocardial failure. The Western Collaborative Study Group has found that the incidence of coronary heart disease is significantly associated with parental coronary heart disease history; blood pressure; reported diabetes; serum levels of cholesterol, triglycerides, B lipoproteins; schooling; smoking habits; and overt behavior pattern.[9]

A Type A behavior pattern was strongly related to coronary heart disease incidence and this association could not be explained by any single predictive risk factor or any combination of them.[10] Type A persons are hard driving, competitive, striving to accomplish more and more in less and less time. They exhibit chronic impatience with people and situations they perceive as thwarting their attempts to maintain high levels of achievement. Type B individuals are relatively relaxed and easygoing, although they may be goal-oriented.

An interesting concept that has been advanced recently is that there may be Type A and B organizations as well as Type A and B people. Type A organizations are those where the work atmostphere may be described best as hard-driving and competitive. Type B organizations, on the other hand, are relaxed and easy-going. Type B people in Type B organizations report the fewest symptoms that correlate with stress-produced or stress-aggravated loss of health homeostasis with the environment. Type A people in Type A organizations report the most symptoms. Type B people in Type A organizations and Type A people in Type B organizations report an intermediate level of symptoms.[11] These findings, while tentative, tend to correspond with the experience of the author in doing comprehensive medical examinations of executives from approximately 100 corporations. Exercise programs seem prophylactic for stressed senior corporate staff.

Even after myocardial infarction,[12] in persons 30-64 years of age controlled exercise will produce a significant difference in mortality (4.6 percent vs. 7.3 percent in controls) and morbidity (5.3 percent vs. 7.0 percent re-infarction in controls) during a 3-year follow-up period. The fact that such patients have been motivated to help themselves also reduces the percentage of persons going on long term disability insurance and salvages a large pool of professional knowledge for the patients' organization.

### *Cancer*

There are many known carcinogenic substances in the environment, although there is no reason to suppose that any new hazards have been introduced in the last few decades, especially in North America, except the unexplained increase in melanoma and the now well-recognized hazard of cigarette smoking which has spread from men to women.[13] There have been many estimates of the proportion of cancer deaths attributed to the environment and to occupations, some of which have been politically motivated and lack scientific merit. Perhaps the most useful estimates are those of Doll and Peto who attribute 4 percent of cancer deaths to occupational factors, 2 percent to pollution, 1 percent to industrial products, and 3 percent to geophysical factors, in contrast to 30 percent to tobacco and 35 percent to diet.[14] One of the hopeful things about occupational cancers is that they are preventable, if not curable.[15] Most discoveries along these lines have been helped by special situations—serendipity and luck. For instance, clustering of cases of a rare disease in the catchment area of one hospital led to the discovery of nasal cancer of furniture workers and of shoe workers. When only a few cases of an unusual cancer occur in a large metropolitan area, their significance may be missed. Many occupational carcinogens produce unusual cancers such as mesothelioma of the pleura and angiosarcoma of the liver, or in unusual places, such as scrotal cancer in chimny sweeps and millwrights who use penetrating oils.

### *Lung Disease*

Diseases which produce scarring of the lungs are important causes of disability. However, most of the industries with a pulmonary hazard are policed so that early signs of danger cause compulsory withdrawal from the workplace. Most of the allergenic and irritative submicroscopic dusts and solvents cause discomfort and shortness of breath to the

15 percent or more of the working population who are sensitive, and they tend to withdraw from the workforce. The main problem involves disease with a long latency so that the middle-aged and older employees become ill from exposures which date back 10 or 30 years. Common examples are silicosis, berylliosis, and asbestosis.

### *Neuropsychiatric Problems at Work*

Some working people will have episodes of psychiatric illness, which may be acute and temporary or chronic. The acute evanescent episodes can be handled in the same way that an acute somatic illness is handled. Whether the illness is of the psyche or the soma, it will involve a time away from work, perhaps a period of convalescence and a return to work. Provided the work environment was not the stressing agent, no job modifictions are likely to be necessary. The same attitude can be taken to the psychoses. When the treating psychiatrist feels that the patient is ready to return to the working environment, the patient's problem should be studied by the company medical and personnel staff. Laymen should not be asked to provide psychiatric support during rehabilitation, but should be able to understand that a treated paranoid schizophrenic may remain a bit suspicious and withdrawn on return to work. They can accept this, as they accept that persons who have had a below-knee amputation and a successful prosthesis may limp after return to work.

A loss of efficiency in an employee requires careful study. If employees have begun to have repeated Monday absences, supervision should refer them for a medical opinion in the hope that the medical department can find a remediable disability. A few such referred employees will be found to have always been inept and will have to be handled as ordinary personnel problems. A few will have a dementing process that may be advancing in steps, perhaps coincident with

strokes, or may be advancing remorselessly. At this stage the resources of modern neurological science departments are needed to define the problem. In the early stages of vascular brain disease, employees may be fit to return to their own jobs after rehabilitation from a cerebrovascular accident. Later, dementia may supervene. Nutritional disease such as advanced irreversible vitamin B or K deprivation or Korsakoff's psychosis are good examples. Pick's lobar dementia and Alzheimer's dementia are functionally the same and require withdrawal from the job market.

Modern noninvasive diagnostic tests such as Electroencephalograms, CT scans, Ultra sound scans and Doppler scans of carotid arteries are most helpful. It is unusual[16] for any one test procedure to be diagnostic by itself; several carefully chosen methods of investigation may have to be used.

***Psychological Aspects of Aging***

As to the psychological aspects of aging, there is evidence to indicate that age *per se* is not a deterrent to good communication.[17] In fact, communication may improve with age, because the aged person has a lifetime of talking and listening experience, a lifetime of living and career experience from which to draw conversational material. Data from numerous psychometric studies support the colloquial belief that aging results in reduced memory function, but also indicate that impairments are neither uniform nor extensive. Normal elderly have little difficulty with immediate or remote recall, but often do worse than younger persons on tests of recent memory.

Normal elderly adults also perform as well as young adults on tests of vocabulary and general information. They have a high accuracy of recall of historical events or famous personalities of their youth. Older adults typically remember fewer items on verbal free recall, paired associate memory

and tests of memory for designs. Older professionals in their 80s will retain about half as much as young professionals of this class of materials.

However, several studies have shown that older adults may fail to recall because they never really learned the item in the first place. This problem can be helped by using mnemonics, by allowing more time to respond, and by minimizing anxieties. One of the key diagnostic features distinguishing the recent memory failures of normal elderly people from those patients with amnestic or dementing features is a sensitivity to remediation of the benign form.[18]

Under experimental conditions, there are no significant differences between older and younger individuals in accuracy of performance on a visual monitoring task.[19] There are significant differences, however, in the pace at which they elect to perform the tasks, and preference for a given pace is significantly related to information processing ability. But the lessons are the same here as in the other experiments. The test must be appropriate to the person in light of his or her physical abilities, but if allowed some freedom in choosing work pace, the older person will perform at the same level as younger workers. Other experimental work suggests that age affects all stages of information processing.[20] The important point is that memory performance of older adults is modifiable.[21] An efficient performance is obtained when instructional training is aimed at the processes that are crucial to the task performance. Effective training procedures have to be based on an analysis of the task, so that the optimum strategies and processes involved in the task are known.

What emerges from an analysis of the training processes is that it is possible to teach people some of the elemental skills of learning; once it is recognized that adults continue to have the basic ability to learn, a great deal can be accomplished.

Belbin, in Great Britain ten years ago, demonstrated in an immensely practical fashion that a large number of persons age 20-64 could be upgraded in important skills. Unskilled laborers became bricklayers; 80 uneducated freight handlers were trained to run a computerized airport freight handling system with no failures; 1,000 London bus conductors were retrained to be bus drivers with only 15 percent failure. The message is clear: once we begin to apply some of the newer technologies of teaching and recognize older people's ability to participate in these activities, impressive results can be achieved.

### *Work and the Older Worker*

But as we look at the evidence on the incidence of illness and the problems that are posed by the environment and the usual degenerative diseases, the fact remains that there are changes as people get older and that these changes may well affect their work status. I turn now to a discussion of these changes and also the problem of work accidents.

### *Loss of Strength*

There is some apparent physiological loss of muscle power which begins to affect athletes in competitive sports in the third decade. For those who earn a living in more ordinary ways, very few jobs in urban areas are so physically demanding that this gradual deterioration in motor power affects their work life. However, some jobs do involve hard physical work. Among urban job holders who do heavy labor are bedside nurses, butchers, steelriggers and furnacemen in steel plants. In smaller communities, hard-rock mining, railway construction or repair, logging, farming, highway construction and maintenance also require heavy labor. This category of jobs may be so demanding that a significant percentage of workers can no longer function in the sixth and seventh decade.

In this group of jobs we must not forget the armed forces. There are few battle-worthy persons over age 45. There are few divisional, brigade and battalion commanders able to command in battle over the age of 40. Cumulative fatigue and emotional drain can paralyze effective action, thought, and decisionmaking in battle. Under such extreme conditions a relatively small decrease in stress tolerance becomes significant.

The steady attrition in the workforce can be seen to parallel and slightly precede the employee mortality experience described earlier. The survivors are mostly healthy. Not more than 10 percent of them develop disease sufficient to force them out of the job market prematurely.

To summarize, most survivors to age 60, 65, 70, and even 75 are fit and able to work. Those that are not fit can be identified by standard medical procedures. It is recognized that this statement is only statistically true and will not include the occasional person with a rare or obscure disease. However, insuring companies and employing companies can balance their books with a statistically valid method of measuring fitness to work.

### *Fitness to Work*

Almost all workers surviving to any given age are physically and mentally fit to work, and many are desirous of remaining in the work situation. Older workers themselves and several organizations supporting them have succeeded in extending their protection under the Age Discrimination in Employment Act and its amendments in the U.S.A. and under the Human Rights Legislation in Canada. Employers and occupational physicians cannot presume that an employee or an applicant for employment is physically or psychologically unable to perform the duties of a job.[22]

The question of fitness for employability must be resolved by a physician, whereas the decision to employ or not to employ (i.e., whether the prospective employee fits the requirements of the desired job), is a personnel function. The handicapped employee must be given an opportunity to demonstrate how the job can be modified to suit the handicap without reducing the quantity, quality, or speed of the job. Generalizations or presumptions must be avoided. For an already employed worker who develops a handicap, it is probably good sense in 1982 to see what the science of ergonomics can do with the man-machine or man-office interface.

Ergonomics is concerned with optimizing the role of man within the man-machine and environment system. This includes the controls whereby energy is passed between man and machine. The science of ergonomics thus is a valuable source of information and practical know-how about designing tools suitable for humans to work with, and environments in which to work. It is particularly helpful with aging employees because the science helps to exploit the distinct advantages older people have in knowledge, judgment, reliability and patience, and to minimize their occasional deficits. Modern machines are very complex, but it has been noted in recent years that ergonomics has been used in machine design. Many semi-skilled jobs can be done using computerized equipment, with the operator basically monitoring the equipment for errors or failures. Older people do this type of job very well. The engineering department and the medical department with industrial hygiene knowledge, can usually do optimum remediation of machines and environment. It is easier to lengthen the legs on a chair than shorten the legs of an employee.

With the advent of legal protection for the disadvantaged employee, employers have to consider the problems of any worker who is physically or psychologically unable to do the

whole job. Objective criteria for assessing fitness must be used. Similar criteria must be used to assess the job so that there is a true job match. In industry, remediation of a job mismatch may require only posting the employee to the same job in subassembly as was formerly done on final assembly. The next stage, which may require some minor loss of salary for the employee, is to use his bumping rights to obtain a more suitable job. At management levels an over-stressed manager can be posted laterally out of line management into a consultant job.

One mature and successful method of matching people to jobs has been developed by the author and his colleagues.[23] The error in job placement with this method is predictably less than 2 percent per annum, including positive and negative errors. The original research was targeted on the older worker but the method has proven to be equally useful and practical for all age groups and all varieties of disadvantaged.

The most sensitive diagnostic instrument and prognostic tool the health sciences have yet developed, or are likely to develop, is the trained intelligence and special senses of the examiner. After the examiner has defined the problem, modern diagnostic instruments can refine the solution. It is essential that the tests given be relevant to the proposed job or they are potentially discriminatory in many jurisdictions. If a test is not relevant to general employability or to the specific job, the test should not be given.

### *Accidents at Work Among Older Workers*

Age and injury-frequency profiles for males and females have been found to be similar when controlled for sex differences in the occupational distribution of employment. Younger workers have many accidents per employee-hour, but the accidents are less severe than those that older workers experience. Cost experience data is needed to combine with injury rate experience.

From a practical point of view, experienced semi-skilled and skilled workmen in a craft factory rarely have an injury. Almost all workplace injuries occur during the first 24 months of employment. There are, of course, exceptions to this generalization. In one case, for example, in order to speed up assembly of a rush order, it was decided to move subassembled parts out of the parts stores and onto the floor around the aircraft being assembled. Senior men who were accustomed to a set position for every obstruction around the final assembly area had a rash of minor to severe accidents, mostly from falling backward over stockpiled parts.

Most industrial accidents involve a moment of inattention as an immediate trigger. The results bear no relation to the cause or length of the inattention. As employees get older, the inattention may be the onset of angina pectoris, a myocardial infarct, a cerebro-vascular accident, or many of the organic diseases common in the old-old but beginning to appear in middle age and increasing thereafter. If the problem can be anticipated, the older employee can be posted to a safer job. If he or she refuses, we do not force the issue. The employee's life is his/her own to live. However if there is a public health problem, management will act. For example, a cardiologist allowed a patient to return to work one month after a myocardial infarct. The company medical officer told the cardiologist we could not let his patient work on the wing of an aircraft 30 feet above the ground. The cardiologist became quite irate, insisting he had to believe his patient, who claimed he could do the job, rather than the company medical department. Exactly the right note was struck when we told the cardiologist that our concern was not merely that his patient might fall and break his neck; that there were other men working with him and under him and that we could not allow the cardiologist's patient to kill any of them when he fell! Public health at its best!

As tools and machines have increased in complexity, man has been straining to use his adaptive ability to use machines that are beyond his capacity. As knowledge has become more complex, it has tended to become compartmentalized. The areas of expertise of the various physical scientists have become separated from each other and from the various compartments of the biological sciences.

By World War II the performance capability of military aircraft was outstripping the human capacity for control. Systems began to fail. This led to the concept that man and machines are not independent entities. One cannot design a machine for human use without considering the limitations and capacities of those who are going to operate and maintain it. When one of the components of a system is a human being, then we have a man-machine system. The components of a system are dynamic and interact. A man-machine system exists within an environment. All three interact. Man's activities and requirements define the machine. The machine in turn modifies or determines man's activities. Both change the environment, as the environment changes both the machine and man by influencing each of them and their interaction.

### *Summary and Conclusion*

About 90 percent of surviving older workers remain fit through their work life. Another small percentage, perhaps 5 percent require posting to physically or mentally less demanding jobs during the last few years of their working life. About 30 percent die during their work life, about 5 percent retire on disability pension and about 5 percent require reposting within the workforce to survive.

Healthy older people retain the ability to learn and to remember new learning. This ability is partly a learned skill and can be improved with specific training. Older people do

best in self-paced activities as compared to assembly line activities. If allowed to set their own pace, their productivity and accuracy increases.

Healthy older people may be very competent at handling stress as their experience in doing so is very broad. They tend to prefer an administrative rather than an executive approach to problem solving and demand more facts than the very young.

Modern industry and commerce needs the older age group. Equipment is being modified in the optimum direction to suit older persons with their learned skills of patience, attention to detail and reliability. The science of ergonomics is able to assist materially in making the interface between older employees, the machinery they use, and the environment they work in less fatiguing, safer, more comfortable, with more efficient results.

## NOTES

1. Life Expectancy Increases but the Life Span is Fixed. James F. Fries, M.D. Letters to the Editor. Amer. J. Public Health. Vol. 72, No. 1, p. 91. Jan. 1982.

2. Aging, Natural Death and the Compression of Morbidity. James F. Fries, M.D. N. Engl. J. Med. Vol. 303, No. 3, pp. 130-135. July 17, 1980.

3. The Epidemiologic Importance of Psychosocial Factors in Longevity. Judith Blackfield Cohen and Jacob A. Brody. American J. of Epidemiology. Vol. 114, No. 4, pp. 451-461. Oct. 1981.

4. Expectation of Life in the United States at a New High. Statistical Bulletin. Vol. 61, No. 4. Metropolitan Life Insurance Company. Oct.-Dec. 1980.

5. Standardized Mortality Ratios and the "Healthy Worker Effect": Scratching Beneath the Surface. A. J. McMichael, M.D., Ph.D. Journal of Occupational Medicine. Vol. 18, No. 3, pp. 165-168. March 1976.

6. Low Mortality Rates in Industrial Cohort Studies Due to Selection for Work and Survival in Industry. A. J. Fox and P. F. Collier. Brit. J. Preventive and Social Medicine. Vol. 30, pp. 225-230. 1976.

7. The Framingham Disability Study: II. Physical Disability Among the Aging. Alan M. Jette, PT, Ph.D. and Laurence G. Branch. Ph.D. American Journal of Public Health. Vol. 71, No. 11, pp. 1211-1216. Nov. 1981.

8. Coronary Artery Disease. Donald A. Rothbaum, M.D. Cardiovascular Clinics. Vol. 12, No. 1, Geriatric Cardiology, pp. 105-118.

9. Coronary Heart Disease in the Western Collaborative Study Group—Final Follow-up Experience of eight and one-half years. Roy H. Roseman, M.D., Richard J. Brand, Ph.D., C. David Jenkins, Ph. D., Meyer Friedman, M.D., Reuben Strauss, M.D., Moses Wurm, M.D., Journal American Medical Association. Vol. 233, No. 8, pp. 872-877. 1975.

10. For additional evidence, see also the relationship of psychosocial factors to coronary heart disease in the Framingham Study III. Eight year incidence of coronary heart disease. Susan G. Haynes, Manning Feinleib and Wm. B. Kannel. American Journal of Epidemiology. Vol. III, No. 1, pp. 37-58. 1980.

11. Type A and Type B Behavior Patterns and Self-Reported Health Symptoms and Stress: Examining Individual and Organizational Fit. Michael T. Matheson, Ph.D. and John M. Ivancevich, D.B.A. Journal of Occupational Medicine. Vol. 24, No. 8, pp. 585-589. August 1982.

12. Effects of a Prescribed Supervised Exercise Program on Mortality and Cardiovascular Morbidity in Patients after a Myocardial Infarction. The National Exercise and Heart Disease Project. Lawrence W. Shaw reporting for the staff. American Journal of Cardiology. Vol. 48, No. 1, pp. 39-46. July 1981.

13. For one list, see The Causes of Cancer: Quantitative Estimates of Avoidable Risks of Cancer in the United States Today. Richard Doll and Richard Peto. Journal of the National Cancer Institute. Vol. 66, No. 6, pp. 1191-1308. June 1981.

14. *Ibid.*, table 20.

15. Towards a Strategy for the Detection of Industrial Carcinogens. E. D. Acheson. British Journal of Cancer. Vol. 44, p. 321. 1981.

16. Computerized Axial Tomograms and Dementia in Elderly Patients. Charles V. Ford, M.D. and James Winter, M.D., Ph.D. Journal of Gerontology. Vol. 36, No. 2, pp. 164-169. March 1981.

17. Communicative Aspects of Aging. Daniel R. Boon, Ph.D., Kathryn A. Bayles, Ph.D. and Charles F. Koopman Jr., M.D., F.A.C.S. Symposium on Geriatric Otolaryngology: Otolaryngologic Clinics of North America. Vol. 15, No. 2. May 1982.

18. Odor Identification in Young and Elderly Persons: Sensory and Cognitive Limitations. Thomas Schemper, B.A., Scott Voss, B.A., and William S. Cain, Ph.D. Journal of Gerontology. Vol. 36, No. 4, pp. 446-452. July 1981.

19. Age and Self-selected Performance Pace on a Visual Monitoring Inspection Task. Paul E. Panek, Gerald V. Barrett, Ralph A. Alexander and Harvey L. Sterns. Aging and Work. Vol. 2, No. 1, pp. 183-190. Summer 1979.

20. Isolating the Age Deficit in Speeded Performance. Timothy A. Salthouse, Ph.D. and Benjamin Somberg, Ph.D. Journal of Gerontology. Vol. 37, No. 1, pp. 159-163. 1982.

21. Training Older Adult Free Recall Strategies. Frederick A. Schmitt, Ph.D., Martin D. Murphy, Ph.D. and Raymond R. Saunders, Ph.D. Journal of Gerontology. Vol. 36, No. 3, pp. 329-337. May 1981.

22. Accommodating Equal Employment and Occupational Health Obligations. Nina G. Stillman, J.P. Journal of Occupational Medicine. Vol. 21, No. 9, pp. 595-606. Sept. 1979.

23. Employing the Older Worker: Matching the Employee to the Job. Leon F. Koyl, M.D., Mary Hackney, Ph.D., and R. D. Holloway, B.A. Second Edition published in 1974 by the National Council on the Aging, Inc., Washington, DC.