Journal of Personality and Social Psychology
1993, Vol. 65, No. 1, 176-185

0022-3514/93/$3.00

Does Childhood Personality Predict Longevity?

Howard S. Friedman, Joan S. Tucker, Carol Tomlinson-Keasey, Joseph E. Schwartz, Deborah L. Wingard, and Michael H. Criqui

Key models relating personality and health predict that personality in childhood is indicative of later health and longevity. Longevity predictions are tested using data derived from the 7-decade longitudinal study initiated by L. M. Terman in 1921 (L. M. Terman & M. H. Oden, 1947). Variables representing major dimensions of personality are used in statistical survival analyses of longevity in 1,178 males and females. Conscientiousness in childhood was clearly related to survival in middle to old age. This finding (a) establishes that childhood personality is related to survival decades into the future, (b) confirms the validity of the conscientiousness dimension in conceptualizing personality, and (c) points to likely and unlikely pathways linking personality to health. Contrary to expectation, cheerfulness (optimism and sense of humor) was inversely related to longevity, suggesting a possible need for reconceptualization of its health relevance.

A central question about human nature concerns the extent to which personality is meaningful over time. For example, does knowing that a child is highly sociable tell us something important about that person's outcomes much later in life? Aside from the many methodological obstacles, this question is especially difficult to address because predisposing tendencies could be realized in so many different ways. However, perhaps such an effect of personality would be revealed if a significant outcome were selected, one that involved a host of converging factors.

A second major question involves the nature of the relations between personality factors and physical health. For example, there is ample evidence that chronic hostility is related to cardiovascular disease (Barefoot, 1992; Booth-Kewley & Friedman, 1987; Matthews, 1988), at least over several years. Although there is reason to believe that personality is significantly related to health throughout one's life (Friedman, 1991), there is as yet no life-span evidence bearing directly on this point.

Bringing these two major questions together, we can derive the following focus of inquiry: Is childhood personality related to health and longevity across the life-span? Three kinds of models of emotions, behavior, and physical health are relevant to this matter. All three maintain that childhood personality will be predictive of later health and longevity, but through different pathways. That is, consistent styles of response already clearly observable in childhood (such as sociability) are hypothesized to be related to physical state many years later (Friedman, 1990, 1991).

First, there is the biological model. Personality should be correlated with longevity if both are influenced by early biological responses of the organism (determined by genetics, pre- or perinatal influences, or early environment). Examples of such types of relations are genetic abnormalities affecting personality and life span, prenatal hormonal influences, early trauma effects on anxiety and health, and constitutional physiological reactivity (Lipsitt, 1983; Manuck, Kaplan, Clarkson, Adams, & Shively, 1992; Strelau & Eysenck 1987; Matthews et al., 1986; Werner & Smith, 1982). These models generally forecast that resilient personalities—high in stability and sociability—are predictive of later health, whereas aggressive, excitable, or hyperreactive personalities are prone to disease and premature mortality. Some of these hypothesized links imply a spurious (noncausal) relation between personality and longevity, but others view biological aspects of personality as mediating mechanisms.

The second prominent type of model predicting relations between early personality and longevity involves life stress and coping. According to such models, certain personalities are less able to cope with the usual trials of modern life and so are more likely to become ill. For example, people who are shy, pessimistic, and low in self-esteem may react to challenge with chronic hostility or feelings of helplessness, which are thought to lead to excessive activation of the autonomic nervous system and the pituitary-adrenal-cortical axis, and illness or death (Booth-

Howard S. Friedman, Joan S. Tucker, and Carol Tomlinson-Keasey, Department of Psychology, University of California, Riverside; Joseph E. Schwartz, Department of Psychiatry and Behavioral Sciences, State University of New York at Stony Brook; Deborah L. Wingard and Michael H. Criqui, Department of Community and Family Medicine, University of California, San Diego.

This research was supported by National Institute on Aging Research Grant AG08825, Howard S. Friedman, principal investigator. Part of the data were made available from the Terman Life-Cycle Study, begun by Lewis Terman. Further assistance was provided by Eleanor Walker of the Terman project. The current investigators bear full responsibility for the data refinements, analyses, and interpretations presented here. Because of the interdisciplinary nature of this project, all of the coauthors made major, greater-than-usual contributions to this research.

We thank Marci Lobel, Dan Ozer, Steve Reise, and Miriam Schustack for helpful comments.

Howard S. Friedman is also Clinical Professor of Community and Family Medicine at the University of California, San Diego, School of Medicine.

Correspondence concerning this article should be addressed to Howard S. Friedman, Department of Psychology, University of California, Riverside, California 92521-0126.

Kewley & Friedman, 1987; Cohen & Williamson, 1991; Friedman, 1991; Shaffer, Graves, Swank, & Pearson, 1987; Somervell et al., 1989). These conceptions rely heavily on the interaction between personality and the environment but generally assert that it is healthier in modern society to be optimistic, sociable, and high in self-esteem.

The third major model suggests that certain people are more likely to engage in unhealthy behaviors or less likely to engage in healthy behaviors. Personalities that lack self-control, are impulsive, are tense, or are careless may be more likely to engage in smoking or drug abuse, have poor eating habits, or avoid regular physical activity, and thereby adversely affect health and longevity (Ratliff-Crain & Baum, 1990; Scherwitz & Rugulies, 1992; Vingerhoets, Croon, Jeninga, & Menges, 1990). Given the commonsense appeal of such behavioral models, there is a surprising paucity of longitudinal research tracing hypothesized links among personality, behavior, and long-term health.

A variation of the above predicts that certain kinds of people are more likely to find themselves in stressful or dangerous environments. For example, people who are excessively competitive (a trait thought to be developed in childhood) may take on more and more work, without adequate support or coping mechanisms (Glass, 1977). Cold, quarrelsome individuals may find themselves without close human ties. Impulsive, thrill-seeking people may seek out challenge, alone and unprepared. Shortened life span might be a result (Seeman, Kaplan, Knudsen, Cohen, & Guralnik, 1987).

A more basic question, implicit in the discussion so far, is whether early personality is related to health at all. Common folklore suggestions that optimistic, active, sociable, and dependable children are headed for healthy lives may be simply that: folklore. Simple relations between early personality and later health and longevity might *not* be found if any of a number of conditions hold: (a) if personality is complexly related to future health—if particular personalities interact with particular environments or particular behaviors, then relations will not be found until, through complex analyses, these environments and behaviors are taken into account; (b) if death is mostly random or is determined in an unknowable fashion—if most people in a sample are dying because of events such as virulent infection, earthquake, pollution, other cataclysmic events, or unknown forces little related to individual reactions, then characteristics of the individual will not predict longevity; (c) if the effect size is small—that is, if the relations are real but cannot be detected in a sample of less than many thousands; (d) if personality is not stable over time—if adult personality differs significantly from childhood personality, then early personality may not matter to health; and, of course, (e) if personality is not related, in truth, to health and longevity. There are also other, methodological, factors that might obscure a relation between early personality and later health and longevity. So, if a relation is found, then it is probably robust and worthy of serious further investigation.

Predictor Variables

To begin to examine these questions, we turned to raw data gathered by the Terman Life-Cycle Study of children. Starting in 1921–1922, Lewis Terman and his associates followed over 1,500 bright male and female children (age $M = 11$ years) at 5- to 10-year intervals; the survivors are still being followed. No other single data set has such a rich body of psychosocial information gathered over a lifetime, albeit in a rough, raw form.

Our choice of personality variables was affected by three sets of considerations. First, we looked for variables that current theory predicts should be related to health, such as optimism and high self-esteem (Kobasa, 1982; Peterson & Bossio, 1991; Scheier & Carver, 1987). Second, we endeavored to select personality variables that basic theory and research have shown are reliable and theoretically meaningful—dimensions that appear in the Big Five factors of personality (John, 1990). Finally, we were limited to the information that Terman had collected. Fortunately, Terman collected a broad range of variables, including detailed parents' and teachers' ratings of the children, which are likely to be more valid (and which Terman showed to be valid in other domains) than the weak self-report personality "tests" available at the time.

We felt it important in a study of this type to avoid capitalizing on chance in predicting longevity, and so we limited our analysis to six predictor dimensions. In particular, we were able to construct measures of four main personality dimensions and two supplementary predictors that seemed directly relevant. (The details of predictor selection are described below in the Method section.) First, we created a *Sociability* index, which included items such as "Fondness for large groups." This factor corresponds to the Extraversion–Surgency factor common to most personality theories. Second, we created a *High Self-Esteem–High Motivation* dimension, including items such as "self-confidence" and "will power." This dimension roughly corresponds to the often-seen basic dimension of Emotional Stability versus Neuroticism. Third, we constructed a dimension of *Conscientiousness–Social Dependability,* including items of prudence, conscientiousness, and truthfulness. This third dimension corresponds to the Big Five dimension of Conscientiousness. The fourth dimension was one of "optimism–sense of humor" (named *Cheerfulness*), which often has been proposed as directly relevant to physical health. Our fifth predictor was termed *High Energy* (rated physical energy), which indicated an active, energetic child (cf. the activity temperament dimension of Buss & Plomin, 1984). Our final predictor was a measure of *Permanency of Moods,* used as a different way of approaching the dimension of emotional stability.

Sex differences as related to personality and longevity are especially interesting, because sex is a strong predictor of longevity. There are numerous hypotheses concerning why women outlive men, and a number of biological and behavioral differences have been examined (Verbrugge & Wingard, 1987; Wingard, 1984). Yet marked sex differences in longevity stubbornly remain after controlling for a variety of factors. Psychosocial variables, including personality, may supply some of the missing links. Fortunately, Terman studied roughly equal numbers of men and women.

In the present study, we focused exclusively on longevity as the outcome variable. Longevity is an extremely reliable life outcome of obvious importance. No other study has ever looked at psychological predictors of longevity across seven decades.

State of health and cause of death are other important outcome variables but are more difficult to measure and are not yet available; they are the subject of our continuing research.

Method

Sample

The original sample involved 856 males and 672 females who were studied in the Terman Life-Cycle Study from the 1920s through 1986 (Terman & Oden, 1947). Terman's aim in selecting participants was to gather a reasonably representative sample of bright school children in California. The sample is fairly homogeneous on intelligence (bright), race (mostly White), and social class (mostly middle), thus minimizing demographic confoundings (such as the correlation of health with socioeconomic status; Terman & Oden, 1959). There is, however, a wide range of psychosocial characteristics and lifestyles. Although not intended to represent the general U.S. population, the sample contains few if any true "geniuses" and generally turned out to be a group of bright 20th-century American whites, including many businessmen, physicians, homemakers, lawyers, teachers, writers, and scientists (Sears, 1984). About 70% are college educated.

The average year of birth was 1910. When first studied, the mean age of the boys was 11 years and of the girls was 11 years. Some participants were older and some entered the study later; to make the sample more homogeneous and to avoid the problem of nonrandom missing data from those not of school age in 1921–1922 (when data collection began), we restricted our analyses to those born between 1904 and 1915, inclusive. This excludes 155 subjects. Of the 1,373 remaining participants, 104 were lost to follow-up, and we do not know if or when they died. An additional 29 are known to have died, but we do not know when. This sample attrition rate of less than 10% is remarkably low for a longitudinal study spanning seven decades. Those lost from the Terman study are not known to differ systematically (cf. Sears, 1984). In addition, in our own checks on attrition, these lost subjects did not differ on any of the personality measures used in this study.

To ensure a sizable time period between the personality assessment and mortality and thus eliminate those whose personalities might have been affected by serious illness at the time of assessment, we excluded 16 participants who died before 1930. This left a total of 1,224 subjects, of whom 769 (63%) were still alive by the 1986 assessment. Of this group, 46 were missing data on all personality measures and so were excluded. An additional 63 were missing data on some of the personality variables, usually only one or two measures. Because the amount of missing data is small, we assigned the mean to missing personality measures for these 63 subjects, leaving a final sample size of 1,178. We replicated all analyses on the 1,115 subjects for whom we had complete data on all personality measures, and the results were essentially unchanged.

Predictor Variable Selection

Initially, we examined all items collected in 1922 that seemed potentially relevant to personality. Using frequency plots and descriptive statistics, we eliminated items showing excessive missing data, little variance, or marked bimodality. To minimize the probability of a Type I statistical error, at no time did we examine relations between individual variables and mortality; prediction of mortality did not begin until we had finalized the small set of personality predictors.

In 1922, one of the subject's parents (usually the mother, or both parents together) and the subject's teacher were asked to rate the subject on 25 trait dimensions chosen to measure intellectual, volitional, moral, emotional, aesthetic, physical, and social functioning. Each of these 25 traits was rated on a 13-point scale, according to the degree to which the child appeared to possess each trait. The scales used are remarkably modern in their appearance, but not all of the trait ratings would be considered, by modern standards, to be theoretically important personality concepts. Trait ratings not included in our initial analyses for data reduction involved musical appreciation and appreciation of beauty; health and physical energy (physical traits); general intelligence (intellectual traits); and mechanical ingenuity. However, as indicated later, some of these (relating to intelligence and energy level) were subsequently used as separate predictors.

Four other variables from the 1922 assessment were chosen for their similarity to some of the 25 trait ratings. These variables were later added to the personality scales to enhance the construct validity of the scales. All were ratings that the parents made of their children. For three of these, the parents assessed their child's preference for the following activities on a 5-point scale (ranging from *dislike very much* to *like very much*): playing games that require lots of exercise, playing with several other people, and going to social activities such as parties, picnics, and dances. In a fourth item, the parents indicated the child's preference for playing indoors versus outdoors.

Using theoretical considerations about personality dimensions as the starting framework, the available trait and activity ratings were examined in two ways. First, the full matrix of intercorrelations was studied, with an eye toward making best use of the available data to capture the relevant dimensions. Second, items were factor analyzed using iterative principal-factoring methods. These factor analyses are not of inherent interest and are not reported here because they are not based on a comprehensive listing of possible traits, but rather are based on those available in the 1922 Terman data; they served only to help us create reliable and meaningful, theoretically driven, personality dimensions. Final scales were formed by summing the equally weighted, standardized (z score) versions of the items.[1] The six personality dimensions that were selected for use in prediction of longevity were as follows (the items comprising each scale are in parentheses, along with Cronbach's alphas): (a) Conscientiousness–Social Dependability (prudence–forethought, freedom from vanity–egotism, conscientiousness, and truthfulness; $\alpha = .76$); (b) High Motivation–Self-Esteem (self-confidence, will power, desire to excel, desire to know, and originality; $\alpha = .71$); (c) Cheerfulness–Humor (sense of humor and cheerfulness–optimism; $\alpha = .52$); (d) Sociability (fondness for large groups, popularity, leadership, preference for playing with several other people, and preference for social activities such as parties; $\alpha = .65$); (e) High Energy–Activity (physical energy, preference for games requiring lots of exercise, and preference for playing outdoors; $\alpha = .43$); and (f) Permanency of Moods (single item). Rated general intelligence (single item) was retained as a control variable.

Although the predictors are perhaps not as comprehensive as we might collect in a study today, it is reasonable to expect that parents and teachers have a fair idea of whether an 11-year-old child is a social,

[1] In regard to missing data, if more than half of the items used to compute a scale were missing for a subject, that subject's scale score was treated as missing. When fewer items were missing for a scale, the missing items for that subject were set to the sample mean before the scale score was computed. Once the final scales were formed, 46 subjects were found to be missing all 6 scales and were dropped. Only 15 subjects were missing 3, 4, or 5 scales. As noted in the text, analyses were replicated using only subjects with complete data. The data were also reanalyzed using regression analysis to predict the missing values, using the information from that subject's other variables; the results remained the same. For the computation of alpha, we used each trait rating (parent and teacher separately).

popular leader or not, is prudent and conscientious or not, is self-confident and motivated or not, and so on. The distributions of these (composite) scales were examined, separately by sex, as to variance and skew. The shape of the distribution for each scale was very similar for males and females. The intercorrelations and the means of the predictor dimensions are shown in Tables 1 and 2. (Note that higher scale numbers indicate higher energy, cheerfulness, conscientiousness, motivation, sociability, mood permanence, and intelligence. Also, all scales were adjusted to have a mean of 21 on the full sample.) The relation between parent-rated childhood health and subsequent longevity was also explored to ensure that lifelong illness or frailty was not a confounding factor; no such relations were found, and the matter is not discussed further.

Statistical Analyses

To predict to the dichotomous dependent variable (alive or dead), two procedures commonly used in epidemiology were used. The preferred one, survival analysis, uses all the available information regarding mortality rate and is now the standard technique in epidemiological studies of this sort. Because survival analysis is only slowly making its way into psychology journals, we also conducted the somewhat simpler logistic regression analyses to determine whether the childhood personality measures predict who dies before age 70. The choice of age 70 as the cutoff was made because (a) all subjects, if alive, would have been at least 70 by 1986 (and so have passed through the risk period being studied; this avoids the problem of right-censored data); (b) age 70 maximizes the variability of the dependent variable among cutoffs that satisfy Condition a; and (c) age 70 is roughly the criterion for attaining old age among White Americans. The logistic regression results, which paralleled the survival analyses results, are summarized in a footnote.

The analyses were constructed in stages. First, sex was entered to control for women's greater life expectancy. At each stage, we checked whether year of birth or rated intelligence, two potentially important confounding variables, are related to outcome. If either was significant at the .10 level, it would be entered as a control variable. Second, bivariate relations between personality predictors and longevity were examined. Third, stepwise procedures were used. To protect against a Type I error, the most significant variable was only entered at a given step if its p value was less than .05 and the global chi-square statistic for all unentered variables was significant at the .10 level. (Note that setting too strict an alpha would markedly increase the chances of a Type II error, a serious problem in a study of this type.)

We then proceeded to test for curvilinear relations and to examine gender differences. It can be argued that simply being too deviant on personality, either too high or too low, is unhealthy. Gender differences were explored by testing Gender × Personality interaction effects and by repeating the analysis separately on the male and female subsamples.

The main analysis used is hazard regression analysis, a form of survival analysis. The advantage of this technique is that it simultaneously considers the mortality rate at all ages and how this rate is related to the various predictors. This is in contrast to the logistic regression analysis, where one must focus on cumulative mortality as of a particular age. We estimated two types of hazard regressions. Cox's widely used (nonparametric) proportional hazards model, $\ln(h[X, Age]) = \beta X + f(age)$, makes no assumptions about the functional form of the underlying hazard function, f(Age), but it does assume that the effect of each explanatory variable is multiplicative and constant across all ages. The Gompertz (parametric) model assumes that the underlying hazard function describing the risk of death at any age can be summarized by an exponential function, $\ln(h[X, Age]) = \alpha + \beta X + (\gamma + \delta X)Age$, which includes age; it therefore trades off increased specificity of the age effect for the ability to test whether the effects of the predictor variables increase or decrease at higher ages.[2] An important strength of hazard regression models is their ability to properly treat right-censored data. (Over 60% of the sample was still alive in 1986, and thus their age at death is unknown.) Depending on the software, hazard regression models can also correctly treat left-censored data, created in our analyses by the decision to limit analyses to the period after 1930. The RATE computer program (Tuma, 1980) has this feature.

Table 1
Interscale Pearson Correlations

Scale	1	2	3	4	5	6	7
1. High Energy	—	.26	.01	.23	.43	.09	.09
2. Cheerfulness		—	.17	.41	.39	.33	.37
3. Conscientiousness			—	.41	.15	.37	.28
4. High Motivation				—	.35	.24	.55
5. Sociability					—	.14	.18
6. Permanency of Mood						—	.18
7. Rated Intelligence							—

Results

The results of the Cox proportional hazards regression analysis are shown in Table 3. In the first step, sex is found to be a strong predictor of the mortality hazard rate: The rate for women is only about two thirds of the rate for men. Neither year of birth nor intelligence is significantly related to mortality. (Note that age has already been taken into account in the RATE program analyses; obviously, age is related to mortality risk.)

When the six personality measures are added to the equation, the global test for the improvement in fit is statistically significant, $\chi^2(6, N = 1,178) = 24.68$, $p < .001$, and the only two significant predictors are Conscientiousness and Cheerfulness–Optimism (second data column of Table 3). When the four other personality variables are dropped from the equation (Eq. 3 column of Table 3), the reduction in fit is statistically insignificant, $\chi^2(4, N = 1,178) = 5.68$, $p > .20$. Furthermore, only Conscientiousness and Cheerfulness were related to longevity in bivariate analyses of longevity, controlling for gender.

The interquartile relative hazards are shown in the rows marked *RH*. (Relative hazards is an estimate of relative risks in a hazard analysis.) Thus, a person in the 75th percentile on Conscientiousness has only 77% of the risk of a person in the 25th percentile of dying in any given year. (Also, women are a third less likely to die than men in any given year.)

Although a global test for curvilinearity and gender differences in the effects of Conscientiousness and Cheerfulness is

[2] In the equation for the Cox model, h represents the hazard function for death, X represents the independent variable, and β represents the coefficient for the independent variable X. In the equation for the Gompertz model, α is the intercept, β is the coefficient for the independent variable X, γ is the main effect of age, and δ is the coefficient of the interaction of the independent variable X with age.

Table 2
Scale Means and Interquartile Means

Scale	Total sample			Male (n = 665)	Female (n = 513)
	M	LQ	UQ	M	M
High Energy	21.01	20	23	20.84	21.22
Cheerfulness	20.93	19	23	20.97	20.88
Conscientiousness	21.04	18	25	20.60	21.61
High Motivation	21.00	17	25	20.85	21.19
Sociability	20.95	18	24	20.17	21.96
Permanency of Mood	21.01	20	22	21.08	20.91
Rated Intelligence	20.93	20	22	20.96	20.88

Note. LQ = lower quartile; UQ = upper quartile.

not statistically significant, $\chi^2(4, N = 1{,}178) = 7.54$, $p = .11$, there is some evidence for a curvilinear effect of Conscientiousness ($p < .05$, without adjustment for multiple tests; see the Eq 4 column). Differences at the lower end of the Conscientiousness distribution tend to be more strongly associated with longevity than differences in the upper half of the distribution. There is no indication of U-shaped relationships to the other personality measures or of sex differences in the effects of personality on mortality.

When the analyses are done separately for males and females (second half of Table 3), there is some indication that permanency of mood may be protective for males, and that the association of conscientiousness with longevity may be stronger for males than for females. (The marginally significant quadratic effect of Cheerfulness for females should not be interpreted, given the lack of confirmation by other tests and analyses. Note also that the change in the linear coefficient when a quadratic term appears is not simply interpretable in this analysis, because it depends on the scale mean.) In a study of this sort, using a valuable life-span archive, it is important to minimize the likelihood of overlooking a phenomenon of interest. In pointing out these trends in the male-versus-female data, we are increasing the risk of Type I error to reduce the chances of making a Type II error. The Terman data are so unique, and the effects of mood permanency and of gender differences are of such theoretical importance, that it seems wise not to overlook these trends in the data.

Estimates of the parametric Gompertz model (not shown) provided results that are virtually identical to those for the Cox regression analysis. The Gompertz model, however, permits us to test whether the effects of any of the predictors vary systematically with age. For example, perhaps low conscientiousness is related to the risk of accidents, and accidents are more common at younger ages. In fact, we find no evidence of age dependency for sex or any of the personality measures.

To provide a more intuitive understanding of the meaning of the major findings, the Gompertz hazard function estimates were used to draw the survival curves shown in Figure 1. The figure shows the predicted probability of a high- and low-conscientious 20-year-old's surviving to a given age, separately by sex. (*High* and *low* refer to the upper and lower quartiles.)

The survival analyses are the preferred analyses, but the logistic regressions are provided in a footnote for those more familiar with this technique.[3] See Morita, Lee, and Mowday (1989) for an explanation of survival analysis, written for psychologists.

[3] Results of the logistic regression analysis are as follows. As expected, sex is indeed an important predictor of who died before age 70, in line with epidemiological findings. Among those born between 1904 and 1915 who were alive in 1930, 32.6% of men and 21.6% of women died before age 70. The odds ratio for men's (vs. women's) dying before age 70 is thus 1.75, that is, (32.6/67.4)/(21.6/78.4). Neither year of birth nor intelligence is significantly related to the outcome at this or any subsequent stage of the analysis. Concerning personality, more conscientious children are less likely to die before age 70, $\chi^2(1, N = 1{,}178) = 9.62$, $p = .002$, whereas, contrary to most predictions, those who are more cheerful–optimistic and have a better sense of humor are more likely to die before age 70, $\chi^2(1, N = 1{,}178) = 8.81$, $p = .003$. The odds of dying before 70 for someone who is at the 25th percentile on conscientiousness or the 75th percentile on cheerfulness is about 35% greater than for someone at the opposite quartile. The effect of sex is essentially unchanged, indicating that sex differences in cheerfulness and conscientiousness do not account for male–female differences in mortality. The global test for the six personality measures yields $\chi^2(6, N = 1{,}178) = 19.17$, $p < .004$. The two scales that are significantly related to mortality if entered next are conscientiousness and cheerfulness, with the former having a stronger effect. After conscientiousness is entered into the equation, the global chi-square statistic for the remaining five personality variables is $\chi^2(5, N = 1{,}178) = 12.09$, $p = .034$. Cheerfulness is the biggest effect not yet in the model and is entered in the next step. At this stage, the global chi-square statistic for the last four scales is not at all significant, $\chi^2(4, N = 1{,}178) = 3.20$, $p = .524$. To test for curvilinear relationships or interaction effects of gender with personality, we tested the significance of quadratic terms for conscientiousness and cheerfulness as well as multiplicative terms of the two personality variables with sex. The significance level of the global test for these four variables is $p = .22$, with no terms being significant at the .05 level. However, there is some suggestion that the effect of conscientiousness is stronger at the bottom end of the distribution (i.e., that the difference between low scores and moderate scores may be more predictive of premature death than the difference between moderate scores and high scores, $p = .092$) and that the protective effect of conscientiousness may be less for females ($p = .074$). Finally, we also tested for the possibility of a U-shaped or inverted U-shaped effect of any of the other four personality variables that did not exhibit a significant main effect, but no evidence of such relationships was found.

In short, the hazard regressions (and the logistic regressions; see Footnote 3) reveal an association between childhood personality and mortality. Conscientiousness predicts greater longevity, but cheerfulness predicts reduced longevity. High motivation, sociability, and a high energy level in childhood are not associated with longevity. As expected, females outlived males. Finally, there are hints that permanency of moods may be associated with longevity among males (i.e., neuroticism may be unhealthy) and that the association between Conscientiousness and longevity may be weaker among females than among males.

The magnitudes of the effects for Conscientiousness and Cheerfulness (relative hazards between 1.2 and 1.3) are comparable to other known risk factors for mortality. For example, two known biological risk factors, systolic blood pressure and serum cholesterol, have been found to have relative hazards of approximately 1.3 and 1.2 for all-cause mortality (Barrett-Connor, Suarez, Khaw, Criqui, & Wingard, 1984). (These comparisons are to the relative hazard per 1.4 standard deviations of a continuous variable.) Relative risks for high versus low levels of social support among adults, including marriage, contacts with family and friends, and group membership, are in the range of 1.5 to 2.0 for all-cause mortality (Berkman & Syme, 1979; House, Robbins, & Metzner, 1982; Schoenbach, Kaplan, Fredman, & Kleinbaum, 1986). (Note that cause-specific risks are often higher. For example, the relative risk of dying from heart disease for 50-year-old males who smoke a pack a day [compared with nonsmokers] is about 2.0:1 [Criqui et al., 1987]).

The association between gender and all-cause mortality in the present study is also comparable to that of other longitudinal studies. The relative hazard for males, about 1.48, is at the low end of the range of three other studies that have found relative risks of all-cause mortality to be between 1.5 and 1.7 (Wingard, 1984).

Discussion

The finding that personality predicts survival across the lifespan has not been previously documented. The striking effect of major personality dimensions, measured in childhood, on adult longevity raises many fascinating questions, mostly concerning causal mechanisms. For example, why are conscientious–socially responsible children who live to adulthood much more likely to live to old age than their less conscientious peers?

Answering this question is difficult and more complicated than it may at first appear. All sorts of hard-to-gather information is needed to trace the causal pathway. First, we need to know cause of death, which is never simple to state or easy to ascertain. Are conscientious people avoiding violent death, cancer, or cardiovascular diseases? One of our current projects involves developing this information for the Terman sample. Second, we need to know the risk factors for each cause of death, but the complete set of risk factors for most major modern diseases (such as cancer) are unknown. Third, we need to know the health-relevant correlates and consequences of having a conscientious personality, a challenging problem. So no simple answers are immediately forthcoming. Still, the clear nature of the current findings makes certain links between personality and disease more likely and others less likely. We will return to this matter shortly.

Despite assertions that optimism and a sense of humor are healthy, we found no evidence for this claim when looking across the life span from childhood to middle and old age; in fact, the evidence supports an inverse association. This finding makes it less probable that an underlying cheerful temperament is generally healthy. To the extent that optimism and humor are healthy for adults, they are more likely to function as adaptive adult coping mechanisms in particular situations, rather than as a lifelong temperamental predisposition. It may also be that optimistic people underestimate the danger of certain risks to their health and thereby fail to take precautions or to follow medical advice (cf. Weinstein, 1989). The same optimistic thoughts that may promote recovery from surgery ("I'm going to be just fine") may prove deadly to a cigarette smoker, a hypertensive, or an overeater ("I'm going to be just fine"). Or, optimistic people may be especially shocked when things turn out badly, and the resulting stress or bad habits are life-threatening.

High Self-Confidence (lack of neuroticism) in childhood did not seem relevant to longevity, although permanence of moods may be slightly beneficial (for men). Thus, simple models that propose that a neurotic constitution is a major factor in adult health are probably inadequate. Similarly, childhood activity level (such as rated physical energy and preference for active games in childhood) did not predict longevity. Here again, simple models are probably inadequate. Or, we could be failing to detect a real phenomenon, due to unreliability of measurement or insufficient statistical power. Positive findings across long time periods that emerge from the Terman data are especially impressive, but negative findings are not necessarily informative. Fortunately, it will be possible to study certain moods, activities, and social relations across the life span in this sample.

Childhood Sociability also did not predict longevity. This finding may seem surprising at first glance, given the established role of social support in some aspects of health maintenance. However, there is a growing literature warning that social ties cut both ways and may sometimes be more harmful than helpful (e.g. Revenson, 1990; Wortman, Sheedy, Gluhoski, & Kessler, 1992). Or again, we may have simply failed to detect a real effect. It is also important to remember that dimensions of personality such as sociability could indeed be very relevant to longevity across the life span but would most likely have their

---

Even though there were no significant interaction effects of gender with personality, we also analyzed males (N = 665) and females (N = 513) separately to determine whether the above effects could be independently documented within each subgroup. The results were mixed. When one estimates the effects of childhood conscientiousness and cheerfulness on mortality for males, both are statistically significant ($p < .001$ and $p = .029$, respectively), and the quadratic term for conscientiousness is almost statistically significant ($p = .064$), closely replicating the results for the full sample. For females, the effect of cheerfulness is similar to that obtained for males ($p = .040$), but the effect of conscientiousness is negligible; neither quadratic term approaches statistical significance.

Table 3
Cox Proportional Hazard Regression Model for Sex and Personality Predicting Death

	Full sample (N = 1,178)				Males (n = 665)		Females (n = 513)	
Variable	Eq 1	Eq 2	Eq 3	Eq 4	Eq 1	Eq 2	Eq 1	Eq 2
Sex (female = 1)								
b	−.42****	−.39***	−.38***	−.39***				
SE	.10	.10	.10	.10				
RH	0.66	0.68	0.68	0.68				
Conscientiousness								
b		−.26**	−.27***	−1.11**	−.33**	−.25**	−.16	−.16
SE		.08	.07	.37	.09	.09	.12	.12
RH		0.77	0.76	0.33	0.72	0.78	0.86	0.85
Cheerfulness–Humor								
b		.21*	.19**	.19*	.14	.22*	.31*	−3.04*
SE		.09	.07	.07	.09	.09	.13	1.42
RH		1.23	1.22	1.21	1.16	1.24	1.36	0.05
High Energy								
b		.07						
SE		.07						
High Motivation								
b		.11						
SE		.09						
Sociability								
b		−.07						
SE		.08						
Permanency of Moods								
b		−.12				−.22*		
SE		.07				.09		
RH						0.81		
Conscientiousness^2								
b				.15*				
SE				.06				
RH				1.16				
Cheerfulness–Humor^2								
b								.32*
SE								.14
RH								1.38
Global test for variables in model								
Partial LR χ^2	18.52	43.21	37.53	42.43	15.46	21.46	6.23	11.12
df	1	7	3	4	2	3	2	3
p	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.05	<.05
Global test for variables not in model								
Partial LR χ^2	24.68	—	5.68	—	7.92	1.92	1.23	—
df	6	—	4	—	4	3	4	—
p	<.001	—	*ns*	—	<.10	*ns*	*ns*	—

Note. Eq = equation; RH = relative hazard; LR = likelihood ratio. All *N*s for chi-square statistics = 1,178.
* $p < .05$. ** $p < .01$. *** $p < .001$. **** $p < .0001$.

effects through interactions with situational or other moderating variables not examined in the present study (cf. Smith, 1992).

Conscientiousness–Social Dependability, which did clearly predict longevity, is an often-identified, basic dimension of personality. It has been variously described as *conscientiousness* (McCrae & Costa, 1989), *prudence* (Hogan, 1986), *need for order–lack of impulsivity* (Costa & McCrae, 1988; Murray, 1938), *constraint–control* (Tellegen, 1985), and *superego control* (Block & Block, 1980; Eysenck & Eysenck, 1985). Interestingly, conscientiousness has previously been found to be stable from early adolescence to late adulthood (Haan, Millsap, & Hartka, 1986), as well as within adulthood (Conley, 1985a; Costa & McCrae, 1988); the evidence is good, involving multiple, reliable measures and longitudinal designs. Note, however, that such studies ascertain whether Conscientiousness at Time 1 is related to Conscientiousness at Time 2. In the present study, we have uncovered a different and more powerful demonstration of the importance of Conscientiousness across the life span, that is, its ability to predict longevity.

How are Conscientiousness and longevity related? Could their relation be spurious? Could they be linked through an underlying third variable? It is not immediately obvious to us which third variable could likely cause both, especially in the Terman sample.

Could Conscientiousness and health be related through

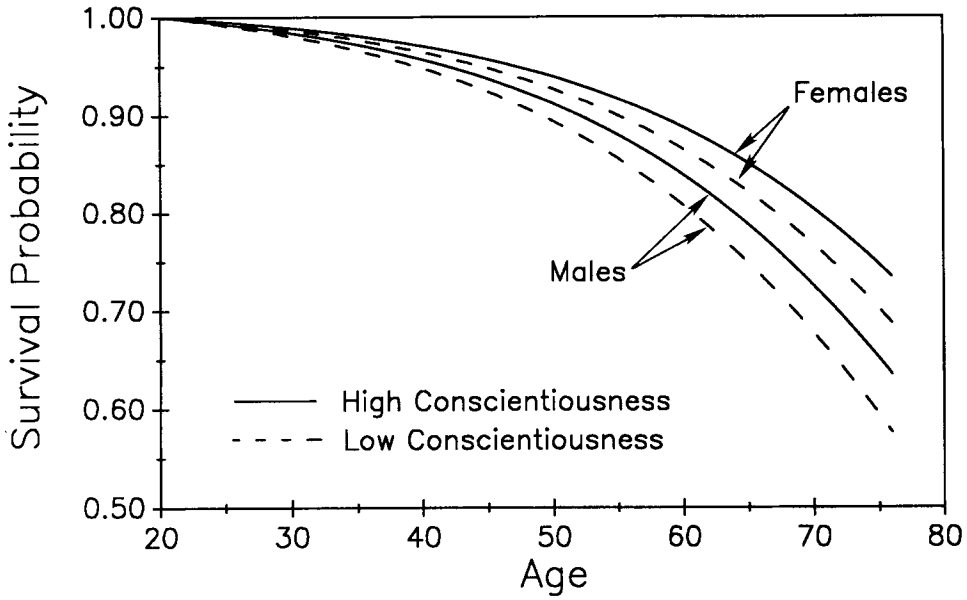

Figure 1. Probability of a 20-year-old's surviving to a given age, by sex and conscientiousness rating. (High-upper quartile; low-lower quartile.) (Copyright © 1992 by Joseph E. Schwartz and Howard S. Friedman. Reprinted by permission.)

healthy *behaviors?* Here, a number of likely possibilities emerge, which can be examined once more is known about the individuals' lives and deaths. Broadly speaking, these links are compatible with the idea that socially responsible people are those who engage in standards of self-care that tend to ward off illness, or who engage in less risk-taking. Conscientious people might have better health habits, cooperate more with medical treatment, or avoid dangerous situations (cf. Tomlinson-Keasey & Little, 1990). On the other hand, untrustworthy, undercontrolled individuals may be more likely to abuse drugs (Block, Block, & Keyes, 1988), become alcoholics (Conley, 1985b), ignore health recommendations, and generally behave in an imprudent manner with regard to their health (and other matters). Relatedly, it might be the case that optimistic, fun-loving people pay less attention to health risks.

It also seems plausible that Conscientiousness and health might be related through a host of *stress-and-coping* types of variables. Perhaps conscientious people prepare for the unexpected challenges of daily life. They may carry extra sets of car keys, keep good lists, and so on, thus avoiding many of the stresses of daily hassles. They may prepare contingency plans (or insurance plans) for more major challenges, thus minimizing the stress of life-change events. Or, conscientious people might rise to positions where they enjoy many resources at their immediate disposal: financial resources, informational (including medical) resources, or social resources.

Relatedly, it seems plausible that conscientious, prudent people would tend to keep themselves out of situations that they could not handle, thus minimizing psychosocial distress. Or they might practice effective coping skills and relaxation techniques in advance. In all of these cases, conscientiousness is hypothesized to promote longevity by lessening the psychophysiological disruptions that weaken physical resistance and allow disease to take hold or progress (Friedman, 1990, 1991).

Gender Differences

Although no clear gender differences in the relations of personality and longevity were found, the hint of a somewhat weaker finding for female Conscientiousness is intriguing. Like males, females varied in their degree of Conscientiousness and their longevity. Why might Conscientiousness be less clearly linked to female longevity? Perhaps the women in this sample had less opportunity to allow low Conscientiousness (and the other factors) to work its ill effects. That is, the women in this sample, possibly restricted in their social roles, may have shown less variation in their health-related behaviors, even though they varied in their personalities. If valid, this explanation implies that some of the female advantage in longevity might be due to societal restriction in unhealthy activities, rather than biological factors or coping factors. If so, male longevity might be improved significantly through certain behavioral interventions, and the female advantage might lessen as women gain greater access to health-harming activities. Although highly speculative, this line of thinking leads directly to testable hypotheses.

General Implications

Attention in the field of personality, stress, and health has been focused mostly on emotional types of variables (such as hostility) and social types of variables (such as isolation; Friedman, 1992). The present findings suggest that attention also should be addressed to the Conscientiousness dimension. Interestingly, many theorists consider extraversion, emotionality, and activity to have a greater constitutional basis than Conscientiousness; indeed, psychophysiological theories of stress tend to be focused on hostility, depression, social isolation, and

so on, rather than on imprudence, laziness, low ego control, or untrustworthiness. It is noteworthy that Conscientiousness is more likely to be a result of early learning and socialization than the other dimensions. It may be more amenable to change. Will to behave in a healthy manner may be more important than "will to live."

The present results concerning cheerfulness warn us against overgeneralizing from short-term studies of coping to long-term (life-span) styles of reacting. Rather, analyses of the particular challenges faced by particular individuals during their life may provide better information about what it means to be healthy. An optimistic style that might help one recover from heart surgery or fight cancer may be unhealthy across the life-span if one minimizes real threats to one's health.

It is important to remember that the Terman group is a bright, White sample, who grew up in a simpler, more structured time. On the average, the people (Americans) in this sample turned 40 around the year 1950. The homogeneous nature of the sample renders unlikely many otherwise-plausible causal links. This is not a sample with members grossly deficient in nutrition, housing, cultural adaptation, intelligence, or basic self-care. On the other hand, we should not be too quick to generalize these findings to today's children, who are facing some different threats to their health.

A significant strength of the present study is that mortality due to all causes of death is included and a range of personality predictors are analyzed. Past research in this field has tended to focus too soon on specific predictors of specific diseases, such as whether hostility predicts heart disease or whether depression predicts cancer. Although such focused predictions may prove valuable in uncovering physiological mechanisms, they lead to serious problems in construct validity and inferential logic (Friedman, 1990; Friedman & Booth-Kewley, 1987; Kaplan, Manuck, & Shumaker, 1992). For example, one aspect of personality may predict more than one illness; one illness may be predicted by more than one aspect of personality; and reductions in the incidence of one illness may not lead to an overall reduction in mortality.

As the present study predicted mortality from childhood measures, it is best suited for evaluating the impact of basic individual differences across the life span; it says little about how particular aspects of adult personality and coping (e.g., repression, hyperreactive hostility, and social support) may be relevant to longevity. But the current results point to productive areas in which to focus future study. First, why is conscientiousness able to predict longevity across the life span? Are there particular health-related habits or coping techniques characteristic of highly conscientious people? Second, why do sociability and optimism not seem protective, in the face of other evidence that they are sometimes protective? Is coping style relevant over a period of years, and what is the role played by stressful life events? Third, why might childhood conscientiousness be less predictive of longevity for females?

Are there any clinical implications of these findings? Discerning any precise treatment implications must await explication of the likely mechanisms that produce the associations. For example, if conscientiousness has its effects mostly through avoidance of substance abuses, then attempts to make people more prudent and dependable may prove less valuable than would attempts to prevent substance abuse. On the other hand, the uncovered correlations may have some predictive utility, as do other health risk markers. They may help us identify young people at higher risk for later health problems. For such people, a general set of health promotion interventions, supported by other evidence (Friedman, 1991), may prove especially helpful.

References

Barefoot, J. C. (1992). Developments in the measurement of hostility. In H. S. Friedman (Ed.), *Hostility, coping, & health* (pp. 13–31). Washington, DC: American Psychological Association.

Barrett-Connor, E., Suarez, L., Khaw, K. T., Criqui, M. H., & Wingard, D. L. (1984). Ischemic heart disease risk factors after age 50. *Journal of Chronic Disease, 37,* 903–908.

Berkman, L. F., & Syme, S. L. (1979). Social networks, host resistance, and mortality: A nine-year follow-up study of Alameda County residents. *American Journal of Epidemiology, 109,* 186–204.

Block, J. H., & Block, J. (1980). The role of ego-control and ego-resiliency in the organization of behavior. In W. Collins (Ed.), *Minnesota Symposium on Child Psychology* (Vol. 13, pp. 39–101). Hillsdale, NJ: Erlbaum.

Block, J., Block, J. H., & Keyes, S. (1988). Longitudinally foretelling drug usage in adolescence: Early childhood personality and environmental precursors. *Child Development, 59,* 336–355.

Booth-Kewley, S., & Friedman, H. S. (1987). Psychological predictors of heart disease: A quantitative review. *Psychological Bulletin, 101,* 343–362.

Buss, A. H., & Plomin, R. (1984). *A temperament theory of personality development* (rev. ed.). New York: Wiley.

Cohen, S., & Williamson, G. M. (1991). Stress and infectious disease in humans. *Psychological Bulletin, 109,* 5–24.

Conley, J. J. (1985a). Longitudinal stability of personality traits: A multitrait-multimethod-multioccasion analysis. *Journal of Personality and Social Psychology, 49,* 1266–1282.

Conley, J. J. (1985b). A personality theory of adulthood and aging. *Perspectives in Psychology, 1,* 81–115.

Costa, P. T., & McCrae, R. R. (1988). Personality in adulthood: A six-year longitudinal study of self-reports and spouse ratings on the NEO personality inventory. *Journal of Personality and Social Psychology, 54,* 853–863.

Criqui, M. H., Cowan, L. D., Tyroler, H., Bangdiwala, S. I., Heiss, G., Wallace, R., & Cohn, R. (1987). Lipoproteins as mediators for the effects of alcohol consumption and cigarette smoking on cardiovascular mortality. *American Journal of Epidemiology, 126,* 629–637.

Eysenck, H. J., & Eysenck, M. (1985). *Personality and individual differences: A natural science approach.* New York: Plenum Press.

Friedman, H. S. (Ed.). (1990). *Personality and disease.* New York: Wiley.

Friedman, H. S. (1991). *The self-healing personality: Why some people achieve health and others succumb to illness.* New York: Holt.

Friedman, H. S. (Ed.). (1992). *Hostility, coping and health.* Washington DC: American Psychological Association.

Friedman, H. S., & Booth-Kewley, S. (1987). The "disease-prone personality": A meta-analytic view of the construct. *American Psychologist, 42,* 539–555.

Glass, D. C. (1977). *Behavioral patterns, stress, and coronary disease.* Hillsdale, NJ: Erlbaum.

Haan, N., Millsap, R., & Hartka, E. (1986). As time goes by: Change and stability in personality over fifty years. *Psychology and Aging, 1,* 220–232.

Hogan, R. (1986). *Hogan Personality Inventory manual.* Minneapolis, MN: National Computer Systems.

House, J. S., Robbins, C., & Metzner, H. L. (1982). The association of social relationships and activities with mortality: Prospective evidence from the Tecumseh community health study. *American Journal of Epidemiology, 116,* 123–140.

John, O. P. (1990). The "Big Five" factor taxonomy. In L. Pervin (Ed.), *Handbook of personality: Theory and research* (pp. 66–100). New York: Guilford Press.

Kaplan, R. M., Manuck, S. B., & Shumaker, S. (1992). Does lowering cholesterol cause increases in depression, suicide, and accidents? In H. S. Friedman (Ed.), *Hostility, coping, & health* (pp. 117–123). Washington, DC: American Psychological Association.

Kobasa, S. C. (1982). The hardy personality: Toward a social psychology of stress and health. In G. S. Sanders & J. Suls (Eds.), *Social psychology of health and illness* (pp. 3–32). Hillsdale, NJ: Erlbaum.

Lipsitt, L. P. (1983). Stress in infancy. In N. Garmezy & M. Rutter (Eds.), *Stress, coping, and development in children* (pp. 161–190). New York: McGraw-Hill.

Manuck, S. B., Kaplan, J. R., Clarkson, T. B., Adams, M. R., & Shively, C. A. (1992). Behavioral influences on coronary artery disease: A nonhuman primate model. In H. S. Friedman (Ed.), *Hostility, coping, & health* (pp. 99–106). Washington, DC: American Psychological Association.

Matthews, K. A. (1988). Coronary heart disease and Type A behaviors: Update on and alternative to the Booth-Kewley and Friedman (1987) quantitative review. *Psychological Bulletin, 104,* 373–380.

Matthews, K. A., Weiss, S. M., Detre, T., Dembroski, T., Falkner, B., Manuck, S., & Williams, R. B. (1986). *Handbook of stress, reactivity, and cardiovascular disease.* New York: Wiley.

McCrae, R. R., & Costa, P. T., Jr. (1989). The structure of interpersonal traits: Wiggins' circumplex and the five-factor model. *Journal of Personality and Social Psychology, 56,* 586–595.

Morita, J. G., Lee, T. W., & Mowday, R. T. (1989). Introducing survival analysis to organizational researchers. *Journal of Applied Psychology, 74,* 280–292.

Murray, H. A. (1938). *Explorations in personality.* New York: Oxford University Press.

Peterson, C., & Bossio, L. (1991). *Health and optimism.* New York: Free Press.

Ratliff-Crain, J., & Baum, A. (1990). Individual differences and health: Gender, coping, and stress. In H. S. Friedman (Ed.), *Personality and disease* (pp. 226–253). New York: Wiley.

Revenson, T. A. (1990). All other things are not equal: An ecological approach to personality and disease. In H. S. Friedman (Ed.), *Personality and disease* (pp. 65–94). New York: Wiley.

Scheier, M. F., & Carver, C. S. (1987). Dispositional optimism and physical well-being: The influence of generalized outcome expectancies on health. *Journal of Personality, 55,* 169–210.

Scherwitz, L., & Rugulies, R. (1992). Life-style and hostility. In H. S. Friedman (Ed.), *Hostility, coping, & health* (pp. 77–98). Washington, DC: American Psychological Association.

Schoenbach, V. J., Kaplan, B. H., Fredman, L., & Kleinbaum, D. (1986). Social ties and mortality in Evans County, Georgia. *American Journal of Epidemiology, 123,* 577–591.

Sears, R. R. (1984). The Terman gifted children study. In S. Mednick, M. Harway, & K. Finello (Eds.), *Handbook of longitudinal research* (Vol. 1, pp. 398–414). New York: Praeger.

Seeman, T. E., Kaplan, G. A., Knudsen, L., Cohen, R., & Guralnik, J. (1987). Social network ties and mortality among the elderly in the Alameda County Study. *American Journal of Epidemiology, 126,* 714–723.

Shaffer, J. W., Graves, P. L., Swank, R. T., & Pearson, T. A. (1987). Clustering of personality traits in youth and the subsequent development of cancer among physicians. *Journal of Behavioral Medicine, 10,* 441–447.

Smith, T. W. (1992). Hostility and health: Current status of a psychosomatic hypothesis. *Health Psychology, 11,* 139–150.

Somervell, P. D., Kaplan, B. H., Heiss, G., Tyroler, H., Kleinbaum, D., & Obrist, P. A. (1989). Psychologic distress as a predictor of mortality. *American Journal of Epidemiology, 130,* 1013–1023.

Strelau, J., & Eysenck, H. J. (1987). (Eds.). *Personality dimensions and arousal.* New York: Plenum Press.

Tellegen, A. (1985). Structures of mood and personality and their relevance to assessing anxiety. In A. Tuma & J. Maser (Eds.), *Anxiety and the anxiety disorders* (pp. 681–716). Hillsdale, NJ: Erlbaum.

Terman, L. M., & Oden, M. H. (1947). *Genetic studies of genius: IV. The gifted child grows up: Twenty-five years follow-up of a superior group.* Stanford, CA: Stanford University Press.

Terman, L. M., & Oden, M. H. (1959). *Genetic studies of genius: V. The gifted group at mid-life.* Stanford, CA: Stanford University Press.

Tomlinson-Keasey, C., & Little, T. D. (1990). Predicting educational attainment, occupational achievement, intellectual skill, and personal adjustment among gifted men and women. *Journal of Educational Psychology, 82,* 442–455.

Tuma, N. (1980). *Invoking RATE.* Unpublished manuscript, Stanford University, Stanford, CA.

Verbrugge, L. M., & Wingard, D. L. (1987). Sex differentials in health and mortality. *Women & Health, 12,* 103–145.

Vingerhoets, A. J., Croon, M., Jeninga, A. J., & Menges, L. J. (1990). Personality and health habits. *Psychology and Health, 4,* 333–342.

Weinstein, N. D. (1989). Optimistic biases about personal risks. *Science, 246*(4935), 1232–1233.

Werner, E. E., & Smith, R. (1982). *Vulnerable but invincible: A longitudinal study of resilient children and youth.* New York: McGraw-Hill.

Wingard, D. L. (1984). The sex differential in morbidity, mortality, and lifestyle. *Annual Review of Public Health, 5,* 433–458.

Wortman, C. B., Sheedy, C., Gluhoski, V., & Kessler, R. (1992). Stress, coping and health: Conceptual issues and directions for future research. In H. S. Friedman (Ed.), *Hostility, coping and health* (pp. 227–256). Washington DC: American Psychological Association.

Received July 23, 1992
Revision received January 7, 1993
Accepted January 8, 1993 ■