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Somatic Complaints in Males as a Function of Age and Neuroticism: A Longitudinal Analysis[1]

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Previous research has shown that both age and neuroticism are correlated with total scores on self-report health inventories; the present study concerns the influence of these two factors on reports of physical complaints in various bodily systems. Six- and twelve-year longitudinal analyses of the physical health sections (A–L) of the Cornell Medical Index were supplemented with cross- and time-sequential analyses. Subjects, aged 17–97, were taken from a group of 1038 male participants in the Baltimore Longitudinal Study of Aging. Results showed that problems in sensory, cardiovascular, and genitourinary systems increased with age, while health habits improved. More neurotic subjects, as measured by the psychiatric sections (M–R) of the CMI and the Emotional Stability Scale of the GZTS showed higher levels of endorsements on all sections. These results suggest that age does not produce a generalized increase in physical complaints; instead, specific age-related symptoms show increases. Implications of these findings for research involving self-assessments of health are discussed.

KEY WORDS: age; neuroticism; somatic complaints; longitudinal analyses; psychological distress.

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INTRODUCTION

Self-perceptions of health are key components of health maintenance, since they influence efforts at self-medication as well as decisions to seek medical treatment. Physicians rely heavily on medical histories and symptom descriptions provided by patients in reaching diagnoses, and social gerontologists often employ self-ratings of health as predictors in investigations of the quality of life. All of these uses presuppose some degree of correspondence between subjective evaluation of health and objective physical status.

Most of the literature in the field of aging has employed global assessments of health, and studies have typically found that these self-ratings are moderately correlated with medical determinations of health (LaRue *et al.*, 1979; Maddox and Douglas, 1973; Tissue, 1972). These studies have also consistently shown that global health ratings are related to psychological characteristics such as health attitudes (Monroe *et al.*, 1965), morale (Friedsam and Martin, 1963; Larson, 1978; Suchman *et al.*, 1958), adjustment (Blazer and Houpt, 1979), or psychological distress (Tessler and Mechanic, 1978). Despite the demonstrable increases in many kinds of illness with age, global ratings often fail to show any marked association with age (Stenback, 1964). Markides and Martin (1979), in a sample of persons 60 and over, 61% women and 70% Mexican Americans, employed a path analysis model to investigate direct and indirect causal effects of age, objective health, and sociodemographic factors on global self-rated health. The most important predictor of self-rated health was an index of physician-rated health. Age had no significant direct effect and only small indirect effects on self-rated health.

Symptom checklists such as the Cornell Medical Index (CMI) offer certain advantages over global ratings. Since they employ specific questions about conditions and symptoms, they may provide more accurate accounts of specific illnesses, less influenced by general health attitudes. Using such measures it is possible to analyze medical conditions or body systems separately and determine whether age is differentially associated with complaints in particular somatic systems. A total score can also be obtained by summing endorsements, giving a measure of overall perceived health with a potentially higher reliability than single-item ratings. It must be noted that many of the individual items on these checklists are ambiguous with regard to etiological interpretation: Reporting chest pain may indicate indigestion instead of angina. However, these responses can legitimately be regarded as indicators of *complaints* about specific symptoms, regardless of the medical basis of the complaints.

Like global ratings, checklists are known to be influenced by both objective health (Abramson, 1966; Abramson *et al.*, 1965) and psychological factors. Clinical diagnoses of hypochondriasis or neurosis have been found to be linked to extremely high endorsement of CMI physical complaints (Ryle and Hamilton, 1962). In addition, a number of other characteristics including general anxiety (McCrae *et al.*, 1976), poor marital adjustment (Hamilton *et al.*,

1962), and psychological problems (Brodman *et al.*, 1960) have been identified as correlates of higher symptom endorsement.

Despite extensive use of self-ratings or perceptions of health, little attention has been given to conceptualizing their determinants. Many of the psychological factors identified in previous research can be hypothesized to have in common a relationship to the broad domain of personality identified as neuroticism (Eysenck, 1960; Costa and McCrae, 1980b). The present study tests this hypothesis by examining the relative influences of age and neuroticism on self-perception of health or illness for several body systems and total physical complaints. In order to separate maturational effects from generational differences and time-of-measurement effects, traditional longitudinal analyses are supplemented by analyses which approximate cross- and time-sequential designs (Schaie, 1965). In order to replicate neuroticism effects, two independent measures which fall in this domain are employed.

METHOD

Subjects. Participants in the Baltimore Longitudinal Study are a community-dwelling, generally healthy group of male volunteers, 96% white, who have agreed to return for testing at intervals of from 1 to 2 years depending on their age. The majority (80%) works in or is retired from scientific, professional, or managerial positions. Almost all (93%) are high-school graduates, and 71% are college graduates; 88% were married. At the time of their first administration of the CMI, the 1038 subjects ranged in age from 20 to 97.

Some analyses employed data from a second or third administration of the CMI. Numbers of subjects in these analyses were smaller, since many subjects had not yet participated in the study for a sufficient number of years, and since some subjects died or withdrew from the study.[4] Evidence from parallel studies on the Guilford–Zimmerman Temperament Survey (GZTS) suggests that subjects who returned for second and third administrations tended to be higher than nonrepeats in Emotional Stability, Objectivity, Friendliness, and Personal Relations and lower in Ascendance (Douglas and Arenberg, 1978).

Measures. The Cornell Medical Index (CMI; Brodman *et al.*, 1949) is a self-report symptom checklist with 195 items divided into 12 somatic sections (A–L) and 6 psychiatric sections (M–R). Two of the somatic sections, I (Frequency of Illness) and J (Fatigue), had extremely low endorsement in this sample and, thus, were combined in all analyses.

The sum of the first 12 sections yields a measure of total physical complaints; the sum of the last 6 sections provides a measure of psychiatric com-

[4] Of those scheduled for retest, 28% failed to take the test, due to either death or dropout. These individuals were 3 years older and two points lower on Emotional Stability than were the retested subjects, but were insignificantly higher on Total Physical Complaints.

plaints or neuroticism. Endorsement of psychiatric items is low, with about 40% of the subjects endorsing none and an additional 20% endorsing only 1 of the 51 items.

The alternate measure of neuroticism, the Emotional Stability Scale of the GZTS (Guilford *et al.*, 1976), is a 30-item scale covering evenness vs. fluctuation of mood (7 items), perseveration of ideas (6 items), composure vs. excitability (2 items), daydreaming (3 items), feelings of guilt, loneliness, or worry (3 items), and cheerfulness vs. gloominess (7 items). Two items explicitly refer to feelings of good vs. ill health. Internal consistency in the present sample was 0.86. Handbook norms give a median score of 18; however, the median in this well-adjusted sample was 22. Correlation between the reflected Emotional Stability Scale and the CMI psychiatric score is 0.52 ($N = 915, p < 0.001$) in this sample.

Procedure. Subjects first completed the CMI as a part of a larger medical history form on their first or second visit to the Gerontology Research Center. Longitudinal analyses were restricted to subjects whose second administration was between 5.0 and 8.0 years after the first and whose third administration was between 10.0 and 17.0 years after the first. Each subject was also given the standard GZTS instructions individually and completed that questionnaire during the remainder of his first or second[5] visit to the Gerontology Research Center. For each item, subjects chose "yes" or "no" or "?." Each scale consists of 30 items, but only "yes" or "no" responses contribute to the total score. A score was invalidated for any scale with more than three "?" responses, a procedure suggested by Guilford and Zimmerman (1949). Only scores from the Emotional Stability Scale were used in the present analysis.

Analyses. Four sets of repeated-measures analyses of variance were conducted, using age and neuroticism as classifying variables. In all analyses, subjects were classified as young (20–44), middle (45–51), or old (57+) on the basis of their age at the first administration. These cutoffs were chosen to equalize the cell sizes. In two of the sets of analyses, neuroticism was operationalized by the Emotional Stability Scale of the GZTS, and subjects were classified as unstable (0–22) or stable (23–30). In the other two sets of analyses, neuroticism was operationalized by the CMI psychiatric (M–R) score, and subjects were classified as high (2 or more) or low (0) in neuroticism. Subjects endorsing one item on the M–R section were omitted from these analyses. Table I shows the sample sizes used in the repeated-measures analyses for two and three administrations of the CMI.

Cross-sequential ($N = 551$) and time-sequential ($N = 637$) analyses were also conducted on first administration data. Cross- and time-sequential designs, discussed by Baltes (1968) and Schaie (1977), are quasiexperimental designs for

[5] Thirty-six subjects were tested on the second visit in the early part of the study, circa 1960–1964. These subjects were an average of 5 years older than the other subjects, but did not differ in Emotional Stability or Total Physical Complaints.

Table I. Sample Sizes for Repeated-Measures Analyses

	Age group		
	20–44 (*N*)	45–56 (*N*)	56–94 (*N*)
CMI psychiatric cutoff scores			
Zero items endorsed			
Two administrations	63	43	61
Three administrations	21	21	16
Two or more items			
Two administrations	45	51	40
Three administrations	17	21	10
GZTS emotional stability scores			
23–30 (stable)			
Two administrations	60	48	58
Three administrations	22	20	18
0–22 (unstable)			
Two administrations	66	61	52
Three administrations	22	25	11
Intervals			
Between 1st and 2nd administrations: 5 to 8 years			
Between 1st and 3rd administrations: 10 to 17 years			

the study of developmental phenomena. Cross-sectional designs confound maturation with generational differences, and longitudinal designs confound maturational differences with cultural changes during the course of the study (and with the effects of repeated exposure to the test). Although they are not capable of conclusively attributing effects to aging, cohort, or time or measurement (Adam, 1978), cross- and time-sequential designs do provide an additional kind of evidence on which to base inferences. In the present study, they also permit longitudinal analysis of first administration responses from a much larger sample than that available for repeated-measures analyses. Since only first administration data are required, these analyses are not biased by selective attrition effects.

In cross-sequential analyses, independent samples of individuals born in the same historical time period are compared at different times of testing. Since recruitment into the BLSA was continuous, the present study contrasted two successive intervals of testing (1958–1963 vs. 1964–1969) rather than two distinct time points and, thus, only approximates a true cross-sequential design. Birth cohorts were defined in 6-year intervals (from 1896–1901 to 1926–1931) to match the 6-year period between times of testing.

In time-sequential analyses, independent samples of individuals of the same age are compared at different times of measurement. In these analyses, times were again defined as the intervals 1958–1963 and 1964–1969. Age groups were defined in 6-year intervals (from 26–31 to 68–73).

Studies which involve analysis of many dependent variables may capitalize on error and falsely reject the null hypothesis in some of the "significant"

results. While it is possible to compensate for this through the adoption of more stringent alpha-levels or through the use of such procedures as multivariate analysis of variance, a different strategy was adopted here. By using different operationalizations of Neuroticism, different subsamples for longitudinal analyses, and a variety of analytic designs, the present paper contains what may be viewed as several replicated studies. Effects which are replicated across several such different analyses may safely be considered nonchance.

RESULTS

Table II summarizes significant ($p < 0.05$) main effects from the four sets of repeated-measures analyses. Most results are replicated in at least two analyses. All sections show an increase with higher levels of neuroticism, and three sections (Cardiovascular, Digestive, and Frequency of Illness and Fatigue), as well as the Total, show this effect in all four analyses. Longitudinal increases are shown for Sensory Systems and Genitourinary sections in all analyses, and longitudinal effects are also seen for Cardiovascular complaints and Total, which increase, and for Poor Health Habits, which decrease. Each longitudinal finding is replicated in at least one cross-sectional analysis. In addition, cross-sectional increases in Miscellaneous Diseases and Musculoskeletal complaints were found, and a cross-sectional decrease in Neurological complaints was observed in one of the four analyses.

Table III summarizes mean changes over the first interval and mean differences between emotionally stable and unstable individuals for one of the four

Table II. Summary of Main Effects from Four Repeated-Measures Analyses

	Aging		
	Cross sectional	Longitudinal	Neuroticism
Sensory Systems	Increases (3)[a]	Increases (3)	Increases (1)
Respiratory	–	–	Increases (1)
Cardiovascular	Increases (1)	Increases (2)	Increases (3)
Digestive	–	–	Increases (3)
Musculoskeletal	Increases (1)	–	Increases (2)
Skin	–	–	Increases (2)
Neurological	Decreases	–	Increases (2)
Genitourinary	Increases (3)	Increases (3)	Increases (2)
Frequency of Illness and Fatigue	–	–	Increases (3)
Miscellaneous Diseases	Increases (1)	–	Increases (2)
Health Habits	Decreases (1)	Decreases (1)	Increases (1)
Total	Increases	Increases (1)	Increases (3)

[a] Number of replications in parentheses.

Table III. Mean Levels of CMI Sections at Two Times and for Emotionally Stable vs. Unstable Subjects

	Time 1 vs. Time 2		Emotionally stable vs. unstable	
	50.1[a] (N = 345)	56.6	54.7 (N = 166)	52.7 (N = 179)
Sensory Systems	1.49	1.68[b]	1.47	1.69[b]
Respiratory	1.24	1.24	0.94	1.52[b]
Cardiovascular	0.94	1.05	0.76	1.23[b]
Digestive	2.02	2.00	1.65	2.37[b]
Musculoskeletal	0.26	0.32	0.22	0.36[c]
Skin	0.41	0.43	0.32	0.52[c]
Neurological	1.14	1.05	0.93	1.26[d]
Genitourinary	1.10	1.37[b]	1.03	1.44[b]
Frequency of Illness and Fatigue	0.25	0.26	0.09	0.42[b]
Miscellaneous Diseases	1.51	1.55	1.38	1.68[d]
Health Habits	1.27	1.17	1.01	1.42[b]
Total	11.62	12.12	9.83	13.91[b]

[a]Mean age.
[b]$P < 0.001$.
[c]$P < 0.05$.
[d]$P < 0.01$.

sets of analyses in order to show the magnitude of the effects. In general, these are modest, with less than one-quarter item increase in 6 years on the two sections (Sensory Systems and Genitourinary) which show significant effects in this analysis. Effects for neuroticism are somewhat larger, with total scores about four items (42%) higher for unstable than for stable subjects.

Two significant age-group-by-time interactions were replicated. Cardiovascular complaints accelerated with age, showing the greatest increases among the oldest subjects. Poor Health Habits declined, but primarily in the old and middle groups, with little or no change in the young group.

Table IV summarizes main effects from the cross-sequential and time-sequential analyses. In cross-sequential analyses, the birth cohort factor confounds cohort and aging, and will be referred to as cohort/aging. The time factor confounds secular changes during the time of measurement and aging, and will be referred to as time/aging. Significant increases in both of these were seen for Sensory Systems, Cardiovascular, and Genitourinary complaints, as well as Total. These are most parsimoniously interpreted as aging or maturational effects. A time/aging effect was also seen for Miscellaneous Diseases, as well as a cohort/aging effect for Musculoskeletal problems. There were no significant interactions.

Table IV. Summary of Main Effects from Cross- and Time-Sequential Analyses

	Cross- sequential		Time- sequential	
	Time/aging	Cohort/aging	Time/cohort	Aging/cohort
Sensory Systems	Increases[a]	Increases[a]	–	Increases[a]
Respiratory	–	–	–	–
Cardiovascular	Increases[a]	Increases[a]	–	Increases[a]
Digestive	–	–	–	–
Musculoskeletal	–	Increases	–	Increases
Skin	–	–	–	–
Neurological	–	–	–	Decreases
Genitourinary	Increases[a]	Increases[a]	–	Increases[a]
Frequency of Illness and Fatigue	–	–	–	–
Miscellaneous Diseases	Increases[a]	–	–	Increases[a]
Health Habits	–	–	–	Decreases[a]
Total physical complaints	Increases	Increases	–	Increases

[a] Replicated in categorical analysis.

In time-sequential analyses, the effects can be identified as aging/cohort and time/cohort, since birth cohort is confounded with each of the other two factors. Significant increases were observed for Sensory Systems, Cardiovascular, Musculoskeletal, Genitourinary, and Miscellaneous Diseases, as well as total complaints on the aging/cohort factor. Significant decreases on this factor were seen for the Neurological and Poor Health Habits sections. By contrast, *no* effects proved significant on the time/cohort factor, nor were any interactions significant. This is strong evidence that maturational rather than generational differences or cultural changes during this period of measurement are responsible for the observed effects. It should also be noted that these analyses generally confirm the repeated-measures analyses; magnitudes of the score differences are also comparable.

Supplementary Categorical Analysis. Because of low endorsement frequencies, distributions for most of the section scores were skewed. Although analysis of variance is known as a robust technique, relatively insensitive to departures from normality (McNemar, 1962), there was some concern that the results might be distorted. As an alternative, the Grizzle–Starmer–Koch (GSK) approach to the analysis of categorical data was considered (Grizzle *et al.*, 1969). This technique was designed to analyze categorical or nominal data, although it can be applied to ordinal data, such as the number of items endorsed. However, in order to test hypotheses, there should be at least 10 observations in every cell (Kleinbaum and Kupper, 1978). To fit the present data to this requirement, it would be necessary to collapse scores into two categories, e.g.,

"none" vs. "some." Information is lost in this process, and there is room for some subjectivity in the choice of a cutoff point. Nevertheless, as a check on the analysis of variance results, categorical analyses were performed on dichotomized section scores to parallel the cross- and time-sequential analyses. Scores for Sensory Systems, Digestive, Neurological, Miscellaneous Diseases, and Health Habits were classified as "none or one" vs. "two or more" endorsements; scores on all other sections were dichotomized as "none" vs. "one or more" endorsements.

The Funcat procedure of the Statistical Analysis System (SAS; Helwig and Council, 1979) was employed to analyze responses. Times of measurement and birth cohorts (as defined in the cross-sequential analyses) were used as factors in one set of analyses, and times of measurement and age groups (as defined in the time-sequential analyses) were factors in the second. Dichotomized section scores were treated as responses. In the first set of analyses, significant ($p < 0.05$) main effects were found for Sensory Systems, Cardiovascular, Genitourinary, and Miscellaneous Diseases. Significant effects for cohort/aging were found for Sensory Systems, Cardiovascular, and Genitourinary sections.

In the second set of analyses corresponding to the time-sequential analyses of variance, no significant effects were observed for time/cohort. Aging/cohort effects were found for Sensory Systems, Genitourinary, Miscellaneous Diseases, and Health Habits. These effects are indicated in Table IV.

Examination of Table IV will show that each main effect in the categorical analysis was also found in the analysis of variance, although the analysis of variance suggested some effects not replicated or found by the categorical analysis. The greater sensitivity of the ANOVA procedure may be due to the additional information available from using scores as a continuous variable. In any case, the general pattern of results is similar from the two sets of analyses.

DISCUSSION

The data presented here show a consistent pattern across different methods of analysis and different operationalizations of neuroticism. Age has a selective effect on physical complaints, while neuroticism appears to produce a more general and diffuse effect on physical complaints. The fact that significant effects were found despite the restriction of range in this healthy and well-adjusted sample argues that the latter relationship must be quite strong, and that the influence of neuroticism on health perception might be even more pronounced in the general population.

The specific effects associated with aging are not surprising. The prevalence of sensory, cardiovascular, musculoskeletal, and genitourinary problems in this age group is well-known (Shanas and Maddox, 1976). It is somewhat puzzling

that respiratory and digestive complaints do not appear to increase with age; this may be an artifact of the particularly healthy sample used. The fact that only certain systems show age-related increases may account in part for the fact that global health ratings are only weakly related to age.

Corroborating evidence that older people do not present large numbers of complaints is provided by Eckstein (1978). As a full-time geriatric physician, Eckstein comments that, "given the large burden of illness and disabilities the elderly endure . . . the complaints of the elderly are remarkably low-keyed and valid" (p. 16). He attributes this to the unwillingness of most older patients to fit the pejorative stereotypes of old complainers. In addition, it can be speculated that health expectations decline with age. Conditions like fatigue after exercise, considered medically significant by younger people, may be regarded as a normal part of aging by the elderly and, thus, not reported as a complaint. Finally, well-adjusted older individuals may show a realistic concern for their health without a greater number of complaints. Most older people, for example, learn to be more cautious in walking in order to avoid falls.

What we do not see in the present sample is any increase in unrealistic, unproductive obsession with health and bodily functioning. These findings contradict the stereotype of aging people as hypochondriacs or "crocks" (Butler, 1978), but they are consistent with other literature. Using psychodynamically oriented psychiatric ratings of hypochondriasis, Gianturco and Busse (1978) report a longitudinal decline in hypochondriasis. In a sample of 176 community-dwelling men and women aged 60–90, 6% became more hypochondriacal, whereas 26% became less so. This does not mean that there are no elderly hypochondriacs; however, the proportion of such people is no higher in old age than in youth or middle age (cf. Shanas and Maddox, 1976).

At any age, excessive complaints are associated with neuroticism, or poor psychological adjustment, which is itself unrelated to age. Gianturco and Busse (1978) report that hypochondriasis was associated with lower levels of happiness, fewer friends, and depression and that "the vast majority of the severe neurotics were . . . hypochondriacs" (p. 12). Luborsky *et al.*, (1973), in a review of over 50 studies in the field of psychosomatic medicine, found a variety of psychological factors including resentment, frustration, depression, anxiety, and helplessness associated with a range of ailments from "cold hands" to cancer; there was no evidence of symptom specificity. Similarly, Tessler and Mechanic (1978) found that psychological distress, whether measured as negative affect, nervousness, or global unhappiness, was associated with lower self-ratings of health. Together with the present findings, these studies lead to a clear conclusion. Any manifestation of neuroticism–hostility, depression, anxiety, vulnerability to stress – is likely to be associated with diffuse somatic complaints.

The nature of the association between neuroticism and perceived health is not fully understood. There is some evidence that more neurotic individuals do not suffer from a higher incidence of fatal illness (Keehn *et al.*, 1974), but

it is possible that they are more frequently troubled by minor health problems, particularly such psychosomatic symptoms as fatigue, gastrointestinal problems, or palpitations. Luborsky *et al.* (1973) suggest that psychological variables may be involved in determining the onset or exacerbation of an illness to which an individual is predisposed. The range of complaints associated with neuroticism might suggest that individuals higher in neuroticism are simply more likely to complain. However, Meadow *et al.* (1978) have provided evidence that perception of somatic functioning, particularly autonomic frequency and reactivity, is significanlty related to neuroticism (stress reactivity). This evidence is consistent with the interpretation that individuals higher in neuroticism are more sensitive or attentive to bodily states.

In any case, it is clear that clinicians or researchers who employ self-reports of health or illness should be aware of the pervasive role of neuroticism. LaRue *et al.* (1979) have suggested that self-ratings of health "could provide a valid cost-effective measure of health assessment" (p. 687). But to the extent that self-ratings of health share the same determinants as measures of somatic complaints, such ratings will be determined by both objective health and neuroticism. Research concerned with the influence of physical health on morale, sick-role behavior, or adjustment should either use objective measures of health or supplement self-ratings with measures of neuroticism in order to control for its effects.

REFERENCES

Abramson, J. H. (1966). The Cornell medical index as an epidemiological tool. *Am. J. Public Health:* 287-298.

Abramson, J. H., Terespolsky, L., Brook, J. G., and Kark, S. L. (1965). Cornell medical index as a health measure in epidemiological studies: A test of the validity of a health questionnaire. *Br. J. Prevent. Med.* 19: 103-110.

Adam, J. (1978). Sequential strategies and the separation of age, cohort, and time-measurement contributions to developmental data. *Psychol. Bull.* 85: 1309-1316.

Baltes, P. B. (1968). Longitudinal and cross-sectional sequences in the study of age and generation effects. *Human. Develop.* 11: 145-171.

Blazer, D. G., and Houpt, J. L. (1979). Perception of poor health in the healthy older adult. *J. Am. Geriatr. Soc.* 27: 330-334.

Brodman, K., Erdmann, A. J., Jr., Lorge, I., and Wolff, H. G. (1949). The Cornell medical index: An adjunct to medical interview. *J. Am. Med. Assoc.* 140: 530-534.

Brodman, K., Erdmann, A. J., and Wolff, H. G. (1960). *The Cornell Medical Index – Health Questionnaire Manual,* Cornell Univesity Medical College, Ithaca, N.Y.

Butler, R. N. (1978). The doctor and the aged patient. In Reichel, W. (ed.), *The Geriatric Patient,* HP Publishing, New York.

Costa, P. T., Jr., and McCrae, R. R. (1980a). The influence of extraversion and neuroticism on subjective well-being: Happy and unhappy people. *J. Personal. Soc. Psychol.* 38: 668-678.

Costa, P. T., Jr., and McCrae, R. R. (1980b). Still stable after all these years: Personality as a key to some issues in aging. In Baltes, P. B., Brim, O. G. (eds.), *Life-Span Development and Behavior,* Vol. III, Academic Press, New York, pp. 65-102.

Costa, P. T., Jr., McCrae, R. R., and Arenberg, D. (1980). Enduring dispositions in adult males. *J. Personal. Soc. Psychol.* 38: 793-800.

Douglas, K., and Arenberg, D. (1978). Age changes, cohort differences, and cultural change on the Guilford-Zimmerman temperament survey. *J. Gerontol.* 33: 737-747.

Eckstein, D. (1978). Common complaints of the elderly. In Reichel, W. (ed.), *The Geriatric Patient,* HP Publishing, New York.

Eysenck, H. J. (1960). *The Structure of Human Personality,* Methuen, London.

Friedsam, H. J., and Martin, H. W. (1963). A comparison of self and physicians' health ratings in an older population. *J. Health Human Behav.* 4: 179-183.

Gianturco, D. T., and Busse, E. W. (1978). Psychiatric problems encountered during a long-term study of normal aging volunteers. In Issacs, A. D., and Post, F. (eds.), *Studies in Geriatric Psychiatry,* Wiley, New York.

Grizzle, J. E., Starmer, C. F., and Koch, G. G. (1969). Analysis of categorical data by linear models. *Biometrics.* 25: 489-504.

Guilford, J. P., and Zimmerman, W. S. (1949). *The Guilford-Zimmerman Temperament Survey: Manual of Instructions and Interpretations,* Sheridan Supply Co., Beverly Hills, Calif.

Guilford, J. S., Zimmerman, W. S., and Guilford, J. P. (1976). *The Guilford-Zimmerman Temperament Survey Handbook: Twenty-Five Years of Research and Application,* Edits, San Diego, Calif.

Hamilton, M., Pond, D. A., and Ryle, A. (1962). Relation of CMI responses to some social and psychological factors. *J. Psychosom. Res.* 6: 157-165.

Helwig, J. T., and Council, K. A. (1979). *SAS Users Guide, 1979 Edition,* SAS Institute, Inc., Raleigh, N.C.

Keehn, R. J., Goldberg, I. D., and Beebe, G. W. (1974). Twenty-four year mortality follow-up of army veterans with disability separations for psychoneurosis in 1944. *Psychosom. Med.* 36: 27-46.

Kleinbaum, D. G., and Kupper, L. L. (1978). *Applied Regression Analysis and Other Multivariate Methods,* Doxbury Press, North Scituate, Mass.

Larson, R. (1978). Thirty years of research on the subjective well-being of older Americans. *J. Gerontol.* 33: 109-125.

LaRue, A., Bank, L., Jarvik, L., and Hetland, M. (1979). Health in old age: How do Physicians' ratings and self-ratings compare? *J. Gerontol.* 34: 687-691.

Luborsky, L., Docherty, J. P., and Penick, S. (1973). Onset conditions for psychosomatic symptoms: A comparative review of immediate observation with retrospective research. *Psychosom. Med.* 35: 187-204.

Maddox, G. L., and Douglas, E. B. (1973). Self-assessment of health: A longitudinal study of elderly subjects. *J. Health Soc. Behav.* 14: 87-93.

Markides, K. S., and Martin, H. W. (1979). Predicting self-rated health among the aged. *Res. Aging* 1: 97-112.

McCrae, R. R., Bartone, P. T., and Costa, P. T., Jr. (1976). Age, anxiety, and self-reported health. *In. J. Aging Human Develop.* 7: 49-58.

McNemar, Q. (1962). *Psychological Statistics,* 3rd ed., Wiley, New York.

Meadow, M. J., Kochevar, J., Tellegen, A., and Roberts, A. H. (1978). Perceived somatic response inventory: Three scales developed by factor analysis. *J. Behav. Med.* 1: 413-426.

Monroe, R. T., Whiskin, F. E., Bonacich, P., and Sewell, W. O. (1965). The CMI questionnaire as a measure of health in older people. *J. Gerontol.* 20: 18-22.

Ryle, A., and Hamilton, M. (1962). Neurosis in 50 married couples. *J. Ment. Sci.* 108: 265.

Schaie, K. W. (1965). A general model for the study of developmental problems. *Psychol. Bull.* 64: 92-107.

Schaie, K. W. (1977). Quasi-experimental research designs in the psychology of aging. In Birren, J. E., and Schaie, K. W. (eds.), *Handbook of the Psychology of Aging,* Van Nostrand Reinhold, New York.

Shanas, E., and Maddox, G. L. (1976). Aging, health, and the organization of health resources. In Binstock, R. H., and Shanas, E. (eds.), *Handbook of Aging and the Social Sciences,* Van Nostrand Reinhold, New York.

Stenback, A., (1964). Physical health and physical disease as objective fact and subjective experience. *Arch Gen. Psychiat.* 11: 290-301.

Suchman, E. A., Phillips, B. S., and Streib, G. F. (1958). An analysis of the validity of health questionnaires. *Soc. Forces* 36: 223-232.

Tessler, R., and Mechanic, D. (1978). Psychological distress and perceived health status. *J. Health Soc. Behav.* 19: 254-262.

Tissue, T. (1972). Another look at self-rated health among the elderly. *J. Gerontol.* 27: 91-94.