

Successful Aging: Myth or Reality

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Robert L. Kahn

Falling into gerontology and deciding to stay there

Sixteen years ago I was a young man of 70 contemplating retirement from the university, which was then required of all faculty at that age. I was entertaining vague thoughts of upgrading my woodworking skills from rough carpentry to cabinet making, or perhaps learning how to restore a 1965 Mustang.

But there had been an invitation from the MacArthur Foundation to come to Chicago and talk about problems of aging. I was not a gerontologist but, for obvious reasons, I had developed an increasing interest in aging. I went to Chicago and talked about my research on social support and its importance throughout the life course.

The MacArthur Foundation Research Network on Aging

After several such conversations, sixteen of us were invited to form an interdisciplinary research group to work on issues of aging. Our charge from the foundation officers was very general: “Do something innovative!”

In some ways, we were a diverse group— psychiatrists and brain researchers, bench scientists and survey researchers, geneticists and epidemiologists, psychologists and sociologists. We came from different universities and we spoke different conceptual languages. Although I did not say so until much later, in our early meetings I thought we resembled a group of radio astronomers listening for signs of intelligent life elsewhere in the universe—not really optimistic but at least vaguely hopeful (Kahn, 1993).

We worked our way past that stage, learned enough of each other’s work to understand its major thrust, and began a critical review of gerontological research. Much of it seemed to share two main characteristics: a careful documentation of successive, age-related decrements and an emphasis on averages. How much muscle mass was lost with each decade of life, how much reaction times slowed, and how much short-term memory eroded—these and other age-related changes were thoroughly described. Most of these findings were based on averages; there was an emphasis on central tendencies and a relative neglect of individual differences.

We decided to concentrate on those differences and to search for the factors that explained them. We wanted to understand what enabled some people to do better than the average.

Structure of successful aging

Some gerontologists had emphasized the distinction between older people who were disabled in some respect and those who were not. We were interested in an additional dichotomy within the large population of older people without disabilities: usual versus better-than-usual aging. We thought of the latter category as successful aging and we developed a definition of successful aging as consisting of three components:

- minimizing the risk of disease and disability
- maintaining physical and mental function
- continuing engagement with life

(Rowe and Kahn, 1998).

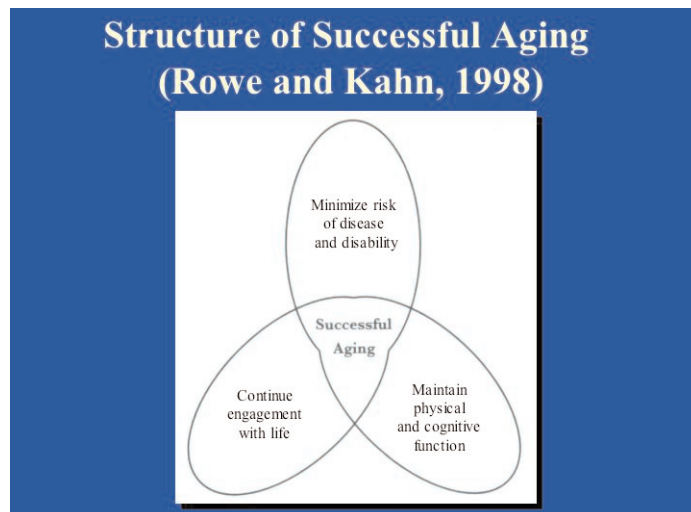


Figure 1

The last of these, continued engagement with life, we defined to include close social relationships, involvement in activities that are meaningful and productive, and use of valued skills and abilities.

As the schematic representation of these three elements (Figure 1) suggests, it is their combination that represents most completely our concept of successful aging. Success, however, is a matter of degree and many people who have been limited in one or another of these three domains have been enormously successful in others. Examples like that of Stephen Hawking and Franklin Roosevelt make the point dramatically, but unnumbered others with lesser fame do so as well. To succeed is to flourish, not necessarily to attain perfection, and there are degrees of success. Less than perfection is not failure.

Criticisms and alternative theories

Disengagement theory, as the term suggests, emphasizes the necessity, with increasing age, of reducing activity and involvement of most kinds. The central task of aging thus becomes letting go, as gradually and gracefully as possible. As developed by Cumming (1961), this theory was influential some decades ago but has become less so in more recent years.

Paul and Margret Baltes (Baltes and Baltes, 1990) developed a model of aging based on three processes: selection, optimization, and compensation. It is usually referred to by the first letters of those processes: SOC. The SOC model emphasizes three main ways in which older people can cope with their gradual reduction in functional abilities and still remain active and productive.

To illustrate the model, Baltes cites the example of the famous pianist, Artur Schnabel, who continued to give successful concert performances well into his ninth decade. In answer to the question of how he managed to do this, Schnabel admitted that, first of all, he no longer played everything in his earlier repertoire; he *selected*. Second, he practiced intensively. He explained that, when he was young, his frequent concert performances gave him all the practice he needed; now he needed additional daily practice. *Optimization*, Baltes would call it. And third, Schnabel said that before he came to a passage that called for great speed and pianistic athleticism, he would deliberately reduce the tempo of the preceding passage in order to emphasize the contrast. *Compensation*, according to the Baltes model.

A third theoretical approach to aging that differs in emphasis from the MacArthur model as developed by Rowe and Kahn is based on the concept of structural lag (Riley and Riley, 1994; Riley, Kahn, and Foner, 1994). Riley's approach begins with the observation that all parts or subsystems of a society do not develop at the same pace. In the 20th century, economic gains, medical discoveries, and improvements in public health combined to increase longevity and vitality in old age. But corporate and governmental policies, Riley and her colleagues argue, have not kept pace with these developments, nor have the less formal but no less powerful social norms that tell people what behaviors are appropriate and acceptable as they age. The result of these developmental differences is structural lag, a gap between the needs and abilities of older people, on the one hand, and the opportunity structure of the society on the other.

Complementarity and integration

I regard these several theories as complementary rather than in direct conflict. Disengagement from activities and ultimately from life itself is an inevitable part of the aging process, but it is not the main task of the increasing number of decades beyond middle age that people can now expect. The ultimate inevitability of disengagement need not mar the many years before it must begin. As Freud wrote to his daughter in 1908:

“You have, my poor child, seen death break into the family for the first time... and perhaps shuddered at the idea that for none of us can life be made any safer. That is something that all we old people know, which is why life for us has such a special value. We refuse to allow the inevitable end to interfere with our happy activities... Your loving father” (Freud, 1960; Sherline, 1994).

The SOC model, especially as elaborated by Baltes in 1998, provides a sophisticated and insightful view of how people can cope with age-related decrements in physical and mental capacity. Larger issues of the societal environment in which older people live, the constraints that it imposes, the opportunities that it offers, and the supports

that it provides are less explicit in the Baltes model. They are referred to as the culture that surrounds the elderly and old age is regarded as involving increased dependence on elements in that culture.

Riley's model of structural lag has clear policy implications: the larger society has an obligation, perhaps the necessity, to undertake a complex process of "catching up" with the increased longevity, extended vitality, and greater potential of older men and women. The implication is for changed laws and norms about retirement, increased flexibility in hours and conditions of employment, reduced restrictions about what older people are expected to do and increased opportunities for them to be productive in the broadest sense of that term. In short, the society should become less age-graded, where age determines what is expected and permissible—an age for education, an age for work and marriage, and an old age for retirement and leisure. Society should become more age-integrated, so that education, work, and leisure are experienced throughout the life course, albeit in varying age-appropriate concentrations.

The Rowe-Kahn model, as we have described it already and will develop it further in this lecture, emphasizes what individuals can do for themselves to maintain vitality in old age. The Riley model emphasizes what society can, and by implication should, do to enable active and productive old age. The Baltes model emphasizes what individuals can do to cope with age-related losses in functional level and reserve. And the earlier disengagement model, as we have seen, emphasizes just that: disengagement from activities, relationships, and life itself.

I believe that the field of gerontology needs a theory of aging that integrates these several models. Such a theory would deepen our understanding of the aging process, stimulate and guide research and, we may hope, influence policies and societal norms. Meanwhile, we search for the determinants of successful aging as defined by the Rowe-Kahn model.

Determinants of successful aging

In the MacArthur research, four factors were significant predictors of successful aging: genetics, education, physical fitness, and self-efficacy.

Genetics. Since the revelation of the double helix, we have been living in an era of tremendous advances in genetic theory and research, and a comparable surge in applying that new knowledge is perhaps near. It is tempting to believe, therefore, that genetic factors are all-powerful, that for each of us, our genes are our destiny. To this way of thinking, the ancient argument of nature versus nurture has been settled; nature, not nurture, determines human health and human behavior.

That belief would be mistaken. The answer to the nature-nurture argument requires a change in the conjunction, not a choice between the nouns. Our health depends on nature *and* nurture, not merely one or the other. Life is always lived in an environment and different properties of that environment are health-promotive or health-

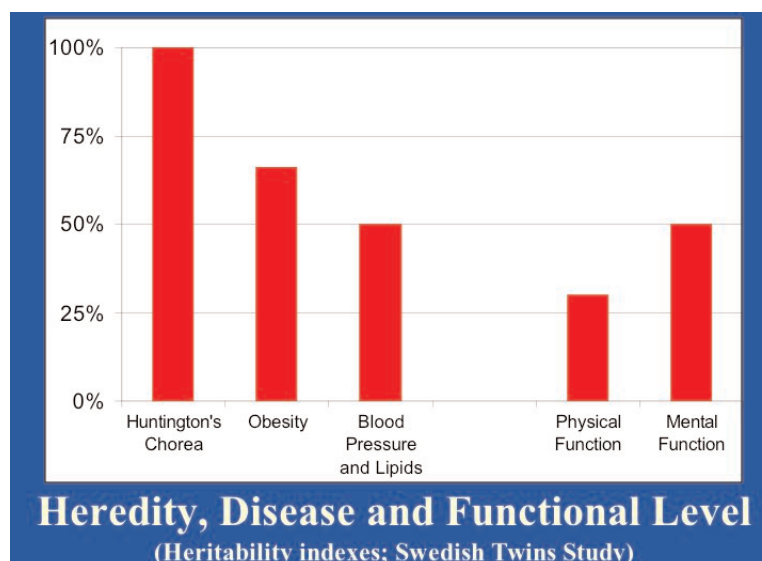


Figure 2

damaging. Geneticists tell us that genes have to be expressed or “turned on,” and the factors that turn them on are environmental. Most genetic factors can be thought of as tendencies or potentialities; their effects on health are best described as probabilities rather than certainties, tendencies rather than inevitabilities.

To provide some estimate of the relative importance of genetic and environmental factors as determinants of well-being in old age, our MacArthur colleagues depended primarily on the Swedish Twin Registry. This includes 25,000 men and women, born between the years of 1886 and 1958. Data on their health and functional level are available at intervals during the long period of their lives. For our purposes, the crucial fact is that, while most of these twins were reared together, some were separated in infancy and reared apart. That fact makes it possible to develop a statistical estimate of the relative importance of genetic and environmental factors in old age.

As Figure 2 shows, heredity explains about one-third of individual differences in physical function and one-half of mental function in old age. But those are averages; the proportions are different for specific characteristics. The onset of some diseases—Huntington’s chorea, for example, seems wholly determined by genetic factors. The fractions vary for more common health problems; genetic and environmental factors are about equally important as determinants of hyperlipidemia and hypertension. Genetic factors are more powerful in predicting obesity; they explain about 66 percent of this characteristic in old age. Even this provides considerable space for lifestyle interventions, but it also suggests some appreciation for the difficulty of weight control by people who are trying to cope with a strong genetic tendency (McClernan, et al., 1994).

Education and mental function. Education has a powerful effect on functional level in old age. This finding was prominent in the MacArthur community data and it is equally so in data from a larger national study, Americans Changing Lives. Successive interviews with the sample population in this study were taken between the years of 1986–2002. The relationship between age and absence of functional limitations is very different for people with three different levels of education—high (16 or more years of education); medium (12 to 15 years); low (less than 12 years). 2002 (House, et al., 2004).

At age 30, the differences are small; regardless of educational background; almost all these young adults have no functional limitations. But by age 40, people in the low education group begin to show significant declines and by age 60 those declines are sharp. For people with the most years of education, on the other hand, functional levels are quite stable until age 80 or shortly before. But by age 90 and beyond, the proportions of people without functional limitations are similar regardless of educational level, reminding us that education, in spite of its many advantages, is not the fountain of eternal youth.

Although the long term effect of education on function is clear, the reasons for it are not fully understood. It is possible that early education has an effect on the development of the brain and thus confirms a lifelong benefit. Experiments in mathematics and in intensive musical training suggest this possibility. It is also likely that educational level determines lifelong patterns of intellectual activity—reading, chess, bridge, crossword puzzles rather than an undiluted dependence on television—and that these activities help to maintain functional level in old age. We can expect that the newer techniques of brain imaging will provide more complete answers to questions about the effects of education, both early in life and in later years.

Physical fitness and mental function. We were not surprised to find, in data from the three-community MacArthur study, that exercise predicted physical fitness, but that exercise and physical function were also associated with mental function had not been expected. As we speculated about the possible explanations for this epidemiological finding, one of the bench scientists in our group reminded us of the advantages of interdisciplinary research; he proposed to conduct an animal experiment to explore the linkage between exercise and mental function.

In this experiment, two groups of rats were randomly assigned to laboratory conditions that were identical except for one thing: the presence of an exercise wheel in the cages of half the rats. In a subsequent test of ability to learn and remember a maze (the Morris water maze), the exercised rats did better than their “unexercised” neighbors in maze learning and recall. Furthermore, examination of their brain tissue showed that the exercised rats had a higher concentration of nerve growth factor, especially in the hippocampus, that part of the brain important for learning and memory.

Self-efficacy and mental function. Self-efficacy refers to a person's perceived ability to cope with specific environmental demands. Research on the concept and its effects, especially by Bandura (1997) and his colleagues, has ranged from the prediction of academic performance to the treatment of phobias. The development of self-efficacy as a persisting personal characteristic presumably occurs in the course of specific past situations and tends to generalize as the individual confronts new challenges. People low in self-efficacy are more likely to avoid such challenges than to deal with them. In effect, fear of failure trumps hope for success.

Although the relationship between self-efficacy and mental function is clear in the MacArthur data, the causal sequence that links these two variables has not been demonstrated. Our tentative explanation goes along the following lines. Many older people encounter memory problems, some serious, other more nuisances than major threats. People low in self-efficacy may be more likely to react with acceptance: "This is my destiny; I can't really change it." People high in self-efficacy may take a more proactive stance: "My memory is not what I would like it to be. What can I do to improve it?" That leads to a course of action that may include practice, list making, and learning various techniques to improve recall. Whatever the process, the overall relationship stands: self-efficacy predicts mental function among older men and women.

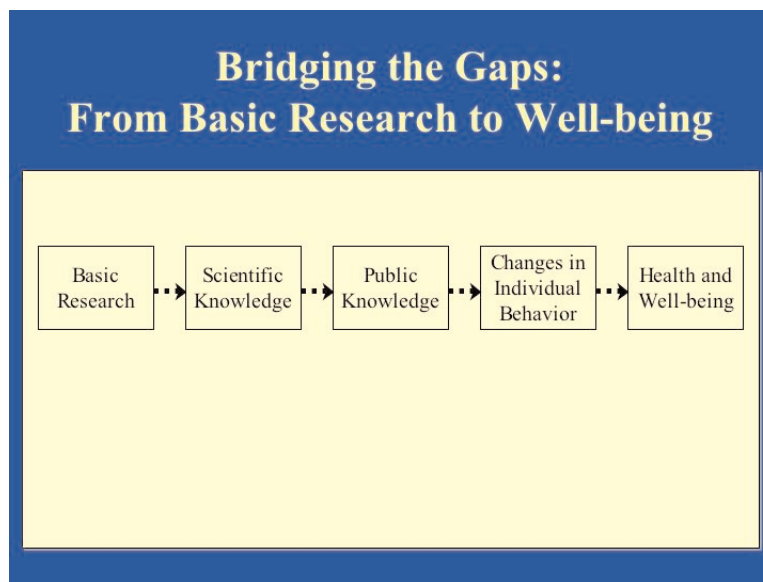


Figure 3

Intervention and application

These research findings are a sample of a more extensive array described in hundreds of journal articles by our MacArthur colleagues. As the MacArthur Research Network on Successful Aging was reaching the appointed sunset of its 10-year foundation support, some of us were eager for a new kind of research. We wanted to put what we had learned to work, to test its relevance in real-life settings. We were thinking of field experiments on successful aging.

We believed that, while much remained to be discovered, a great deal had already been learned about the lifestyle choices that are conducive to a long and healthy life. Much less was known about the factors that might enable and motivate people to make those lifestyle choices. The time seemed right for research on those issues. Our mood was well summarized in a quotation from the great poet-philosopher, Goethe:

Knowing is not enough; we must apply.

Willing is not enough; we must do.

The Institute of Medicine, the part of the National Academy of Science most concerned with matters of health, had taken that quotation as its motto. We were prepared to sign on. The question was how best to proceed.

Bridging the gaps

If we think about the sequence from basic research to health and well-being, it seems that there are four potential gaps, illustrated in Figure 3: (1) research may not have discovered enough of the scientific knowledge needed for effective application; (2) scientific knowledge may not have been successfully communicated to the public; (3) public knowledge may not have led to appropriate changes in behavior; (4) changed behavior may not have produced the hoped-for gains in health and well-being (Landry and Kahn, 2003).

Let's consider each of these: Is there a lack of basic research on factors that affect successful aging? Not really, I think. Certainly much is yet to be discovered; science is an ongoing process. But much is already known about ways of preventing or postponing illness and disability.

Is there a failure to communicate this scientific knowledge to the public? Yes, to some extent. Scientists write mainly for other scientists to read and they publish in journals that are not accessible to the general public. The popularizers of science are many and their offerings vary greatly in quality and adherence to scientific evidence. As a result, the public is bombarded with exaggerated and contradictory claims. But in spite of all that, some things—the benefits of moderate exercise and weight control, for example, and the avoidance of smoking—are widely understood. In those matters, people can “talk the talk.”

The big gap is between “the talk” and “the walk,” between what people know they should do for the sake of their own health and what they actually do. How best to close that gap is a researchable question, but research of the kind needed to answer it is seldom done. It requires interventions designed to enable, motivate, and support changes in health relevant behavior, changes in behavior patterns that have deep roots in habitual life routines.

The MacArthur Foundation had supported our research network from its inception but learning how to apply research on aging was not among its research priorities. It was at the top of the list, however, for Westport Advisors, an organization that buys, builds, and operates continuing care retirement communities. Lawrence Landry, the Westport CEO, had been the chief financial officer of the MacArthur Foundation and was well acquainted with our research on successful aging. With consultation and guidance from Denis Prager, who had headed the MacArthur programs on health, Westport was exploring ways of improving well-being and quality of life among the elderly residents in its retirement communities. Thus was begun a research experiment with the optimistic title of *Masterpiece Living*.

Masterpiece Living: An experiment in successful aging

This research is best described as an ambitious pilot study. Now in its second year, it is based in two retirement communities. The purpose of the experiment is to create a living environment that facilitates, encourages, and motivates behavior patterns that research has shown to be associated with successful aging. Intended changes include diet, exercise, intellectual involvement, social relations, and voluntary activity.

In attempting to create change of all these kinds, we were following the Lewinian dictum to social experimenters: Start strong! (Cartwright and Zander, 1960). In other words, do all the major things that you think will produce the outcome you seek. This advice contradicts the textbook recipe for experimental design: manipulate one variable at a time and hold everything else constant. We were convinced that such a manipulation of single variables would teach us only that no one variable was sufficient to produce the outcome of successful aging as we had defined it: minimizing risk of disease and disability, maintaining mental and physical function, and continuing engagement with life.

Experimental changes were introduced in five areas: physical facilities, dining and diet, social and intellectual opportunities, voluntary organizations, and staff support. Changes in physical facilities were made as needed to provide ample space for exercise, adequate equipment (treadmills, stationary bicycles, step machines, weights, etc.). Swimming pools included ramps for easy access and water was maintained at temperatures comfortable for elderly men and women.

The quality and variety of meals, always important determinants of satisfaction or dissatisfaction in group settings, were given major attention. Residents were given wide choice and information about calorie and fat content of main dishes. In one of the Westport communities, the importance given to quality and healthfulness of meals led

to a major change in arrangements for setting menus and preparing food. These responsibilities had been “outsourced,” provided under contract with an outside corporation. The entire process was moved “in house;” an executive chef was hired and a kitchen staff took over under his direction. The result was an improvement in the quality and attractiveness of meals, as well as increased attention to their calorie and fat content, their sugar, and their salt. The purpose was not to impose a Spartan diet but to provide the basis for informed choice and to be sure that dietary virtue did not sacrifice attractiveness and flavor.

At first we had been surprised that the advertisement for an executive chef produced responses from some of the best known chefs in the area. Perhaps we should not have been surprised, however. In addition to receiving an appropriate salary and benefits, the chef in a retirement community knows the number of people who must be served, the hours at which meals must be provided, and the number of entree choices that are required. These certainties must be compared with the conditions in a typical restaurant: uncertainty about the number of customers at any given time, long evenings during which meals must be offered, and the large number of menu choices that is demanded.

To encourage intellectual activity, book clubs and discussion groups were organized within the retirement community and arrangements were made to tap external resources. For example, in a retirement community located near a university campus, residents were allowed to audit a number of courses without paying tuition and transportation from community to campus was provided. Closed-circuit television enabled participation by residents for whom the short commute was a problem.

Opportunity and invitation to participate in voluntary activities were offered in two ways: through an emphasis on resident involvement in the governance of the retirement community itself and through invited visits by leaders of voluntary organizations from the larger community.

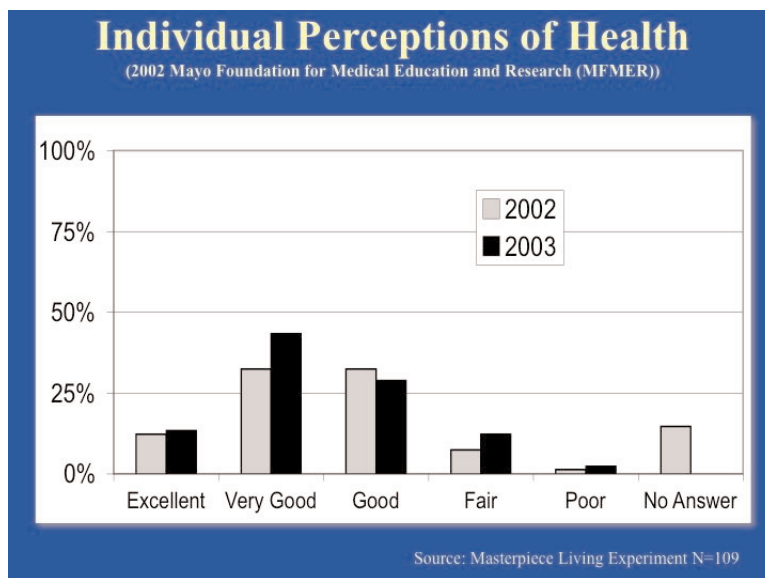


Figure 4

Finally, a new staff position was created in each community. The Lifestyle Coordinator, as the title suggests, had overall responsibility for implementation, bringing the program to life, as well as for the collection and utilization of research data.

Experimental dynamics

The structural and organizational changes just described alter the opportunity structure of the community; they do not in themselves deal with the issue of motivation. Our experimental design emphasizes two motivational sources: feedback of relevant information to each person and social support in acting on that information.

Information on how people are doing comes from three sources:

- (1) an assessment of risk factors, provided on demand by the Mayo Clinic through the internet,

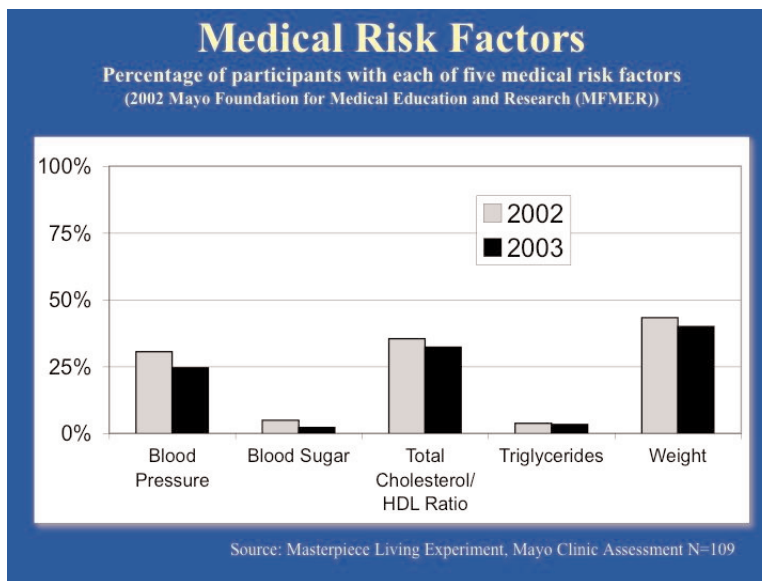


Figure 5

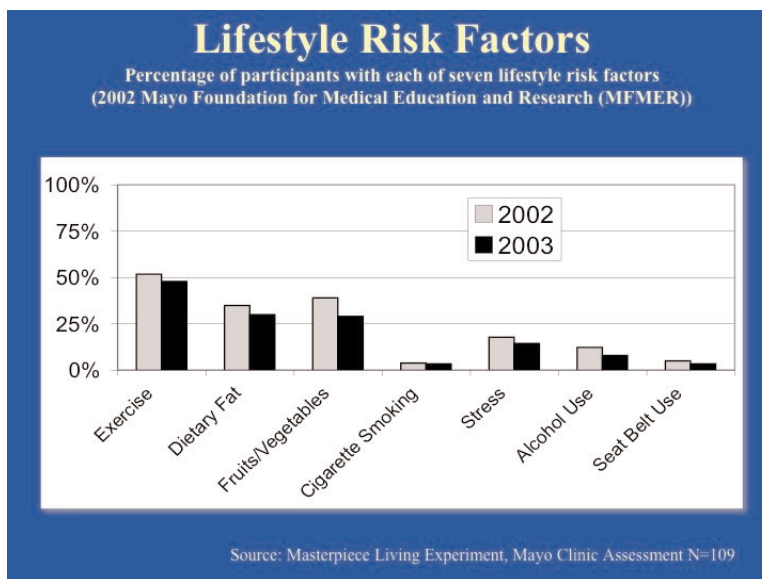


Figure 6

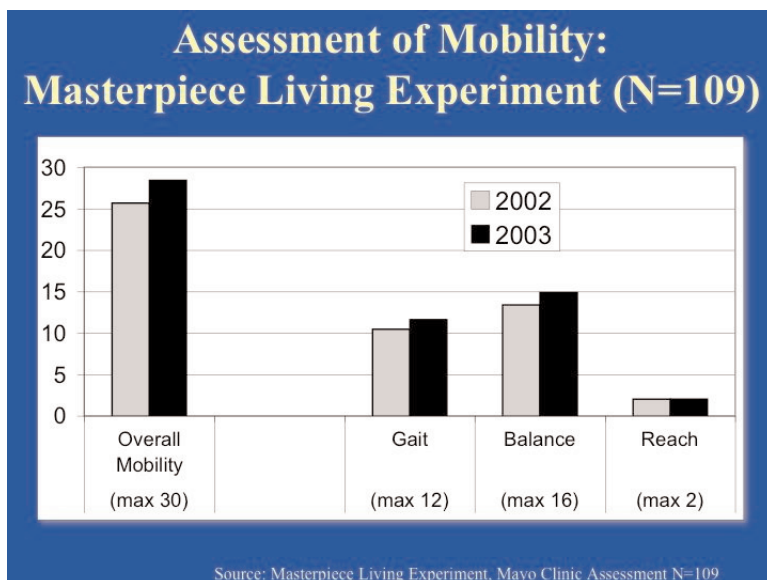


Figure 7

- (2) an assessment of mobility (gait, balance, and reach), conducted by the lifestyle coordinator at 6-month intervals,
- (3) the Lifestyle Review, a questionnaire that covers such topics as health, activities, beliefs, and life satisfaction.

Each person can get his or her performance on Mayo risk

factors at any time, by computer. Performance on the mobility test is reported individually by the lifestyle coordinator. Two kinds of findings from the Lifestyle Review are reported— for each question, each resident is shown his or her own responses and the average for all residents. After six months and again after one year, residents are also shown their latest and their earlier responses, so that each of them can see gain, loss, or stability in all areas.

When this information has been distributed, residents are invited to meet in small groups to discuss these results and plan appropriate actions. In these informal feedback sessions, each resident has his or her own data but no one else has this information. How much of that personal information is shared in the course of group discussion is a matter of individual choice. The discussions, with the lifestyle coordinator as facilitator, may include plans for individual improvement, suggestions for staff support and assistance, and proposals for additional facilities and equipment. Pairs or small subgroups may form to work together in various ways.

Research findings

Overall perception of health (Figure 4). From 2002 to 2003, the data show modest gains in the proportion of residents who rate their own health as excellent or very good.. The proportion who considered their health only good was reduced, but there was some increase in the proportion who reported their health as only fair, a finding for which we do not yet have a full explanation.

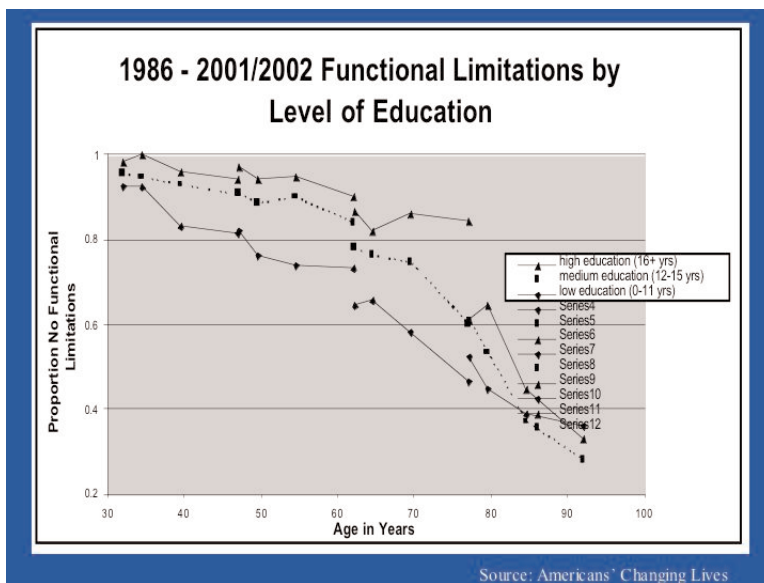


Figure 8

Medical risk factors (Figure 5). Participants in the experiment showed improvement—that is, reduction—in all six of the Mayo Clinic’s medical risk factors: blood pressure, blood sugar, cholesterol/HDL ratio, triglyceride level, and weight (overweight). The change in triglyceride level was minuscule, partly because triglycerides were not problematical to begin with.

Lifestyle risk factors (Figure 6). Mayo defines seven characteristics as lifestyle risks: lack of exercise, excess dietary fat, inadequate amounts of fruits and vegetables in the daily diet, cigarette smoking, stress (regardless of source), use of alcohol beyond the recommended daily ration of two drinks for men and one for women, and failure to

fasten seat belts while driving or riding in a car. Participants in the Masterpiece Living experiment showed improvements (reductions) in all of these risk factors, although even at the start of the experiment very few people had reported smoking cigarettes, using alcohol to excess, or failing to fasten their seat belts.

Assessment of mobility (Figure 7). The average scores of participants showed improvements in gait and balance, and therefore in overall mobility, which is simply a sum of the three component tests. The measure of reach, in which the subjects stand facing a wall at a prescribed distance, extend their arms toward it, and lean forward, presented no difficulty for any subjects; all of them performed easily, both at base line (2002) and in 2003.

Interpretation and comparison

The overall pattern of these experimental findings shows small but consistent improvement, one might say “stability-plus” rather than dramatic gains in functional level. This exploratory pilot study is an experiment without a control group, a limitation that we plan to avoid in the next phase of this research. Some perspective on our findings can be provided, however, by comparison with larger population samples that include measures of functional level for people in all age groups.

Americans Changing Lives (ACL), a study conducted by James House and his colleagues to which we referred earlier, includes data appropriate for such comparisons. The population sample for the ACL study, first interviewed in 1986, included 3,617 adults aged 25 years or more. They were a nationally representative cross-section, selected by methods of probability sampling that are fully described in the writings of Leslie Kish and his colleagues.

Respondents in this study were interviewed again in 1989, 1994, and 2001/2002. All these interviews included measures of functional limitation and longitudinal data are available at four points during the six-year period of the research. It is therefore possible to generate a curve that shows the relationship between age and presence or absence of functional limitations.

Figure 8 shows three such curves, for people with different levels of education—more than 16 years, 12 to 15 years, and fewer than 12 years (House, 2004; House and Kaplan, 2004). Several conclusions leap out from a glance at the figure:

(1) The trend of the curves is downward; the proportion of people without functional limitations decreases with age.

(2) Educational level makes a big difference, however. People with the most education are quite free of functional limitations until age 75 and beyond; people with the least education experience the onset of functional limitations much earlier, at age 35, and precipitously after age 65.

(3) Even at age 65, however, most people report no functional limitations.

(4) Important as educational level is in shaping the relationship between age and functional level, there are two great convergences in the three curves: At age 25 more than 90 percent of adults, regardless of education level, are free of functional limitations. And by age 85 most people, regardless of their educational level, report some limitation in function.

It is this last point that is especially relevant for interpreting the results of our experiment in retirement communities. Our experimental subjects, aged about 80, showed consistent small functional gains at a time of life when even stability is an accomplishment.

Conclusion

The Westport experiment demonstrates what can be done to increase successful aging in retirement communities of relatively prosperous, well-housed, well-fed, and well-educated men and women. Or perhaps it would be more accurate to say that the experiment shows what a community of such octogenarians can do for themselves, given appropriate environmental opportunities and supports.

What about the larger population of community-dwelling older men and women? The research challenge is to answer that question by means of a more ambitious experiment, in which comparable resources and motivational supports are provided to a larger and more dispersed population.

Perhaps an even more important challenge is to the understanding and empathy of our larger society, and thus to the political decisions and corporate policies that do so much to determine the quality of life among older Americans.

And finally, as I lecture in a distinguished school of social work, our research reminds us of a dual challenge to that already over-burdened profession of social work—

to help people deal more successfully with the world as it is, and
to move us toward one still better.

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