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Cognitive and Personality Variables in College Graduates of Advanced Age*

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I. Introduction

The increase in sophistication of research methods available to students of the aging process has led to a mounting conviction that it is imperative to move from the description of phenomena to their experimental manipulation. Nevertheless, many of the false starts and indeed the scarcity of experimental studies may be attributed to the fact that descriptive work has not gone far enough and has failed to explore some of the most relevant issues that should be covered before fruitful experimentation becomes

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possible. For example, descriptive studies covering substantial portions of the adult life-span can still be cited as noteworthy exceptions whether they be of a cross-sectional or longitudinal nature, and few such studies extend far enough to generate useful data on the most advanced years. It may be fortunate, of course, that the efforts devoted to substantial studies have been relatively limited, since past major efforts can and have been attacked from the standpoint of method (Jones, 1959; Schaie, 1959, 1965).

While one-shot studies (including longitudinal studies limited to a single cohort*) cannot contribute conclusively to our understanding of lawful changes related to age, they can and do provide useful descriptive data on the state of functioning organisms at a given point in time. To serve this purpose, the investigator must consider the equivalence of sample characteristics for the different age groups included in his study. 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, and are less familiar with and unfavorably disposed toward 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.

Problems of adequate assessment of the aged individual transcend the concern of the researcher interested in developmental changes with advancing age. Similar problems make it difficult for the practicing clinician to assess the degree of pathology in the older individual, since normative data on a representative population may yield no more than measures of typical pathology. It is generally not the objective to identify the one-eyed man who is king among the blind. Hence, a more meaningful point of reference might be sought by inquiring into the limits of optimal functioning for a population of specified age. Given such information, experimental intervention might then be addressed to the question whether specific populations can by suitable treatment approach the known limits. Knowledge of optimal limits, moreover, might permit more meaningful comparisons of the capability of populations of different ages and antecedent conditions where the comparison of certain so-called representative populations may be implicitly impossible because of the conditions under which these populations must be defined and measured.

If we are interested in defining optimal limits, it then becomes necessary to obtain information on a sample that is unusual in that it must be res-

tricted to the upper limits of the p novel. Indeed, Sward (1945) man executives in order to demonstr even under favorable conditions. the sense that there was no adequ secure inference that his sample their age on the most crucial va tual decrement.

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It has been our good fortune t of Ss who met the foregoing strictu available. The study here report It originated when the senior au multidisciplinary faculty group that was interested in proble approached by a group of retir demonstrate by intensive studie level of functioning. Consequen logical, social, and physical func demonstration of optimal behavi ceived themselves as still most ca questioned by society.

It is the purpose of this chapt personality variables in a rather sp to this population it must be der qualify as a suitable vehicle for c under optimal assessment conditi cription of relevant physical and be required in a paper dealing necessary. We are therefore not questions of measurement or theo ing of psychological decrement w that we have obtained a sample c

*The term cohort refers to that group of persons who enter the environment at the same point in time. The point in time may be broadly defined as the extent of the interval used in the particular study.

stricted 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 that 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 that will permit ready identification of a superior group of normal adults who would be suitable for a study of the upper limits of optimal behavior in our older population. It should be stressed that it would be foolish to assume that such individuals would be representative in any sense, since we must be interested in a highly specialized population. Hence, it is incumbent upon us to describe in detail, and clearly to understand, the social environment and 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 had available an unusual group of *Ss* who met the foregoing 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 multidisciplinary faculty group at the University of Washington that was interested in problems of aging. This study group was approached by a group of retired professors who felt it desirable to demonstrate by intensive studies that their members retained a high level of functioning. Consequently a comprehensive survey of psychological, social, and physical functioning was designed that 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.

It is the purpose of this chapter to report upon data on cognitive and personality variables in a rather special population. To justify our attention to this population it must be demonstrated that it can indeed be used to qualify as a suitable vehicle for describing optimal limits of functioning under optimal assessment conditions. Hence, a much more detailed description of relevant physical and background data than would otherwise be required in a paper dealing with psychological variables will be necessary. We are therefore not directly concerned with methodological questions of measurement or theoretical questions on the nature and meaning of psychological decrement with age. Instead we will attempt to show that we have obtained a sample of individuals who should be as intact as

can be found at their age, who are measured under optimal conditions, but who nevertheless show significant changes in cognitive performance from the performance seen in individuals in the prime of life.

II. Method

A. Subjects

All of our *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 70 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 *S* be 70 years or older, have a minimum education of a bachelor's degree, have at some time during his life been employed at the professional level, not reside in an institution for the aged or infirm, and be in good enough physical shape to visit the project office without any help or assistance by a 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 feedback 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 the participating *Ss* were as highly motivated a group as can be obtained for the type of population being studied.

The final group of *Ss* consisted of 25 men and 25 women 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.

B. Procedure

Four two-hour blocks of a physical examination, psychological testing blocks. Within each block were other order effects. The a licensed physician, and conducted by qualified technicians interview data, and the level clinical psychology

The medical examination Medical Index (CMI) (assessment of the cardiac and skeletal areas was X ray, audiometric exam

Social history and covering the material in Cavan, and Havighurst recreational fact-finding

The psychological tests Abilities Test, Intermodal Wechsler Memory Scale (Stein, 1961) as measure of personality Preference Schedule Rigidity (Schaie, 1955), thought to be relevant. All were administered in advance was reported as or of any of the other

The purpose of our study was to demonstrate the presence of a superior group also to demonstrate the characteristics that would permit measuring the optimum. In the following section characteristics of our sample on the psychological of comparable young shall pay due attention to characteristics.

B. Procedure

Four two-hour blocks of examinations were conducted. 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 laboratory 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 (CMI) (Brodman, 1953). A physical examination included assessment of the cardiovascular, respiratory, and nervous system. Superficial examination of the abdomen, skin, eyes, ears, nose, and throat, 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 survey on activities and attitudes by Burgess, Cavan, and Havighurst (1948), 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 & Thurstone, 1947), the Wechsler Memory Scale (Wechsler, 1945), and the Symbol-Gestalt Test (Stein, 1961) as measures of intellectual functions. The Edwards Personality Preference Schedule (EPPS) (Edwards, 1954) and the Test of Behavioral Rigidity (Schaie, 1955, 1960) were used to assess personality dimensions thought to be relevant. 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 of 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 also to demonstrate that this group had the social and physical characteristics that 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.

III. Results

A. Physical Characteristics

1. Self-Description of Physical Health

Our subjects were introduced to the medical examination by being asked to complete the Cornell Medical Index, a true-false inventory that lists a large number of possible somatic complaints and covers the areas of vision, hearing, respiratory system, cardiovascular system, musculoskeletal system, skin, nervous system, and genitourinary system. Also included were questions on fatigability and the presence of obesity. Means and standard deviations of the number of complaints for each of these systems or areas are given in Table I. In most instances, the number of complaints endorsed by our Ss was quite low even when compared with normative populations in their prime. Some typical complaints are not even restricted to advanced age, but are characteristic of adults in general, such as the almost universally endorsed item indicating that the *S* requires eyeglasses. The range of endorsed items was in all instances less than the possible number of complaints and 60% or more of the Ss 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 Ss who felt free of complaints.

The foregoing data suggest that our Ss either experienced very little

TABLE I
SELF-DESCRIPTION OF PHYSICAL HEALTH ON THE CORNELL MEDICAL INDEX^a

Complaint area	No. of items	Mean no. of complaints			SD of complaints			Range			No. of Ss with no complaint		
		M	F	T	M	F	T	M	F	T	M	F	T
Vision	6	1.72	1.80	1.76	0.66	2.03	0.84	1-2	0-3	0-5	0	2	2
Hearing	3	0.60	0.40	0.51	0.68	0.63	0.68	0-2	0-2	0-2	13	17	30
Respiratory	18	1.64	1.48	1.56	2.26	1.67	1.65	0-7	0-5	0-7	10	11	21
Cardiovascular	13	1.72	2.08	1.90	1.18	2.46	2.07	0-5	0-8	0-8	5	10	15
Musculoskeletal	8	0.44	1.04	0.74	0.75	1.56	1.27	0-2	0-7	0-7	18	13	31
Skin	7	0.44	0.80	0.62	0.69	1.05	0.91	0-2	0-3	0-3	17	14	31
Nervous system	27	1.20	1.44	1.32	1.47	1.89	1.56	0-6	0-5	0-6	11	8	19
Genitourinary	11	2.60	3.00	2.80	1.54	2.65	2.17	0-7	0-8	0-8	1	6	5
Fatigability	8	0.48	1.24	0.86	1.09	1.72	1.47	0-5	0-6	0-6	19	14	33
Obesity	1	0.20	0.24	0.22	0.40	0.40	0.41	0-1	0-1	0-1	20	19	39

^aMale, M; female, F; total, T.

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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.

2. *The Physical Examination*

Every *S* received a complete physical examination following the format of the State of Washington disability examination. The examining physician was then asked to make a rating of clinically positive, questionable, or negative findings for each of ten diagnostic areas according to the set of criteria specified in Table II. A clinically positive finding here is considered one that involves the positive identification of pathology. The written record of the examination was independently reevaluated by a second physician, who also made ratings for the categories requiring subjective judgement. A third physician-judge finally arbitrated the few instances of disagreement.

The results of the physical examination are reported in Table III. It is of interest that 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 a 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, and more loss for the male than the female *Ss*. The men, however, showed significantly less loss at the lower frequencies, and performed significantly better with their right than their left ears (also see Schaie, Baltes, & Strother, 1964).

Fewer than 10% of our *Ss* showed positive significant findings in the respiratory, musculoskeletal, genitourinary, 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*. By assigning a weight of 2 to a positive finding and 1 to a questionable finding, a crude overall index of physical problems can be obtained. This index ranged from 3 to 12 out of a possible 20 points, with a mean index of 8.1 for the men and 6.8 for the women. The physical examination thus showed our sample to be in generally good condition, though some sense organ impairment and cardiovascular defects were quite

TABLE II

CRITERIA FOR THE EVALUATION OF PHYSICAL EXAMINATION DATA^a

Diagnostic area or system	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
Hearing	Maico audiogram (range, 256-4096) max. loss	35 dB or more	15-30 dB	10 dB or less
Respiratory	Chest X ray Clin. examination		— ^a	
Cardiovascular	Clin. examination Heart, arteries, extremities, edema liver margin Blood pressure Pulse rate	160/95+ 90+	150/90 80-89	145/85 or lower 65-79
Musculoskeletal	Clin. examination Skeletal mineralization (X ray)		— ^a	
Nervous	Clin. impression		— ^a	
Genitourinary	Urinalysis Pus cells (males only) Albumin	16+ 2+	10-15 1+	9 or less Trace
Skin	Clin. examination		— ^a	
Fatigability	Hemoglobin Male Female Hematocrit Male Female	10.9 or less 9.9 or less 39 or less 36 or less	11-11.9 10-10.9 40-44 37-39	12 gm or more 11 gm or more 45-50 40-45
Obesity	Abdominal examination Weight		— ^a	
		6 lb ± normal range	Up to 5 lb ± normal range	Within normal range

^aWhere no criteria are given, clinical judgment was used in evaluating the presence or absence of pathological symptoms or conditions.

Diagnostic area or system	+
Vision	24
Hearing	22
Respiratory	3
Cardiovascular	10
Musculoskeletal	3
Skin	4
Nervous	4
Genitourinary	3
Fatigability	0
Obesity	7

^aFrequency of positive (

common. Subjectively, relatively few complain

There is almost no re and findings in corres The one exception is th serial correlations betw of CMI items endorsed

These findings raise means of evaluating th seems that the symptom logical nature. Our S functioning that raise a superficial symptomatic disease who is otherwis or deny the presence o

B. Social and Environ

1. Demographic Char

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TABLE III

RESULTS OF PHYSICAL EXAMINATION^a

Diagnostic area or system	Males			Females			All Ss		
	+	?	-	+	?	-	+	?	-
Vision	24	0	1	20	3	2	44	3	3
Hearing	22	3	0	17	5	2	39	8	2
Respiratory	3	5	17	1	4	20	4	9	37
Cardiovascular	10	10	5	16	4	5	26	14	10
Musculoskeletal	3	7	15	1	4	20	4	11	35
Skin	4	8	13	3	3	19	7	11	32
Nervous	4	1	20	1	0	24	5	1	44
Genitourinary	3	4	18	0	1	24	3	5	42
Fatigability	0	1	24	0	1	24	0	2	48
Obesity	7	3	14	10	3	12	17	6	26

^aFrequency of positive (+), questionable (?), and negative (-) findings of pathology.

common. Subjectively, the Ss saw themselves as being in good health with relatively few complaints.

There is almost no relationship between the reported physical symptoms and findings in corresponding diagnostic areas in the actual examination. The one exception is the "honest" report of a need for wearing glasses. Biseri- al correlations between the presence of positive symptoms and number of CMI items endorsed all fell short of statistical significance at the 5% level.

These findings raise serious questions as to the validity of the CMI as a means of evaluating the health status of older Ss. In our sample, at least, it seems that the symptoms endorsed on the CMI are primarily of a psychological nature. Our Ss tended to report complaints in areas of physical functioning that raise apprehensions, perhaps on the basis of misunderstood superficial symptomatology. On the other hand, the S with actual physical disease who is otherwise in relatively good condition is likely to minimize or deny the presence of a physical deficit.

B. Social and Environmental Characteristics

1. Demographic Characteristics

The information relating to the environmental and demographic characteristics was obtained from the inventory of Burgess *et al.*, supplemented by a housing schedule prepared by Cohen (1954). Tables IV through VII give the proportions within the sample for different types of family status, economic situation, sources of economic support, and employment status. It was found that most of the men were married and living with their wives, whereas the preponderant categories for women were single and widowed. Close to half

TABLE IV
FAMILY STATUS

Status	Male (%)	Female (%)	Total (%)
Single	4	40	22
Married	76	12	44
Married but separated	8	4	6
Widowed	12	44	28

TABLE V
PERCENTAGE BREAKDOWN ACCORDING TO EMPLOYMENT STATUS

Status	Male (%)	Female (%)	Total (%)
Working full time	4	4	4
Working part time	40	16	28
Not working	56	80	68

TABLE VI
SOURCES OF ECONOMIC SUPPORT

Source	Male (%)	Female (%)	Total (%)
Present earnings	40	16	28
Social security	12	12	12
Pension from former occupation	68	60	64
Aid from children	4	4	4
Insurance or annuities	4	36	20
Investments and savings	60	64	62

TABLE VII
ECONOMIC SITUATION

Self-description	Male (%)	Female (%)	Total (%)
Unable to make ends meet	0	0	0
Have enough to get along	28	20	24
Comfortable	52	80	66
Well-to-do	20	0	10
Wealthy	0	0	0

of the men were still employed at the time of the study. The women were gainfully employed. The men and women who were still employed received economic support from investments and savings. The men and women who were not working received economic support for both sexes from their children. When queried about their financial situation, the men that they had at least enough to get along. The women rated themselves as well-to-do. The men described themselves as well-to-do.

Special attention was given to the living arrangements that living arrangements may be interfering with continuing participation in the community. The men and women in our sample by sex and marital status were living in the residential area of their own dwellers. Our average S occupied accommodations for an average of 6.5 rooms.

Satisfaction of our Ss with their living arrangements was high. It was found that 66% were well satisfied. Ss were then asked about their housing arrangements. The house was now too large, although due to location or physical arrangement maintenance of environmental conditions seemed present, it is of interest to note that the actual, living arrangements c

District	RESIDUAL		
	S	M	M-S
Business	0	0	0
Rooming house	0	0	0
Apartment house	0	3	1
Small homes (less than 6 rooms)	0	5	1
Large homes (more than 6 rooms)	1	11	0
Total	1	19	2

*Key: S, single; M, married; M-S, m

of the men were still employed at least part time, while only one fifth of the women were gainfully employed. Consequently a substantial minority of the males still received economic support from present earnings, even though income from investments and savings accounted for the primary source of economic support for both sexes. Only two of the Ss were supported by their children. When queried about their economic situation, all Ss 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.

Special attention was given to the housing of our respondents recognizing that living arrangements may be an overriding determiner in facilitating or interfering with continuing optimal interaction with and effective participation in the community. Table VIII gives the residential location of our sample by sex and marital status. Most of our Ss lived in homes of their own in the residential area of their city, but about one fifth were apartment dwellers. Our average S occupied 5½ rooms and had lived in the same accommodations for an average of 15.5 years (range 1-44 years).

Satisfaction of our Ss with their living arrangements was also inquired into. It was found that 66% were very well satisfied and another 24% fairly well satisfied. Ss were then 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 that 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 Ss. Of our 50 Ss, only three indicated

TABLE VIII
RESIDENTIAL LOCATION^a

District	Male					Female					Group total
	S	M	M-S	W	T	S	M	M-S	W	T	
Business	0	0	0	0	0	0	0	0	2	2	2
Rooming house	0	0	0	0	0	0	1	0	0	1	1
Apartment house	0	3	1	0	4	2	1	1	2	6	10
Small homes (less than 6 rooms)	0	5	1	2	8	4	1	0	4	9	17
Large homes (more than 6 rooms)	1	11	0	1	13	4	0	0	3	7	20
Total	1	19	2	3	25	10	3	1	11	25	50

^aKey: S, single; M, married; M-S, married but separated; W, widowed; T, Total.

a desire to live in a residence for old people and one would have preferred to live with her children. The remaining 92% insisted on the desirability of independent living arrangements.

2. Interaction with the Environment

It has been argued that decline in performance and other psychological functions may be associated with lack of environmental interaction or of exposure to the conditions of life and cultural content that could benefit the younger *S* on certain test performance. One theoretical position (Schaie, 1962) holds that declining test performance may indeed be a function of restraints that limit the successful environmental interaction of the organism. A contrary position is, of course, taken by writers favoring the notion of disengagement (Cummings & Henry, 1961), who regard a successive and successful withdrawal from the demands of the environment as an organism-maintaining strategy. In any event, it seems incumbent upon us to present some data on environmental interaction for our sample, and Tables IX-XIV bear on this matter.

It was found that contacts with friends apparently have decreased for a majority of our respondents, but that there is a substantial minority who report increased contacts. Almost all of our *Ss* maintain some contact with young people and 90% of our sample belong to at least one club or organ-

TABLE IX
CONTACT WITH FRIENDS

	Male (%)	Female (%)	Total (%)
Less than at 55	44	40	42
About same	36	24	30
More than at 55	20	36	28

TABLE X
CONTACT WITH YOUNG PEOPLE

	Male (%)	Female (%)	Total (%)
None	4	8	6
A few times a year	40	24	32
Once or twice a month	20	52	36
About once a week	20	12	16
Every day	16	4	10

Cognitive

MEMBER

No. of organizations

None
One
Two
Three
Four or more

AT

Frequency

Never
Less than once a month
Once or twice a month
Once a week
Twice a week or more

TIME SPENT ON

Amount of time

More
About same
Less

TABLE XI
MEMBERSHIP IN CLUBS AND ORGANIZATIONS

No. of organizations	Male (%)	Female (%)	Total (%)
None	12	8	10
One	24	12	18
Two	12	8	10
Three	4	12	8
Four or more	48	60	54

TABLE XII
ATTENDANCE AT CLUB MEETINGS

Frequency	Male (%)	Female (%)	Total (%)
Never	24	12	18
Less than once a month	12	8	10
Once or twice a month	36	24	30
Once a week	20	32	26
Twice a week or more	8	24	16

TABLE XIII
TIME SPENT ON CLUB ACTIVITIES AS COMPARED WITH AGE 55

Amount of time	Male (%)	Female (%)	Total (%)
More	8	36	22
About same	24	32	28
Less	68	32	50

TABLE XIV
FREQUENCY OF CHURCH ATTENDANCE^{a,b}

	Male			Female			Total		
	Mb	NMb	T	Mb	NMb	T	Mb	NMb	T
Never	3	9	12	3	2	5	6	11	17
Less than once a month	1	1	2	1	0	1	2	1	3
Once or twice a month	0	1	1	0	1	1	0	2	2
Once a week	8	1	9	18	0	18	1	26	27
Twice a week or more	1	0	1	0	0	0	1	0	1
Total	13	12	25	22	3	25	35	15	50

^aAll respondents were either Protestants or had no religious preference.

^bColumn-head abbreviations: Mb, church member; NMb, nonmember; T, total.

ization. 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 Ss 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 decreasing participation. On the other hand, two thirds of the men reported lessened participation, whereas 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 church membership. Only half the sample, however, attended church as frequently as once a week.

These data do not permit any direct answer to the question whether the sample's contact with the environment has increased or lessened. It seems clear, however, that most of our Ss, at least in terms of their self-report, continued to interact socially in a variety of ways, which would suggest that they had rather extensive exposure to current cultural events.

3. 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 by the individual in meaningful nonwork-related activities. A special recreational fact-finding inventory (Kunde, 1954) was developed that surveys such areas as the amount of time spent on various types of leisure activities, specific activities engaged in, relative desirability of various kinds of recreational activities, and factors that seem to interfere with effective use of leisure time.

It soon became clear that the concept of leisure time was rather meaning-

less for our Ss. Indeed, the notion of total use earlier phase in the leisure related. Table sex of respondent, dev women spend the ma activities and activities activities, and spectato and devotional activi women.

Participation in spe listed) was also tabula dicating participation i Although the time spe excessive participation rather for activities of ticipation in activities i given for lack of recre of organized program ated physical conditi group an inability to low relevance.

C. Cognitive Variab

1. Measures of Intelle

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AVERAGE PROPORTI

Type of activity

Physical
Creative
Social
Having educational value
Audience and spectator
Informal games
Civic and social services
Devotional

less for our Ss. Indeed, any such use had to be carefully differentiated from the notion of total use of time, which included components that, during an earlier phase in the individual's life, would be considered either work or leisure related. Table XV gives the average proportion of leisure time, by sex of respondent, devoted to the various time classifications. Both men and women spend the major portion of their time almost equally on physical activities and activities having educational value. Creative activities, social activities, and spectator sports rank next for the men, while creative, social, and devotional activities have relatively high secondary interest for the women.

Participation in specific activities (a total of 43 different activities were listed) was also tabulated. Table XVI gives the number of respondents indicating participation in specific activities listed in rank order of preference. Although the time spent in physical activities is high, this does not represent excessive participation in organized physical activity. 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, whereas women indicated physical condition as the principal source of interference. For this group an inability to finance recreation or lack of friends seems of rather low relevance.

C. Cognitive Variables

1. Measures of Intellectual Ability

The mental ability level of our Ss was measured with the intermediate form of the Thurstone Primary Mental Abilities (PMA) Test. This instrument, although originally constructed for group testing of adolescents, has been

TABLE XV
AVERAGE PROPORTION OF LEISURE TIME SPENT ON VARIOUS TYPES OF ACTIVITY

Type of activity	Male	Female	Total
Physical	28.4	31.5	30.1
Creative	13.0	12.5	12.7
Social	8.0	10.3	9.2
Having educational value	28.7	26.9	27.7
Audience and spectator	8.3	4.0	6.0
Informal games	4.2	4.2	4.2
Civic and social services	5.2	4.4	4.8
Devotional	4.2	6.2	5.3

Total

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TABLE XVI
NUMBER OF MEMBERS OF ELDERLY GROUP PARTICIPATING IN SPECIFIC
ACTIVITIES IN ORDER OF FREQUENCY^a

Activity	M	F	T
Reading	25	25	50
Radio Listening	24	23	47
Chores	21	25	46
Visiting	21	25	46
Attending lectures	20	22	42
Clubs	19	22	41
Dinners	18	23	41
Meetings	16	19	35
Concerts	16	18	34
Church services	14	20	34
Card games	17	16	33
Walks	15	16	31
Parties	14	15	29
Scripture reading	11	18	29
Gardening	15	12	27
Theater	15	12	27
Movies	15	12	27
Sport events	16	9	25
Discussions	11	14	25
Community work	12	11	23
Writing	12	11	23
Church work	9	14	23
Outings	12	7	19
Forums	7	11	18
Crafts	8	9	17
Television	11	3	14
Checkers	8	4	12
Lodge meetings	6	4	10
Billiards	7	0	7
Music	2	4	6
Chess	5	1	6
Prayers	4	2	6
Golf	3	0	3
Horseback riding	3	0	3
Fishing	2	1	3
Arts	2	1	3
Hymn singing	2	1	3
Croquet	1	1	2
Hunting	2	0	2
Dancing	1	1	2
Dramatics	0	1	1
Bowling	0	0	0

^aMale, M; female, F; total, T.

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Table XVII gives the I
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using Thurstone's conver
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expected to attain at the
average 17-year-old in ve
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RAW SCORE MEANS A

Variable

Variable	Mean
Verbal meaning	30.68
Space	15.20
Reasoning	8.72
Number	26.52
Word fluency	43.76

PMA TEST MEAN

A 1

Variable

Variable
Verbal meaning
Space
Reasoning
Number
Word fluency

shown to have adequate range of difficulty and reliability for older Ss (Schaie, Rosenthal, & 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 correctly identifying 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 XVII gives the PMA raw score means and standard deviations separately by sex and for the total group, while Table XVIII provides comparison with young adults by converting the raw score means to *T* scores, using Thurstone's conversion table for his young adult (17 years plus) norm 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 in verbal and numerical abilities. On space and reasoning, however, a significant decrement is apparent, with mean values

TABLE XVII
RAW SCORE MEANS AND STANDARD DEVIATIONS ON THE PRIMARY MENTAL ABILITIES (PMA) TEST

Variable	Males		Females		Total group	
	Mean	SD	Mean	SD	Mean	SD
Verbal meaning	30.68	6.20	35.60	12.22	33.14	9.91
Space	15.20	8.06	10.80	7.64	13.00	8.09
Reasoning	8.72	4.89	11.36	5.47	10.04	5.30
Number	26.52	10.67	23.28	10.40	24.90	10.56
Word fluency	43.76	11.51	47.80	13.51	45.78	12.58

TABLE XVIII
PMA TEST MEANS CONVERTED INTO *T* SCORES AS COMPARED WITH A 17-YEAR-OLD NORMATIVE POPULATION

Variable	Males	Females	Total group
Verbal meaning	46	50	48
Space	40	38	39
Reasoning	42	44	43
Number	55	51	53
Word fluency	49	53	51

approximately 1 SD 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 examining the range of individual scores for those of our *Ss* who are in the eighties. Of sixteen such individuals, ten were still above the comparison mean for verbal meaning; nine subjects exceeded it on number and six equalled or exceeded it on word fluency. There seems to be a sex difference, shown by a greater decrement for men than for women on verbal tasks and by the reverse trend on tasks not involving verbal behavior. The men did significantly better ($p < .05$) on space, while the women exceeded the men on verbal meaning and reasoning.

Whether the PMA, developed for adolescents and young adults, should be considered suitable for our *Ss* is, of course, open to question. In a factor-analytically derived test, however, a pertinent bit of evidence would be the maintenance of separation between factor scores. Table XIX gives the intercorrelations among subtests. These are quite moderate except for the typically high correlation between verbal meaning and reasoning. Thus it seems that the relations among the PMA subtests are quite similar to those found in young populations.

2. Memory

The Wechsler Memory Scale (WMS) was used to determine the extent of memory deficit that might interfere with our group's effective functioning. The WMS has seven subtests: personal and current information, orientation in time and space, mental control (as measured by counting and reciting the alphabet), digit span, reproducing visual figures, reproducing the content of two short news reports, and paired-associate learning. The combined scores on these subtests yield a Memory Quotient (MQ) that is roughly comparable to the IQ derived from Wechsler's intelligence tests.

TABLE XIX
INTERCORRELATIONS AMONG THE PRIMARY MENTAL ABILITIES

	V	S	R	N	W
Verbal meaning		.35	.61	.30	.17
Space			.36	.19	.09
Reasoning				.40	.35
Number					.29
Word fluency					

The overall memory of 93 based on Wechsler interest, however, are therefore, presents the and the total number of total group, since no sig of the differences betw statistically significant, of the discrepancy. As group's ability to reprod learning was only slight of meaningful material in time and space and listing the alphabet, we

3. Visual-Motor Fun

Difficulties that older crimination and respon times attributed to pr visual-motor area. Steir relevant functions in o of the Wechsler digit s induce the *S* to produc for our group and for S control groups.

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MEAN PERFORMANCE

Subtest
Current information
Orientation
Mental control
Logical memory
Digit span forward
Digit span backward
Visual reproduction
Associative learning

The overall memory measure indicates only a mild deficit, with an MQ of 93 based on Wechsler's normative group of young adults. Of more interest, however, are specific components of memory functions. Table XX, therefore, presents the means for our group, a group of young adults, and the total number of attainable responses. Means here are based on the total group, since no significant sex differences were found. Although most of the differences between our sample 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 of 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.

3. Visual-Motor Functioning

Difficulties that 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 (1961) Symbol-Gestalt Test was used to assess the relevant functions in our sample. Stein's test is essentially a modification of the Wechsler digit symbol subtest; his symbols have a poor gestalt and induce the *S* to produce closure phenomena. Table XXI gives mean scores for our group and for Stein's adult (mean age 40 years) brain-damaged and control groups.

On two of the symbol-gestalt measures our group is midway between Stein's control and brain-damaged samples. It appears that there is a lowering in both the speed of reproducing correct symbols and the rate of

TABLE XX
MEAN PERFORMANCE ON THE SUBTESTS OF THE WECHSLER MEMORY SCALE

Subtest	Total possible	Norm group (20-29 years old)	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

TABLE XXI
MEAN SCORES ON STEIN'S SYMBOL-GESTALT TEST

Scoring variable	Superior old group	Brain-damaged (N=60)	Controls (N=120)
Correct symbols in 3 minutes	42.72	29.92	50.08
No. of qualitative errors	1.68	1.62	0.63
Improvement	1.08	.45	2.16

improvement, comparing performance in the first and third minute of the test. When the number of qualitative errors is considered, our Ss are quite close to Stein's Brain-damaged group. Of course, the 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 visual-motor functioning are likely to have occurred.

D. Personality Characteristics

1. Behavioral Rigidity

Difficulty in optimal functioning is often related to response style as well as to intellectual ability. The construct of rigidity has been interchangeably applied in both the cognitive and personality spheres (Chown, 1959). Schaie (1955, 1960) has developed a Test of Behavioral Rigidity (TBR) that provides operational measures of the two aspects of rigidity and of the related variable of psychomotor speed. The measure of motor-cognitive rigidity is derived from a ratio of interfered to noninterfered responses. This is done by means of 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 that require shifts in interpersonal habits and response patterns. The psychomotor speed measure is obtained by counting the number of responses elicited in simple copying and in response to overlearned antonym and synonym lists.

Table XXII gives the *T*-score means and standard deviations obtained by our sample on the TBR. The *T* scores are based on general population norms (ages 21-70). A low score is in the rigid direction. The results show a decrement in flexibility or response speed from middle adulthood, by from $\frac{1}{2}$ to 1 SD, but several of our Ss were still less rigid than a comparison population in its prime. Our group was somewhat less rigid in terms of personality-perceptual rigidity than of motor-cognitive and response speed attributes, where the peripheral sense organ decrement may be particularly important. Decreased psychomotor speed is particularly significant for our male Ss.

MEANS AND STANDARD DEVIATIONS ON EDWARDS PERSONALITY BEHAVIORAL INVENTORY

	Mean
Psychomotor speed	39.16
Personality-perceptual rigidity	44.84
Motor-cognitive rigidity	44.08
Composite	42.60

2. Need Structure

The Edwards Personality Inventory was designed to measure the Murray's list of manifest status of young adults. Fifteen male and 25 female graduate students were administered the inventory and provide close matching for the young and old groups.

Table XXIII gives mean scores and standard deviations for norms for both the young and old groups as presented in Table XXI. In three instances (deferred gratification, sexual activity and exhibitionism) there were differences indicating a need for abatement on the part of the older group.

Of particular interest are the scores on the need for achievement, which is as high in the young as in the old. This finding may of course be due to the fact that the sample is composed of professional and graduate students, a considerable amount of responsibility and achievement is different from the young group. The need for affiliation or friendship, giving and receiving of affection, is also high in both groups alike. The need for change is higher in the older than to the younger group. The need for introversion and needs of introception and

TABLE XXII
MEANS AND STANDARD DEVIATIONS FOR FACTOR SCORES ON THE TEST OF
BEHAVIORAL RIGIDITY (GENERAL POPULATION NORMS)

	Male		Female		Total	
	Mean	SD	Mean	SD	Mean	SD
Psychomotor speed	39.16	5.51	43.64	7.50	41.40	6.90
Personality-perceptual	44.84	6.35	43.64	5.90	44.24	6.10
Motor-cognitive rigidity	44.08	6.25	42.76	7.83	43.42	7.04
Composite	42.60	4.25	43.36	5.39	42.98	4.82

2. Need Structure

The 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 analysis, a comparison group of 25 male and 25 female graduate students with a mean age of 25 was selected to provide close matching for academic background and vocational interest.

Table XXIII gives means for the EPPS *T* scores in terms of Edwards' norms for both the young and old professional groups. Analyses of variance, as presented in Table XXIV, showed highly significant differences between the young and old groups on five of the fifteen needs measured by the EPPS. In three instances (deference, order, and endurance) need scores were higher for the older than for the younger group. The reverse was true for heterosexual activity and exhibition (or attention). Marginally significant also 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 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 old group was also no different from the young on need for autonomy or independence and on need for affiliation or friendships. In the needs for nurture and succorance—the giving and receiving of affection, sympathy, and help—old and young are alike. The need for change or new experience is no less important to our older than to the younger group and there is no difference between groups in the needs of introception and aggression.

TABLE XXIII
MEAN *T* SCORES ON THE EPPS^a

Need	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
Intracception	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

^aMeans are given in terms of Edwards's norms for both the young college group and the old group.

Table XXV 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 heterosexuality, where males greatly exceed female *Ss*. The male *Ss* are also higher on achievement and aggression, and the female *Ss* on nurture, affiliation, and succorance.

One other point of interest with respect to sex differences in the need structure of our group is that on eight of the needs the sex differences are larger in the older group. Terman and Miles' (1936) data 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.

3. Attitudinal Variables

a. Attitudes toward Self and Environment. The Burgess *et al.* (1948) inventory contains a section that gives information about the respondents' attitudes toward themselves and the environment. Seven scales are included, each of which contains seven items. Each scale was scored so that a score of four reflects average satisfaction or acceptance, while lower scores indicate dissatisfaction and higher scores above-average satisfaction. Table XXVI

ANALYSIS OF VARI

Variable	Age
	MS
Achievement	46.24
Deference	1142.44
Order	1474.56
Exhibition	198.81
Autonomy	15.21
Affiliation	0.36
Introception	3.61
Succorance	51.84
Dominance	98.01
Abasement	116.64
Nurturance	22.09
Change	77.44
Endurance	1108.89
Sex	4316.49
Aggression	4.84
Consistency	0.09

^aSignificant at or beyond .

^bSignificant at or beyond .

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TABLE XXIV
ANALYSIS OF VARIANCE OF SEX AND AGE DIFFERENCES ON THE EPPS

Variable	Age		Sex		Interaction		Residual
	MS	F	MS	F	MS	F	
Achievement	46.24	2.25	289.00	14.08 ^a	0.36		20.53
Deference	1142.44	111.89 ^a	38.44	3.76	0.64		10.21
Order	1474.56	96.95 ^a	1.44		40.96	2.69	15.21
Exhibition	198.81	15.98 ^a	34.81	2.80	1.21		12.44
Autonomy	15.21		12.25		13.69		22.70
Affiliation	0.36		207.36	11.71 ^a	12.96		17.71
Introception	3.61		100.41	4.30 ^b	13.69		23.33
Succorance	51.84	3.09	169.00	10.09 ^a	0.64		16.75
Dominance	98.01	4.55 ^b	320.41	14.86 ^a	0.01		21.56
Abasement	116.64	4.60 ^b	112.36	4.43 ^b	1.44		25.34
Nurturance	22.09	1.09	246.49	12.20 ^a	7.29		20.20
Change	77.44	3.60	5.76		27.04	1.26	21.51
Endurance	1108.89	61.40 ^a	2.89		1.69		18.06
Sex	4316.49	26.76 ^a	102.01		161.29	7.07 ^a	22.81
Aggression	4.84		237.16	14.79 ^a	1.00		16.04
Consistency	0.09		6.25	1.97	0.09		3.17

^aSignificant at or beyond 5% level of confidence.

^bSignificant at or beyond 1% level of confidence.

gives means and standard deviations on these scales. The results suggest that our Ss are reasonably satisfied with their current state of health, their friendships, the satisfaction they derive from their family, their feelings of economic security, and their sense of 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 were found in satisfaction derived from the family, which was higher for the male than female Ss, and in the acceptance of religious experience, which was much lower for the men than for the women. The latter finding coincides with the sex difference in religious participation reported in the section on environmental interaction. It is unclear, of course, whether lower satisfaction leads to reduced environmental interaction or whether the reported low satisfaction from religious experience is a consequence of a tendency to withdraw from relevant experiences.

b. Self-Ratings of Happiness and Success. As a concluding indication of our Ss' views of their life experiences, Tables XXVII and XXVIII provide data on their retrospective ratings of their life in terms of happiness and accomplishment. Only one member of the group described her life as having been unhappy, whereas over three fourths of the Ss considered their lives to have been at least moderately happy. Moreover, 90% of the Ss

TABLE XXV
MEANS AND STANDARD DEVIATIONS ON THE EPPS

Need	Total		Male		Female		<i>t_{m/f}</i>
	Mean	SD	Mean	SD	Mean	SD	
Achievement	15.04	4.20	16.68	3.95	13.40	3.85	2.97 ^a
Deference	17.06	3.39	16.52	3.33	17.60	3.43	1.13
Order	16.48	3.69	15.96	3.79	17.00	3.58	0.97
Exhibition	11.40	3.70	11.88	4.21	10.92	3.14	0.92
Autonomy	15.06	4.74	15.04	5.59	15.08	3.83	0.03
Affiliation	16.28	4.65	14.48	4.68	18.08	3.93	2.64 ^b
Introception	16.18	4.58	15.84	4.62	16.52	4.61	0.44
Succorance	10.02	4.47	8.64	3.97	11.40	4.60	2.27 ^b
Dominance	12.90	5.04	14.68	5.20	11.12	4.28	2.65 ^b
Abasement	13.62	5.32	12.44	5.27	14.80	5.20	1.59
Nurturance	15.28	4.62	13.44	4.95	17.12	3.47	3.04 ^a
Change	15.48	4.57	15.76	4.54	15.20	4.68	0.43
Endurance	19.58	3.65	19.28	3.10	19.88	4.17	0.58
Sex	4.56	4.67	6.84	5.16	2.67	7.13	3.92 ^a
Aggression	11.04	4.09	12.48	4.10	9.60	3.59	2.64 ^b
Consistency	11.96	1.47	12.24	1.59	11.68	1.31	1.36

^aSignificant at or beyond 1% level of confidence.

^bSignificant at or beyond 5% level of confidence.

TABLE XXVI

POSITIVE ATTITUDES TOWARD SELF AND ENVIRONMENT
EXPRESSED ON BURGESS ATTITUDE SCALE^a

	Total		Male		Female		<i>t_{m/f}</i>
	Mean	SD	Mean	SD	Mean	SD	
Health	4.38	1.23	4.52	1.16	4.24	1.31	0.80
Friends	4.98	1.02	4.92	1.16	5.04	0.89	0.41
Work	3.96	1.18	4.12	1.17	3.80	1.19	0.96
Economic security	4.52	0.95	4.52	1.12	4.52	0.76	0.00
Religion	4.16	1.93	3.44	2.22	4.88	1.27	2.82 ^b
Usefulness	4.46	0.95	4.44	0.96	4.48	0.96	0.15
Happiness	4.00	1.07	4.24	1.02	3.76	1.10	1.60
Family	4.72	0.76	5.00	0.76	4.44	0.65	2.80 ^b

^aBurgess *et al.* (1948).

^bSignificant at or beyond 1% level of confidence.

SEL

Very happy
Moderately happy
Average
Unhappy

SELF-

Well satisfied
Reasonably satisfied
Dissatisfied

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TABLE XXVII
SELF-RATING OF RESPONDENT'S LIFE IN RETROSPECT

	Male	Female	Total
Very happy	10 (40%)	10 (40%)	20 (40%)
Moderately happy	11 (44%)	8 (32%)	19 (38%)
Average	4 (16%)	6 (24%)	10 (20%)
Unhappy	0 (0%)	1 (4%)	1 (2%)

TABLE XXVIII
SELF-RATING OF RESPONDENT'S ACCOMPLISHMENT IN LIFE

	Male	Female	Total
Well satisfied	8 (32%)	6 (24%)	14 (28%)
Reasonably satisfied	14 (56%)	17 (68%)	31 (62%)
Dissatisfied	3 (12%)	2 (8%)	5 (10%)

considered themselves at least reasonably satisfied with their lifetime accomplishment. No significant sex differences occurred in these global self-descriptions.

E. Effects of Confounding Variables on Performance on the Cognitive and Personality Variables

1. *Effect of Speed, Memory, and Motor-Cognitive Rigidity on the Primary Mental Abilities*

When the performance of our sample is compared with that of young reference groups, it becomes readily apparent that maximum decrement was found on the variables of psychomotor speed, memory, and motor-cognitive rigidity. An attempt was therefore made to adjust scores on the Thurstone Primary Mental Abilities Test for the effect of these three variables. Table XXIX gives the correlations between the PMA scores and the variables assumed to have a confounding effect, and reports mean *T* scores for the total group before and after the effects of speed, memory, and motor-cognitive rigidity have been removed.

The means on the PMA tests have been adjusted to the level that would obtain if there had been no age decrement on the confounding, and possibly peripherally determined, factors. After such adjustment, group means are raised to about 1 SD above the average performance in young *Ss* for verbal meaning, number, and word fluency. The adjusted mean score on reasoning is at the mean of the young population, but the space score remains approximately 1 SD below the mean of the young reference group. Further details

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TABLE XXIX
CORRELATIONS BETWEEN SCORES ON THE PMA TEST AND THE VARIABLES
OF PSYCHOMOTOR SPEED, MEMORY, AND MOTOR-COGNITIVE RIGIDITY

Variable	Verbal Meaning	Space	Reasoning	Number	Word fluency
Psychomotor speed (TBR)	.68	.14	.67	.41	.40
Overall memory score (WMS ^a)	.38	.31	.57	.31	.45
Motor-cognitive rigidity (TBR)	.50	.26	.46	.32	.02
MEAN T SCORES ON PMA TEST BEFORE AND AFTER ADJUSTMENT FOR EFFECT OF SPEED, MEMORY, AND MOTOR-COGNITIVE RIGIDITY					
Before	48	39	43	53	51
After	62	42	52	60	59

^aWechsler Memory Scale.

on the method and results of the PMA score adjustment have been reported elsewhere (Strother, Schaie, & Horst, 1957).

2. Effects of Activities and Attitudes on Cognitive and Personality Variables

No attempt was made to adjust test scores for the effects of attitudinal variables and the level of environmental interaction shown by our Ss, since information on these variables was lacking for a comparable population at the young adult age level. However, several significant correlations were found in our sample that might have warranted appropriate adjustments if they had been feasible. Thus, correlations significant at the 5% level of confidence were found between the overall index of environmental interaction and the verbal meaning score on the PMA. Positive correlations were further found between the amount of leisure activity and the PMA scores for verbal meaning, reasoning, and number. An intriguing finding is a negative correlation between the PMA space score and expressed feelings of security. Apparently the greater the remaining ability to orient oneself in space, the greater one's feeling of security.

A positive correlation was found between the overall activity index and need for deference, while the correlations were negative between this index and the need for autonomy and that for aggression. Those of our Ss who were most active apparently had resolved conflicts that led to high need scores on the EPPS. Several correlations were significant also for the relationship between the composite score summarizing the attitude measures on the Burgess *et al.* (1948) activities inventory and the EPPS. Thus positive correlations were found between positive attitudes and needs for deference and order, and negative correlations occurred between the expression of positive attitudes about the self and needs for autonomy and dominance.

IV. Concluding Remarks

The results reported in this paper provide support to the proposition that the literature cannot be taken as motivation or artifact of an environmental and social level of education and experience in their adult life. Nevertheless, the highly selected group of young adults. This is an obvious decrease in physiological decrements in the general slowing of

Psychological decrements in visual-motor responses is also clearly apparent in a range of individual differences. Changes in cognitive functions are not necessarily accompanied by acceptance of reduced performance of the older individual. The conditions of his performance are constraints that require

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Brodman, K. Cornell University, *Intelligence towards medical psychology*.
Burgess, E. W., Cavanagh, Science Research Associates, Chown, Sheila M. Rigid
Cohen, J. Supplemental instrument, Univer. of
Cummings, Elaine, & H. Edwards, A. L. *Manua* Corp., 1954.
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IV. Concluding Remarks

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

Psychological decrement is most apparent in functions that 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. Although there are clearly changes in cognitive processes in the direction of reduced ability, these are not necessarily accompanied by a corresponding reduction in needs or an acceptance of reduced interaction with the environment. **It is the relation of the older individual's continuing needs and aspirations to the limiting conditions of his physiological apparatus and the resulting environmental constraints that require most urgent attention and further study.**

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