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ABSTRACT
                There is increasing acceptance of the premise that
growth and development continue throughout adult life and, as life
expectancy has lengthened, there is a much expanded mid-life period.
Yet, middle adulthood has been neglected as an area of theoretical
and empirical examination. Adults (N=251) in middle adulthood (age
35-55) completed instruments measuring current health status, health
locus of control, health value, health habits, self-management
effectiveness, stressful life events, social support, genetic
predisposition, gender, level of education, and income. The results
indicated that internal locus of control was positively related to
total self-management, health self-management, and health habits,
while chance locus and powerful others locus were negatively related
to these behavioral variables. The strongest predictors positively
related to health were internal locus of control and health habits.
The strongest predictors inversely related to health were powerful
others locus, genetic predisposition, and less-than-high school
education. Although some factors not readily modifiable for
middle-aged adults were found to contribute to health status,
modifiable attitudinal and behavioral varibles were also found to be
important: even in cases with high genetic predisposition to disease,
good health habits appeared to make a significant difference.
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Predictors of Health in Middle Adulthood

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Abstract

This study examined the relationship between selected predictor variables and health status of 251 Americans in middle adulthood. Independent variables included health locus of control, health value, stressful life events, social support, health habits, self-management effectiveness, genetic predisposition, level of education, income, and gender. Primary data collection sites were the 1982 World's Fair and a metropolitan general hospital in Knoxville, Tennessee. The combination of variables accounted for 57% of the variance in health status. Modifiable attitudinal and behavioral variables (e.g., locus of control) were as salient, and perhaps more salient, to health than environmental or genetic factors which were uncontrollable.

Predictors of Health in Middle Adulthood

Mid-life: Are you at the peak or over the hill? A poster posing this question attracted potential subjects to my data collection booth at the 1982 World's Fair. The purpose of my study was to examine the relationship between selected predictor variables and health status of Americans in middle adulthood. The mid-life age group was selected for several reasons: (a) the cumulative effects of genetic predisposition, health attitudes and behaviors, and environmental variables are beginning to accrue for these individuals; (b) most people in this age group are not yet chronically ill and therefore have time to make life-style changes and environmental modifications which could prolong their lives; and (c) the mid-life crisis, a time of introspection and ot questioning the way the first half of life has been lived, offers nurses and other health professionals an opportunity to intervene effectively with promotion of a wellness life-style.

Middle adulthood has been neglected as an area of theoretical and empirical examination until the 1960's and 1970's, despite earlier recognition as a crucial period of development by such eminent figures as Jung[1] and Erikson[2]. Stevenson[3] attributes this lack of interest in middle adulthood to the tendency of researchers to focus on groups defined as problematic to society, such as adolescents or the elderly. Further, members of the middle-aged establishment define the problem groups which need study. Another cause of reluctance to examine middle age was identified by Levinson[4]: fear that careful scrutiny might reveal only decline and restriction. The negative imagery of aging in our society is ubiquitous; middle age begins to activate deep anxieties about loss of youth, deterioration in the quality of life, and dying.

However, there is increasing acceptance of the premise that growth and development continue throughout adult life. As life expectancy has lengthened, there is a much expanded mid-life period. During this period, individuals hold key leadership positions in the major institutions of American society and enact significant roles in their families and their communities. The majority of persons in middle adulthood experience only moderate deterioration in physical abilities and performance[5]. Due to improved nutrition and health care, these individuals appear younger and more vigorous than their counterparts in the previous century. Sheehy[6] asserted that the new middle-aged no longer "think sick", no longer settle for a sedentary, indoor middle age. Instead, they are actively seeking information about health preservation and enhancement.

If nurses are to provide accurate information to mid-life clients regarding specific attitudinal and/or behavioral changes that may lead to optimal wellness, empirical evidence regarding the efficacy of these changes is needed. Much of the previous research purportedly on health actually has focused on illness; typical instruments have consisted of lengthy catalogues of pathological symptoms[7]. In some studies, a single variable related to health status (e.g., stressful life events) has been examined, rather than using a multivariate approach. Even in studies including several predictors of health status, only a small amount of the variance has been accounted for[8-10]. Inadequate instrumentation, particularly for assessment of general health, has also been problematic. Using a deductive approach, psychological, environmental, sociodemographic, and life-style variables were selected for the present study. The primary objective of the project was to develop an empirically validated multivariate model of health with utility for patient teaching and counseling. Additionally, 5 hypotheses were tested.

Review of the Literature

Psychological variables

Locus of control is a construct from Rotter's social learning theory [11]. The reinforcement patterns to which individuals are exposed eventually produce either a general expectancy that reinforcements are contingent upon one's own behavior (internal locus) or a general expectancy that reinforcements are received on a purely random basis (chance locus) or dispensed by powerful others such as doctors (powerful others locus of control). It logically follows that individuals with an internal locus of control are more likely to engage in positive health behaviors; they believe that the reinforcement (good health) is directly the result of their own behavior.

However, the reinforcement value of health to an individual, in comparison with other life values such as pleasure, prosperity, or social recognition, must be assessed. Lowery [12, p.295] pointed out: "Although it night be assumed that the state of health is always valued, in many health-related situations the reinforcement value of the outcome for the patient must be considered."

Life-style variables

The Alameda County longitudinal study revealed five key health practices predictive of greater longevity: not smoking, consuming no more than 45 drinks per month, exercising several times a week or more, sleeping 7-8 hours per day, and being within -10% and +29% of ideal weight for height [13]. Rand Corporation researchers developed comparable definitions of positive health practices for use in their Health Insurance Study and found that physical activity and weight were the most important factors in relationship to health [14].

The ability to acquire and maintain a preponderance of healthful habits suggests effective application of behavior management strategies by individuals in their lives. The concept of self-management was derived from applied behavioral analysis. Thomas, Williams, and Olsen have focused their research efforts for several years on assessment of self-management effectiveness across broad areas of life, including physical health, interpersonal relationships, professional productivity, and leisure. Effective self-managers achieved a more nearly optimum balance across these areas than ineffective self-managers[15].

Environmental variables

The relationship of stressful life events and illness was established in the pioneering research of Holmes and Rahe[16], although correlations are often modest and intervening variables are frequently overlooked. Some researchers[17] have proposed that adequate social support from friends, family, and neighbors somewhat buffers or ameliorates stress for the individual. Blake, Roberts, Mackey, and Hosokawa[18] found a higher utilization rate of professional services in a primary care clinic by clients with low social support.

Genetic predisposition

Research on genetic predisposition has involv examination of family histories, longitudinal studies, and twin studies. A recent review of this research noted that constitutional predisposition is known to play a role in peptic ulcer, essential hypertension, allergic reactions, heart disease, cancer, and many other disorders; illness is thought to occur in the constitutionally weakest organs or systems of the predisposed individual when stress is too intense or adaptation to stress is inadequate[19].

Sociodemographic factors

Gender, level of education, and income also must be conside ed in a comprehensive model for predicting health status. Virtually a ' .. .s show that women, despite their greater longevity, report more health problems than men. Two stereotypes about the health-related consequences of women's social roles are prevalent: the "neurotic housewife" who develops hypochondriacal complaints and the "career woman" who succumbs to the stressors of the work world; initial results of Depner's [20] study negate these stereotypes, however. Role status usually has no significant effect when variables such as age, education, and income are entered first into the regression equation.

Franks and Boisseau [21] found a strong positive relationship between years of schooling and health in their review of the literature. Similarly, higher income has been correlated with good health in numerous studies. Both physical and mental illnesses tend to be more prevalent among those of lower socioeconomic status [22].

Method

This was an ex post facto study of the survey research type. The independent variables were health locus of control, health value, health habits, self-management effectiveness, stressful life events, social support, genetic predisposition, gender, level of education, and income. The dependent variable was current health status.

Participants in the study were 251 individuals in middle adulthood (defined as age 35-55) from thirty-two states in the United States of America. Subjects resided in communities of all sizes, ranging from large cities to tiny rural hamlets. There was considerable diversity within the sample in terms of education, income, genetic predisposition, occupations, health status, and other variables of interest.

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The first phase of data collection took place during the 1982 World's Fair in Knoxville, Tennessee. A poster soliciting volunteers for the study directed fair visitors to the data collection area in the Wellness Station of the University of Tennessee College of Nursing. Persons who agreed to participate then completed their questionnaires on-site; 159 usable sets of questionnaires were obtained. The second phase of data collection took place during the winter of 1982-83 at a large metropolitan general hospital. Because the investigator sought a sample representative of all stages of the health-illness continuum and a variety of medical, surgical, and psychiatric disorders, all adult nursing units except the Obstetric Unit and the Acute Care units were visited regularly. Forms were left with subjects for completion at their convenience, and collected by the researcher later the same day or the next day; 71 usable sets of questionnaires were obtained at this site. Because self-management effectiveness was a variable of interest in the study, the investigator sought to obtain participants who might represent extremes of the self-management continuum (i.e., substance abusers and members of a club for executives) and 21 additional sets of questionnaires resulted from this effort.

Instruments

Current health status was assessed by the current health subscale of Ware's Health Perceptions Questionnaire (Form II); reliability and validity of the scales of the HPQ were established through field testing of over 2,000 adults prior to administration of the instrument to the 8,000 people participating in Rand's Health Insurance Study[23]. Three subscales of the Medical History Questionnaire, Form A, developed and extensively validated for use in the Rand Study[24], were used to assess health habits, stressful life events, and social support.

Locus of control was assessed by the Multidimensional Health Locus of Control Scale developed by Wallston, Wallston, and DeVellis[25]; good alpha reliabilities, test-retest reliability, and concurrent and discriminant validity of this instrument have been established[26]. The Value Survey, developed by Wallston, Maides, and Wallston[27], lists nine of Rokeach's values and adds health, to determine its rank in relation to other important outcomes. The procedure was modified slightly for this study. Subjects, instead of ranking all 10 values, were simply asked to indicate the four values most salient to them. If health was among the four selected, subjects were classified as high health value.

Self-management effectiveness was operationalized as the subject's total self-management score and his/her scores on the four scales (work, social, health, and leisure) of the Tennessee Self-Description Form developed by Thomas, Williams, and Olsen[15]; the compilation of normative data and establishment of internal consistency reliability and validity of the TSDF is in progress at the present time. Genetic predisposition was operationalized as the subject's score on a Family Background Survey developed by the researcher to ascertain the number of close relatives who have/had diseases with a hereditary/constitutional component: heart attacks, high blood pressure, diabetes, and cancer. An 11-item survey was also developed by the researcher to obtain standard demographic data.

Analyses

Univariate descriptive statistics for all variables were examined for skewness and the presence of outliers. Health value was deleted due to extreme skewness; 88% of the subjects in this mid-life sample valued health highly. Plots of each independent variable with the dependent variable were examined for departures from linearity. To examine relationships among the dependent and independent variables, correlational and regression analyses were used. To test hypotheses, analysis of variance and t tests for independent samples were used.

Results

Zero-order correlations of independent variables with current health status are presented in descending order of magnitude in Table 1. The intercorrelation matrix (not shown) revealed that beliefs held by individuals regarding health locus of control are significantly related to their enactment of health-promoting behaviors. Internal locus was positively related to total self-management, health self-management, and health habits. In contrast, chance locus and powerful others locus were negatively related to the behavioral variables. All of these relationships found in the correlational analyses were consistent with a rational model of health except the negative correlation between social self-management and health status, which was contrary to prediction. There are several possible explanations for this phenomenon. Persons who were seriously ill tended to score high on this subscale, suggesting that they were exhibiting pleasing social behaviors in an attempt to elicit physical care or emotional support from others. Another possible explanation for the inverse relationship is that over-emphasis on social camaraderie may lead to neglect of health; specifically, excessive alcohol intake, unwise eating, and inadequate rest could be attributed to such over-emphasis on the social sphere of life.

Next, the backward elimination type of stagewise variable selection procedure was performed between current health as the dependent variable and health habits, stressful life events, social support, gender, level of education, income, genetic predisposition, the four self-management subscales, and the three locus of control subscales as independent variables. The backward elimination procedure was selected because it allows all variables to interact together. Younger[28] has pointed out that both forward selection and stepwise procedures can miss a key set

of variables. The procedure begins with all variables in the model, removing them one at a time according to which one gives the smallest partial F value; the procedure concludes when all partial F's are significant at the specified significance level. Although an alpha level of .05 was selected for other procedures of the study, a more liberal level of .10 was chosen for the backward elimination procedure due to its exploratory nature. The final regression model is presented in Table 2. R^2 was .57, indicating that 57% of the variability in current health status could be predicted by the combination of independent variables which remained in the equation. Because there was some multicollinearity present in the data, the sizes of the standard errors of the regression coefficients were examined closely; none was too large relative to the size of the coefficients. An analysis of the residuals was performed to ascertain that the model met the assumptions of multiple regression analysis.

The strongest predictors positively related to health were internal locus of control and health habits. Additional predictors with positive coefficients were income, gender, and health self-management. The regression coefficient for gender indicated that if everything else were held constant, females would score higher on the current health scale; this finding is consistent with the greater potential of women for good health and longevity, despite their well-known tendencies to report more symptoms and to visit doctors more frequently. The strongest predictors inversely related to health were powerful others locus, genetic predispositi. , and less-than-high school education. Consistent with previous studies, stressful life events were inversely related to health status. However, stress was not as strong a predictor as the modifiable attitudinal and behavioral variables. Regardless of the stressful nature of life changes such as moving or changing jobs, it is reasonable to predict that their effects on health should be somewhat time-limited.

Tests of hypotheses

Hypothesis One predicted that subjects who held internal locus of control beliefs would have better health status than persons with external (chance or powerful others) locus of control. A one-way ANOVA was used to compare high scorers (those whose scores were equal to or greater than one standard deviation above the mean) on each of the orientations. The difference between groups was significant (F = 7.42, df = 2/69, p<.0012). Duncan's New Multiple Range Test was used for post hoc comparison of means and revealed that high scorers on internal locus had significantly better health status than high scorers on either of the external locus orientations. Thus, Hypothesis One was supported.

The second hypothesis predicted that effective self-managers would have better health status than ineffective self-managers. High scorers and low scorers on total self-management were compared; a statistically significant difference was found (t = 4.15, p<.0001).

Hypothesis Three predicted that subjects with a preponderance of healthful habits would have better health status than persons with poor health habits, regardless of the level of stressful life events reported. Persons reporting regular adherence to four or five of the key health habits identified by Wiley and Camacho[13] were compared with persons reporting two or fewer than two of these habits. The current health mean score for subjects with good habits (n=47) was 36.5, while the mean for subjects with poor habits (n=21) was 27.3. The difference between groups was significant (t= 4.21, p<.0002). Next, level of stress was considered. Because stress was a skewed variable, it was inappropriate to create high and low stress groups by using the mean plus or minus one standard deviation. Instead, the upper 25% and lower 25% of scorers on the stressful life events scale were selected.

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Individuals with good health habits had better health than those with poor habits whether in a low stress condition (t = 2.56, p<.0171) or in a high stress condition (t = 5.43, p<.0001). The difference in mean health scores was greatest in the high stress group. Thus, Hypothesis Three was supported.

The fourth hypothesis predicted that subjects with adequate social support would have better health status than persons who did not have adequate social support, regardless of the level of stressful life events reported. Subjects with social support scores greater than or equal to 65.13 (the upper 25%) were compared to persons with social support scores less than or equal to 44.74 (the lower 25%). The current health mean scores for these two groups did not differ significantly, although the mean for the well-supported subjects was slightly higher. Under the high stress condition, social support appeared more salient, as there was greater difference in mean health scores in the predicted direction, but the t test was not significant at the .05 alpha level.

The final hypothesis predicted that subjects with a preponderance of healthful habits (as defined previously) would have better health status than persons with poor health habits, regardless of genetic predisposition. Persons reporting seven or more relatives with diseases with a constitutional or hereditary component were compared with persons reporting two or fewer than two relatives with such diseases. These groups represented the upper 25% and the lower 25% of the sample. Subjects with good health practices had better health than those with poor habits whether in the low genetic predisposition group (t = 3.85, p<.0009) or the high genetic predisposition group (t = 4.87, p<.0001). Therefore, hypothesis five was supported.

Discussion and Implications

This study has examined the relative importance of a variety of predictors of health status for Americans in middle adulthood. Consistent with previous research, genetic predisposition, stressful life events, education, and income contributed to the variance in health status in this investigation. These factors are not readily modifiable for individuals in middle adulthood. However, the results of this study lend credence to the growing body of evidence that the modifiable attitudinal and behavioral variables are indeed as salient, and perhaps more salient, to health than noxious environmental factors or organismic factors which are uncontrollable. Particularly important to individuals in middle adulthood is the finding that even in cases with high genetic predisposition to disease, good health habits appear to make a significant difference.

Among the strengths of the present study were: (1) the diversity of the national sample obtained by collecting data at the 1982 World's Fair; (2) use of state-of-the-art instrumentation; and (3) selection of relevant variables which together accounted for 57% of the variance in health status.

It is evident from the correlational nature of this study that causality cannot be inferred; however, these results provide impetus for further investigation of an experimental nature to discover whether or not the variables are causally linked.

The combination of independent variables selected for this study accounted for a respectable amount of the variance in health; however, there was still a significant amount of unexplained variation. Further research is needed to discover other important variables affecting health status.

Limitations of the study include: (1) underrepresentation of ethnic minorities; (2) a non-probability sample; (3) the use of self-report data; and (4) assessment of subjects at only one point in time. Several of these limitations will be addressed in the future phases of this longitudinal investigation.

The findings of this study have implications for health counseling and teaching. Two appropriate interventions are internality training and promotion of a self-managed life-style. Such programs can be implemented by nurses who practice in a variety of inpatient and outpatient settings. Arakelian[29] asserted that the potential for changing an individual's locus of control orientation always exists because new experiences can be introduced that alter previous patterns of success/failure. Williams and Long[30] presented a systematic approach to the acquisition of self-management skills; key elements are assessment of priorities, development of measurable daily goals and daily action plans, recording of behavior, and provision of appropriate rewards for performance of target behaviors.

It is vitally important that health professionals maintain a sense of optimism regarding their clients' change potential. The recent research report by Schachter[31] provides professionals with food for thought; he found that many laypersons successfully quit smoking or lost significant amounts of weight without the benefit of professional help. It appears that motivated individuals are indeed capable of making quite radical changes in their habitual behaviors. The mid-life crisis of finitude may provide the necessary impetus for some individuals to embark on a program of life-style modification which will enhance the quality of their remaining years.

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TABLE 1. Zero-order Correlations of Variables with Current Health
         Status

Variable	r	p
Health habits	.48	.0001
Health self-management	.43	.0001
Less-than-high school educ.	-.41	.0001
Powerful others locus	-.36	.0001
Stressful life events	-.36	.0001
Genetic predisposition	-.34	.0001
Internal locus	.32	.0001
Income	.31	.0001
Total self-management	..29	.0001
Leisure self-management	.27	.0001
College education	.25	.0001
Social self-management	-.22	.0004
High school/vocational educ.	-.21	.0010
Chance locus of control	-.19	.0039
Work self-management	.18	.0042
Social support	.15	.0216
Gender	-.02	.7937

TABLE 2. Regression Model for Dependent Variable Current Health
Obtained by Backward Elimination Procedure

Variable	b	β	F	Prob. F
Internal locus of control	0.4370	0.2181	21.84	.0001
Powerful others locus	-0.3652	-0.2166	19.99	.0001
Genetic predisposition	-0.4996	-0.1875	14.89	.0002
Health habits	1.8388	0.2047	13.69	.0003
Less-than-H. S. education	-7.9574	-0.2105	11.89	.0007
Income	0.0001	0.1381	9.56	.0023
Gender	3.4642	0.1678	9.24	.0027
Social self-management	-0.3272	-0.1102	5.29	.0225
Stressful life events	-0.0222	-0.1145	4.62	.0328
H. S./vocational education	-2.1221	-0.1052	3.81	.0524
Health self-management	0.2089	0.0947	2.75	.0990

R = .75

R^2 = .57

NOTE: b = unstandardized regression coefficients.

β = standardized regression coefficients.