Interdiscipl. Topics Geront., Vol. 1, pp. 132–150 (Karger, Basel/New York 1968)

Limits of Optimal Functioning in Superior Old Adults

K. W. Schaie and C. R. Strother

Departments of Psychology, West Virginia University, Morgantown, W. Va. and University of Washington, Seattle, Wash.

Over the past few years there has been no paucity in descriptive studies of the psychological functioning of older individuals as well as a variety of both longitudinal and cross-sectional studies covering substantial portions of the adult life span. While most of these studies can and have been attacked from a methodological viewpoint (see *Schaie*, 1959; 1965) they do provide useful descriptive data on the state of functioning organisms at a given point in time. As a consequence, much interest has been expressed in the equivalence of sample characteristics for the different age groups included in cross-sectional studies. Particular concern is occasioned by the knowledge that older samples are frequently not representative of their population cohorts because they were obtained from institutional settings or other specialized sources. Moreover, it is argued that the description of older individuals on psychological measures suffers because such *Ss* have lower motivation, less familiarity with and unfavorable attitudes towards psychological tests. Disabilities of older *Ss* with respect to speeded measures also are presumed to make evidence on age differences difficult or impossible to interpret.

These problems plague not only the researcher interested in developmental changes with advanced age but are also of concern to the practicing clinician. They make it difficult to assess the degree of pathology in an older individual since normative data on a representative population might yield no more than measures of typical pathology. A more meaningful point of reference might therefore be sought by asking the question as to the limits of optimal functioning for a population of specified age.

If we are interested in defining optimal limits, it then becomes necessary to obtain a sample which is unusual in that it is restricted

to the upper limits of the population. This approach in itself is not novel. Indeed, *Sward* (1945), many years ago used a population of older executives, in order to demonstrate decline in intellectual functioning even under favorable conditions. The Sward study, however, is deficient in the sense that there was no adequate information which would permit the secure inference that his sample consisted of *Ss* who were superior for their age on the most crucial variables likely to be related to intellectual decrement.

It might well be argued that it is much more difficult to identify individuals who are well-functioning than those who are burdened with specific dysfunctions. Nevertheless, criteria can be developed which will permit ready identification of a superior group of normal adults which would be suitable for a study of the upper limits of optimal behavior in our older population. Since we are interested in a highly specialized population it would be foolish to assume that such individuals would be representative in any sense. It is of interest therefore to describe in detail and clearly understand the social environment and the physical status of individuals whom we consider to be a criterion group for the upper limits of the population.

It has been our good fortune to have available an unusual group of *Ss* which meets the above strictures and on whom comprehensive data are available. The study here reported has an interesting natural history. It originated when the senior author served as executive secretary to a multi-disciplinary faculty group at the University of Washington which was interested in problems of aging. This group was approached by a group of retired professors who felt it desirable to demonstrate by intensive studies that their members still retained a high level of functioning. Consequently a comprehensive survey of psychological, social and physical functioning was designed which would permit demonstration of optimal behavior by a group of old people who perceived themselves as still most capable but whose performance was being questioned by society.

While we shall focus the present report upon the data relevant to cognitive and personality variables we shall consider in some detail relevant physical and social background variables and consider their interrelation with psychological functioning. This paper, however, will not enter into the methodological questions of measurement or the theoretical questions on the nature and meaning of psychological decrement with age. Instead we will address ourselves to a description of optimal limits of functioning under optimal conditions of assessment.

Method

Subjects

All *Ss* were volunteers obtained from the membership of a retired university faculty group or from among retired academic or professional workers who had responded to appeals in newspapers published in the city in which the research was conducted. The public appeal indicated our interest in studying outstanding old persons over the age of seventy who because of their physical and mental fitness would be able to demonstrate that productive and meaningful living was possible in advanced age. The minimum requirements for initial acceptance for the study were that the prospective *Ss* were seventy years or older, had a minimum education of a bachelor's degree, had at some time during their life been employed at the professional level, did not reside in an institution for the aged or infirm, and were in good enough physical shape to visit the project office without any help or assistance by any third party.

Before final acceptance for the project, each *S* was further interviewed intensively about his motives and expectations in regard to the proposed study. It was explained that about eight hours spread over several days would be required for the physical examinations, psychological tests and interviews. At this point, every *S* was given an opportunity to withdraw from the study if he wished and was rejected in those instances where the screening interviewer concluded that participation would present any physical or psychological problems. All *Ss* were informed that feed-back would generally be limited to reports on group performance and that they ought not to participate if they expected their participation to result in health or counseling services. These stringent restrictions in the selection of *Ss* suggest that those participating were as highly motivated a group as can be obtained for the type of population being studied.

The final group consisted of 25 male and 25 females ranging in age from 70 to 88 years with a mean age of 76.5 years. Age means and standard deviations were approximately equal for male and female subgroups. Clinical and laboratory examinations (some details of which will be reported later) indicated that all members of the group were in fair to superior physical condition for their age. Moreover, no significant psychiatric complaints or symptoms were noted by the examining physicians.

Procedure

Four two-hour blocks of examinations were given. These consisted of a physical examination block, a social history block, and two psychological testing blocks. The four blocks were randomized and procedures within each block were also randomized to avoid systematic fatigue or other order effects. The clinical medical examination was conducted by a licensed physician and all lab tests and audiometry were conducted by qualified technicians. A trained social worker collected structured interview data, and the psychological testing was conducted by master's level clinical psychology graduate students.

The medical examination was begun by administering the Cornell Medical Index. A physical examination included assessment of the cardiovascular, respiratory and nervous system. Superficial examination of the abdomen, skin, EENT and skeletal areas was also made. Laboratory studies included a chest x-ray, audiometric examination, urinalysis and blood counts.

Social history and background data included structured interviews covering the material in the 'Your Activities and Attitudes' (*Burgess, Cavan* and *Havighurst*, 1948) survey, a housing survey (*Cohen*, 1954) and a recreational fact finding inventory (*Kunde*, 1954).

The psychological test battery included the Thurstone Primary Mental Abilities Test, Intermediate Form (*Thurstone* and *Thurstone*, 1947), the Wechsler Memory Test (*Wechsler*, 1945), and the Symbol-Gestalt Test (*Stein*, 1961) as measures of intellectual functions. The Edwards Personality Preference Schedule (*Edwards*, 1954) and the Test of Behavioral Rigidity (*Schaie*, 1955; 1960) were used to assess personality dimensions thought to be of relevant interest. Although some of these tests are group procedures, all were administered individually to assure that no spurious low performance was reported as a function of improperly understood instructions or any of the other hazards of group testing.

The purpose of our batteries was not only to measure the performance of a superior group of old people on psychological variables, but to demonstrate that this group had the social and physical characteristics which would permit us to conclude reasonably that we were indeed measuring the optimal limits of psychological functioning in old age. In the following sections we shall therefore first describe the qualifying characteristics of our sample. Next we shall describe the comparisons of our sample on the psychological variables in relation to the performance of comparable young adults at early maturity. In all these instances we shall pay due attention to the range of behavior as well as to group characteristics.

Results

Physical Characteristics

Self-description of physical health. As the first step of the medical examination, all *S*s completed the Cornell Medical Index. This is a true-false inventory which lists a large number of possible somatic complaints and which covers the areas of vision, hearing, the respiratory system, the cardio-vascular system, the musculoskeletal system, the skin, the nervous system and the genito-urinary system. In most instances the number of complaints endorsed by our *S*s was quite low even when compared with normative populations in their prime. Some typical complaints are not even relevant to advanced age but are characteristic of adults in general, such as the almost universally endorsed item indicating that the *S*s require eyeglasses. The range of endorsed items was in all instances less than the possible number of complaints and 60% or more of the *S*s did not endorse any complaint at all in the areas of audition, skin, musculoskeletal systems and the complexes of fatigability and obesity. Moreover, for every region of inquiry there are at least some *S*s who feel free of complaint.

The above data suggest that our *Ss* either experienced very little physical discomfort or, as may be more plausible, were unwilling under the conditions of our inquiry to admit a large number of physical complaints. Indeed, it might be that the complaints endorsed, particularly since most of them came from relatively few *Ss*, may be more related to psychological problems than to physical difficulties. If the latter is true, one would then expect little agreement between physical complaints and objectively determined disease processes. This is indeed what was found when actual physical examinations were conducted.

The physical examination. Every *S* received a complete physical following the format of the State of Washington disability examination. The examining physician was then asked to make a rating of positive, questionable or negative for each of ten diagnostic areas according to a set of criteria given in Table I. The written record of findings was then independently re-evaluated by a second physician who also made ratings for the categories requiring subjective judgment. A third judge arbitrated the few instances of disagreement.

The results of the physical examination are reported in Table II. Most of the identified physical problems involve the peripheral sense organs, the cardiovascular system and the finding of obesity. Nevertheless, there were three members of the group whose eyesight was normal and two who had less than 10 db. hearing loss. Additionally three individuals had only marginal visual loss and eight had marginal auditory loss. A more detailed analysis of auditory loss furthermore showed significantly more severe loss at higher than lower frequencies with more severe loss at the higher frequencies for the male *Ss* (also see *Schaie, Baltes* and *Strother,* 1964).

Less than ten per cent of our *Ss* showed positive significant findings in the respiratory, musculoskeletal, genito-urinary and nervous systems and only two questionable findings occurred for fatigability as measured by Hemoglobin and Hematocrit analyses.

The overall analysis showed that at least one significant physical symptom could be found for every *S*. If a weight of two is assigned to a positive finding and a weight of one to a questionable finding, one can then obtain a crude overall index of physical problems. This index ranged from 3 to 12 out of a possible 20 points, with a mean index of 8.1 for the males and of 6.8 for our female *Ss*.

Table I. Criteria for the evaluation of physical examination data[1]

Diagnostic Area	Items of information used for diagnosis	Positive clinical finding	Criteria questionable	No clinical finding
Vision	Uncorrected distance vision (Snellen Chart)	20/50 or worse	20/40	20/30 or better
Hearing	Maico audiogram (range from 256–4096) max. loss	35 db. or more	15–30 db.	10 db. or less
Respiratory system	Chest X-ray Clin. examination			
Cardiovascular system	Clin. examination heart, arteries, extremities, edema liver margin			
	Blood pressure	160/95 or more	150/90	145/85 or lower
	Pulse rate	90 or more	80–89	65–79
Musculoskeletal system	Clin. examination Skeletal mineralization (X-ray)			
Skin	Clin. examination			
Nervous system	Clin. impression			
Genito-urinary system	Urinalysis:			
	pus cells (males only)	16 or more	10–15	9 or less
	Albumin	2 plus	1 plus	trace
Fatigability	Hemoglobin (male)	10.9 or less	11.0–11.9	12.0 or more
	(female)	9.9 or less	10.0–10.9	11.0 or more
	Hematocrit (male)	39 or less	40–44	45–50
	(female)	36 or less	37–39	40–45
Obesity	Abdominal examination weight	6 lbs. ± normal range	up to 5 lbs. ± normal range	within normal range

[1] Where no criteria are given, clinical judgment was used in evaluating the presence or absence of pathological symptoms or conditions.

Table II. Results of physical examination

	Males			Females		
	Pos.	Quest.	Neg.	Pos.	Quest.	Neg.
Vision	24	0	1	20	3	2
Hearing	22	3	0	17	5	2
Respiratory system	3	5	17	1	4	20
Cardiovascular system	10	10	5	16	4	5
Musculoskeletal system	3	7	15	1	4	20
Skin	4	8	13	3	3	19
Nervous system	4	1	20	1	0	24
Genito-urinary system	3	4	18	0	1	24
Fatigability	0	1	24	0	1	24
Obesity	7	3	14	10	3	12

There is almost no relationship between the reported physical symptoms and findings for corresponding diagnostic areas in the actual examination. The one exception is the 'honest' report of a need for wearing glasses. Biserial correlations between the presence of positive symptoms and number of CMI items endorsed ranged from 0.04 to 0.15, all being nonsignificant deviations from chance at or beyond the 5% level of confidence.

The physical examination thus showed our sample to be in generally good physical condition with some sense organ impairment and cardiovascular defects being common. Subjectively, moreover, the *Ss* saw themselves as being in good health with relatively few complaints.

Social and Environmental Characteristics

Demographic characteristics. The information relating to the environmental and demographic was obtained from the Burgess, Cavan and Havighurst inventory supplemented by a housing schedule prepared by *Cohen* (1954). It was found that most of the men were married and living with their wives, while the preponderant categories for women were single and widowed. Almost one half of the men were still employed at least part time, while only one fifth of the women were still gainfully employed. Consequently a substantial minority of the males still received economic support from present

earnings, even though for both men and women pensions, income from investments and savings accounted for the primary source of economic support. Only two of the *S*s were supported by their children. When queried about their economic situation all *S*s indicated that they had at least enough to get along. Half of the men and four fifths of the women rated themselves as comfortably situated and one fifth of the men described themselves as well-to-do.

Particular attention was given to the housing arrangements of our respondents in recognition of the fact that this may well be an overriding determiner in facilitating or inhibiting continuing optimal interaction with and effective participation in the community. Most of our *S*s lived in homes of their own in the residential area of their city, but about one fifth were apartment dwellers. Our average *S* occupied $5^1/_2$ rooms and had lived in the same accommodations for an average of 15.5 years (range 1 to 44 years).

When queried about the *S*'s satisfaction with their living arrangements, 66% of the *S*s were very well satisfied, and another 24% fairly well satisfied. *S*s were also asked to indicate sources of dissatisfaction with their housing arrangements. The modal complaint seemed to be that the house was now too large, although a few complaints involved inconvenience due to location or physical arrangement which might interfere with optimal maintenance of environmental contacts. Since some degree of dissatisfaction seemed present it is of interest to note the preferred as contrasted to the actual living arrangements of our *S*s. Of our 50 *S*s, only three indicated a desire to live in a residence for old people and one would prefer to live with the children. The remaining 92% insisted on the desirability of independent living arrangements.

Interaction with the environment. Theoretical positions concerned with the disengagement (*Cumming* and *Henry*, 1961) or the imposition of constricting restraints limiting the interaction of the aging organism (*Schaie*, 1962) make it desirable to describe the reported activities by our *S*s which reflect environmental interaction. It was found that contacts with friends apparently have decreased for a plurality of our respondents, but that there is a substantial minority who report increased contacts. Almost all of our *S*s maintain some contact with young people and 90% of our sample belong to at least one club or organization. Indeed more than half the sample reports membership in four or more such units. Rather active participation

is indicated also by the finding that 42% of the *S*s attend a meeting once a week or oftener and another 30% attend at least a meeting a month. Comparative participation with advancing age seems to be sex-linked. That is, we find almost as many women reporting increased participation as decreased participation. On the other hand, two thirds of the men reported lessened participation while only 8% reported an increase. A final index of contact is that of church membership and attendance. Here 70% of the sample (about half the men and almost all the women) indicated curch membership. Only half the sample, however, attended church as frequently as once a week.

Use of leisure time. One of the criteria for successful adjustment after retirement would seem to be the effective use of leisure time and participation into the individual meaningful non-work related activities. A special recreational fact-finding inventory (*Kunde*, 1954) was therefore developed which surveys such questions as the amount of time spent on various classes of leisure activities, the specific activities engaged in, the relative desirability of various kinds of recreational activities and the reasons which seem to interfere with effective use of leisure time activities.

It soon became clear that the concept of leisure time was rather meaningless for our *S*s. Indeed any such use had to be carefully differentiated from the notion of total use of time which included components which during an earlier phase in the individual's life would be considered either work or leisure related. The results of our inquiries revealed that an average of 67 h each week was spent in some purposefully aimed activity. Of this time, individual members of the group spent from 3 to 36 h a week on physical activities (including chores) with an average of 18.9. An average of $8^1/_2$ (range: 0 to 41 h) was spent on creative activities (whether of a professional or hobbyist import). 6.2 (range: 0 to 20 h) were spent on social activities; 18.3 (range: 2 to 50 h) on mental and cultural activities having some educational value; 2.8 h (range: 0 to 12) on informal games; 4 h (range: 0 to 26) on audience and spectator sports; 3.5 h (range: 0 to 15) on devotional activities; and 3.2 (range: 0 to 20) on services of civic and social usefulness.

Participation in specific activities (a total of 43 such different activities were listed) was also tabulated. While the time spent in physical activities is high, this does not represent excessive partic-

ipation in organized physical activity. Much preference is shown rather for activities of a more passive kind even though incidence of participation in activities involving social interaction is high. Among the reasons given for lack of recreational activity, men most frequently cited the lack of organized programs or facilities for older people while women indicated physical condition as the principle source of interference. For this group, inability to finance recreation or lack of friends seems of rather low relevance.

Cognitive Variables

Measures of intellectual ability. The mental ability level of our *Ss* was measured with the intermediate form of the Thurstone Primary Mental Abilities Test (PMA). This instrument, although originally constructed for group testing of adolescents, has been shown previously to have adequate range of difficulty and reliability for older *Ss* (*Schaie, Rosenthal* and *Perlman,* 1953). The form of the test used in this study contains the subtests of Word Meaning (measured by identifying the analogy of a stimulus word from a multiple-choice list); Space (measured by identifying correctly rotated geometric forms); Reasoning (measured by identifying the correct letter needed to complete a letter sequence); Number (measured by the identification of correct or incorrect solutions for simple addition tasks) and Word Fluency (measured by requiring the writing of words beginning with a specified letter). Table III gives the PMA raw score means and standard deviations separately by sex and provides comparison with young adults by converting the raw score means to T-scores using Thurstone's conversion table for his 17-year-old group.

Although our *Ss* function well below the level they would have been expected to attain at their prime, they are still at or above the mean for the average 17-year-old on the verbal and numerical abilities. On Space and Reasoning, however, significant decrement is apparent with mean values being approximately one standard deviation below the reference group. An overall estimate of mental ability comparable to the efficiency quotient estimate obtained from standard clinical instruments would place the mean of our group at approximately the population average for the adolescent group. The maintenance of verbal skills in particular is further emphasized by

Table III. Raw score means, standard deviations and means converted into T-scores as compared with a 17-year-old normative population on the Primary Mental Abilities Test

	Males			Females		
	Mean	S.D.	T-Scores	Mean	S.D.	T-Scores
Verbal meaning	30.68	6.20	46	35.60	12.22	50
Space	15.20	8.06	40	10.80	7.64	38
Reasoning	8.72	4.89	42	11.36	5.47	44
Number	26.52	10.67	55	23.28	10.40	51
Word fluency	43.76	11.51	49	47.80	13.51	53

examining the range of individual scores for those of our *S*s who are in the eighties. Of sixteen such individuals, ten are still above the young mean for Verbal Meaning; nine *S*s exceed the comparison mean on Number and six equal or exceed the comparison mean on Word Fluency.

There seems to be a trend for a sex difference involving greater decrement for men than for women on verbally oriented tasks with reverse trends on tasks not involving verbal behavior. The men did significantly better (5% level of confidence) on Space, while the women exceeded the men on Verbal Meaning and Reasoning.

Memory. The Wechsler Memory Scale was used to determine the extent of memory deficit which might interfere with our group's effective functioning. The Wechsler Memory Scale has seven subtests varying from the assessment of gross to subtle memory deficit. The subtests include personal and current information, orientation time and space, mental control (as measured by counting and reciting the alphabet), digit span, reproduction of visual figures, reporting content of meaningful paragraphs, and associate learning of pairs of words. Scores on these parts are then combined to yield a Memory Quotient which is roughly comparable to the IQ derived from Wechsler's Intelligence Tests.

The overall measure indicates only mild deficit with a Memory Quotient of 93 as compared with a group of young adults. Of more interest, however, are specific components of memory functions. Table IV, therefore gives the means for our group, for a group of young adults and the total number of attainable responses. Means here are for the total group since there were no significant sex differences. Although most of the differences between our sample

Table IV. Mean performance on the subtests of the Wechsler Memory Scale

	Total possible	Norm group 20–29 year olds	Superior old group
Current information	6.00	5.96	5.72
Orientation	5.00	5.00	4.86
Mental Control	9.00	7.50	7.46
Logical memory	23.00	9.28	8.52
Digit span forward	8.00	7.04	6.86
Digit span backward	7.00	5.26	5.04
Visual reproduction	14.00	11.00	7.90
Associative learning	21.00	15.72	13.64

and the comparison group are statistically significant, the more important issue is the absolute magnitude of the discrepancy. As expected, there was a substantial decrement in our group's ability to reproduce visual figures. But efficiency of paired associate learning was only slightly lowered while retention of number series and meaningful material was still close to the young average. Orientation in time and space and mental control as measured by counting and by listing the alphabet were virtually unimpaired.

Visual motor functioning. Difficulties which older people experience on tasks involving visual discrimination, and response requirements involving visual mediation are at times attributed to progressive cortical decrement particularly in the visual motor area. *Stein's* Symbol Gestalt test (1961) was used for an exploration of this question. *Stein's* test is essentially a modification of the Wechsler Digit Symbol subtest. His symbols have poor gestalt and induce the *S* to produce closure phenomena. Table V gives mean scores for our group and for Stein's adult (Mean age 40 years) organic and control groups.

For two of the Symbol-Gestalt measures our group is midway between the normals and organics. It appears then that there is lowering both in the speed of reproducing correct symbols as well as in the rate of improvement comparing performance in the first and third minute of the test. When the number of qualitative errors are considered, our *S*s fall quite close to Stein's organic group. Of course, the findings of visual impairment shown in the medical examination may account for these results, nevertheless it seems that even in as well-functioning a group as ours, cortical changes as measured by visuo-motor functioning are likely to have occurred.

Table V. Mean scores on Stein's Symbol Gestalt Test

	Superior old group	Organics (N = 60)	Controls (N = 120)
Correct symbols in 3 min	42.72	29.92	50.08
Number of qualitative errors	1.68	1.62	0.63
Improvement	1.08	0.45	2.16

Personality Characteristics

Behavioral rigidity. Difficulty in optimal functioning is often related to response style as well as to intellectual ability. The construct has been interchangeably applied both in the cognitive and personality spheres (*Chown,* 1959). *Schaie* (1955; 1960) has attempted to provide operational measures of both aspects as well as to provide a measure of psycho-motor speed which is closely related to rigid response tendencies. The measure of motor-cognitive rigidity involves assessment of the ratio of interfered to non-interfered responses. This is done by such tasks as having a paragraph of writing copied and then having it copied once again substituting small letters for capital letters and capital letters for small letters. The personality-perceptual rigidity measure involves questionnaire responses regarding behaviors which require shifts in accustomed patterns.

Table VI gives T-score means and standard deviations as compared with general population norms (Ages 21 to 70 years). The results here show decrement in flexibility or response speed from middle adulthood by from one half to one standard deviation. Again at least several of our *Ss* are still less rigid than a comparison population in its prime. It is noteworthy also that our group is less rigid in terms of 'personality-perceptual' rigidity than when it comes to motor-cognitive and response speed attributes where the peripheral sense organ decrement may be particularly important.

Most decrement as compared with young groups was found on the variables of psychomotor speed, memory and motor-cognitive rigidity. An attempt was therefore made to adjust scores on the Primary Mental Ability for the effect of the above three variables. Adjusted means were computed and showed that when these possibly peripherally determined factors were allowed for, group means were now

Table VI. Means and standard deviations for factor scores on the test of behavioral rigidity

	Male		Female	
	Mean	S.D.	Mean	S.D.
Psycho-motor speed	39.16	5.51	43.64	7.50
Personality-perceptual rigidity	44.84	6.35	43.64	5.90
Motor-cognitive rigidity	44.08	6.25	42.76	7.83
Composite	42.60	4.25	43.36	5.39

at about one standard deviation above the young *Ss* for Verbal Meaning, Number and Word Fluency. The adjusted reasoning score mean is at the mean of the young population but the Space score remains approximately one sigma below the mean of the young reference group. Further details on the method and results of the PMA score adjustment have been reported elsewhere (*Strother, Schaie* and *Horst*, 1957).

Need structure. Edwards' Personality Preference Schedule (EPPS), a forced choice test designed to measure the relative strength of fifteen needs derived from Murray's list of manifest needs was used to compare our group with the status of young adults. For this special analysis, a comparison group of 25 male and 25 female graduate students with a mean age of 25 years was obtained to achieve close matching for academic background and vocational interest.

Table VII gives means in T-scores according to Edwards' norms for both old and young professional groups. Highly significant differences occurred between the two groups on five of the fifteen needs measured by the EPPS. On three of these (need for deference, for order and for endurance) the older group had higher need scores than the younger. But need for heterosexual activity and for exhibition (or attention) was significantly lower. Also marginally significant were differences indicating lower need for dominance and higher need for abasement on the part of the older group.

Of particular interest are the needs with respect to which the older group is similar to the young graduate students. One of these is the need for achievement, which is as high in the older group as for the graduate students. This finding may of course be a function

Table VII. Mean T-Scores on the Edwards Personal Preference Schedule

	Superior Old Group		Graduate Students	
	Male	Female	Male	Female
Achievement	53	51	56	54
Deference	64	64	46	46
Order	63	65	48	45
Exhibition	43	41	52	47
Autonomy	51	56	55	63
Affiliation	49	51	51	49
Intraception	50	48	49	50
Succorance	45	48	48	46
Dominance	44	43	48	47
Abasement	51	50	46	45
Nurturance	49	51	48	48
Change	51	45	52	52
Endurance	62	64	51	51
Heterosexuality	31	28	50	58
Aggression	49	48	50	49

of the fact that the older group is composed of professional workers whose need for achievement has had a considerable amount of reinforcement. However, our group is no different from the young comparisons also on need for autonomy or independence and for need of affiliation or friendships. In the needs for nurturance and succorance—the giving and receiving of affection, sympathy and help, older and young are alike. For our older group, at least, need for change or new experience is no less important than to the younger and there is no difference for need intraception and need aggression.

Table VIII gives raw score means and results of the t-tests for the sex differences within the old group. The most significant such sex differences appear for need heterosexuality where the males greatly exceed the female *Ss*. But the male *Ss* are also higher on need achievement and agression and the female *Ss* are higher on need nurturance, affiliation and succorance.

One other point of interest with respect to sex differences in the need structure of our group is the fact that on eight of the needs the sex differences are larger for the older group. *Terman* and *Miles'* data (1936) have usually been interpreted to indicate that sex differences become smaller in older groups. Our data seem to show that this is not consistently the case when needs are involved.

Table VIII. Means and standard deviations on the Edwards Personal Preference Schedule

	Male		Female	
	Mean	S.D.	Mean	S.D.
Achievement	16.68	3.95	13.40	3.85[2]
Deference	16.52	3.33	17.60	3.43
Order	15.96	3.79	17.00	3.58
Exhibition	11.88	4.21	10.92	3.14
Autonomy	15.04	5.59	15.08	3.83
Affiliation	14.48	4.68	18.08	3.93[1]
Intraception	15.84	4.62	16.52	4.61
Succorance	8.64	3.97	11.40	4.60[1]
Dominance	14.68	5.20	11.12	4.28[1]
Abasement	12.44	5.27	14.80	5.20
Nurturance	13.44	4.95	17.12	3.47[2]
Change	15.76	4.54	15.20	4.68
Endurance	19.28	3.10	19.88	4.17
Heterosexuality	6.84	5.16	2.67	7.13[2]
Aggression	12.48	4.10	9.60	3.59[1]

[1] Sex differences significant at $p<0.05$.

[2] Sex differences significant at $p<0.01$.

Attitudinal Variables. The Burgess, Cavan and Havighurst inventory contains a section yielding information on the respondents attitudes towards self and the environment. Seven scales are included each of which contains seven items. Each scale was scored such that a score of four reflects average satisfaction or acceptance, while lower scores would indicate dissatisfaction and higher scores above average satisfaction. Table IX gives means and standard deviations on these scales. The results suggest that our subjects are reasonably satisfied with their current state of health, their friendship relationships, the satisfaction they derive from their family, their feelings of economic security and in experiencing continued usefulness. Only average satisfaction is expressed with respect to their ability to carry on useful work, feelings of happiness and acceptance of religious experience. Significant sex differences occurred for satisfaction derived from the family which was higher for the male than female *Ss* and the acceptance of religious experience which was much lower for the males than the females.

As a final indication of our respondents' outlook on their experience, it seems appropriate to report results of self-ratings of their appreciation of their life in terms of happiness and accomplishment.

Table IX. Positive attitudes towards self and environment expressed on Burgess Attitude Scale

	Male		Female	
	Mean	S.D.	Mean	S.D.
Health	4.52	1.16	4.24	1.31
Friends	4.92	1.16	5.04	0.89
Work	4.12	1.17	3.80	1.19
Economic security	4.52	1.12	4.52	0.76
Religion	3.44	2.22	4.88	1.27[2]
Usefulness	4.44	0.96	4.48	0.96
Happiness	4.24	1.02	3.76	1.10
Family	5.00	0.76	4.44	0.65[2]

[2] Sex differences significant at $p<0.01$.

Only one member of the group described her life as having been unhappy and 90% of the group were at least reasonably satisfied with their lifetime accomplishment. No significant sex differences were found in this global self-description.

CONCLUSIONS

The results which we have reported on the assessment of a carefully selected and highly motivated sample of individuals of advanced age lends strong support to the proposition that psychological age decrements reported in the literature cannot simply be criticized or refuted by referring to low motivation or artifacts of sampling. Our group reported generally satisfying conditions of their environment and social conditions and all our *S*s had attained a high level of education and related professional use of their abilities throughout their adult life. Nevertheless, the present state of psychological functioning of this highly selected group is at best at or slightly below the population average for young adults. The results of our physical and social studies suggest that this obvious decrement from peak performance is most likely related to physiological decrement particularly of a sensory nature but probably also related to general slowing down of response speed.

Psychological decrement is most apparent in functions which require visual-motor response or where speed is of importance. But some decrement is also clearly apparent in most other cognitive

processes even though the range of individual differences is quite large. While there are changes in cognitive processes these are not necessarily accompanied by corresponding reduction in needs or acceptance of reduced interaction with the environment. It is perhaps the relation of continuing needs and aspirations of the older individual to the limiting conditions of his physiological apparatus and the resulting environmental constraints which require most urgent attention and further study.

ACKNOWLEDGEMENTS

This research was conceptualized by a faculty group at the University of Washington known as the 'Committee on Gerontology' and supported by a grant from the Agnes H. Anderson fund. Most active members of the research group in addition to the authors were *Joseph Cohen* (Sociology), *Norman Kunde* (Physical Education) and *Benjamin Houghton* (Preventive Medicine). Design, data collection and analysis were conducted by the senior author with the assistance of *Mary Marjorie Campbell* and *Beverly Frasure.*

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Authors' address: Dr. *K. W. Schaie,* Department of Psychology, West Virginia University, *Morgantown, W.Va. 26505* and Dr. *C. R. Strother,* Department of Psychology, University of Washington, *Seattle, Wash.* (USA).