This is to certify that the

dissertation entitled

Hardiness, Life Stress, and Neuroticism:

A Structural Equation Model of Self-reported Illness

presented by

Lois A. Benishek

has been accepted towards fulfillment
of the requirements for

Ph.D. degree in Counseling Psychology

Federico H. Lopez
Major professor

Date 2-11-93

DATE DUE	DATE DUE	DATE DUE
[illegible]	NOV 0 8 2005	
JUN 2 5 [illegible]		
FEB 2 4 [illegible]		
JUL 0 9 2001		
NOV 2 6 2001		
FEB 1 9 2002		
APR 1 7 2003		

HARDINESS, LIFE STRESS, AND NEUROTICISM: A STRUCTURAL EQUATION MODEL OF SELF-REPORTED ILLNESS

By

Lois A. Benishek

A DISSERTATION

Submitted to
Michigan State University
in partial fulfillment of the requirements
for the degree of

DOCTOR OF PHILOSOPHY

Department of Counseling, Educational Psychology
and Special Education

1992

ABSTRACT

HARDINESS, LIFE STRESS, AND NEUROTICISM:
A STRUCTURAL EQUATION MODEL OF
SELF-REPORTED ILLNESS

By

Lois A. Benishek

Kobasa's hardiness theory posits that persons exhibiting the personality characteristics of commitment, control, and challenge are less likely to report physical illness when encountering stressful life events. The hardiness construct is confounded with neuroticism and subjective illness reports. Recent studies have also begun to identify gender differences in how hardiness is expressed. The purpose of this study was to confirm the factor structure underlying two measures of hardiness, to evaluate Kobasa's theory when addressing recent criticisms of hardiness, and to investigate possible gender differences. One hundred and eighty-five university employees completed measures of hardiness, life stress, neuroticism, self-reported illness, and a more objective measure of illness behaviors. Confirmatory factor analyses did not identify the hypothesized three component model of hardiness. Further exploration of the three-factor model using a principal components analyses identified a five-factor solution underlying the Personal Views Survey and a two-factor solution underlying the Revised Hardiness Scale. Results from the structural equation models based on both

frequency and severity scores identified differences in how hardiness is expressed in men and women; the models, however, were structurally weak. Implications for future research and practice are discussed.

ACKNOWLEDGEMENTS

The process of completing this research project was made significantly more enjoyable thanks to the contributions of several individuals. Fred Lopez provided me with an optimum balance of support and challenge and, most importantly, was readily available to me throughout my numerous "crises." His melding of a humanness and professionalism has provided me with a model I hope to emulate in my own professional career. I am grateful to Gloria Smith for supporting me throughout my master's and doctoral programs. I have an especially high regard for how she continually placed my professional interests before her own. Jeff Jensen was the bright spot throughout my SPSS and LISREL nightmares. He supplied me with excellent statistical guidance and constantly reminded me (through his expertise, sense of humor, enthusiasm, and bottomless jar of peppermints) that statistics is enjoyable. I thank Bertram Stoffelmayr for the seminal role he played in my professional development. Bertram provided me with a wide array of opportunities to learn about research, politics, the interplay between the two, as well as how to make a wicked cup of coffee. Aaron Jackson and Randi Kim provided me with ongoing emotional support and encouragement to "move on" when I became too compulsive about my analyses. Mary Anderson made it possible and painless for me to collect data in Michigan while I was living in Utah. Much more important than her contribution to my data collection efforts was the friendship and music she provided me when I was feeling frustrated, tired, and impoverished. Last but not least, I would like to thank Marilyn Benishek for teaching me the importance of hard work and dedication.

TABLE OF CONTENTS

LIST OF TABLES viii

LIST OF FIGURES x

Introduction 1
Problem Statement 5

Review of the Literature 6
The Relationship Between Life Stress and Health . 6
Psychological Hardiness: Kobasa's Initial Research 7
Kobasa's Subsequent Research on Hardiness 9
The Hardiness Buffering Effect 13
The Factor Structure Underlying the Hardiness Construct 16
Principal components analyses 16
Predictive strength of the hardiness components 21
The Potential Confound Between Hardiness and Neuroticism 26
The Potential Confound Between Neuroticism, Life Stress, and Illness 31
Confound with life stress 32
Confound with illness 36
Sex Differences 40
Criticisms of the Hardiness Construct and Hardiness Research 44
Measurement issues 45
Inappropriate use of statistical methods . . 47
Summary 48
Hypothesized Model 50

Methodology 54
Subjects 54
Procedures 55
Instruments 59
Hardiness 59
Personal Views Survey 59
Revised Hardiness Scale 60
Stressful Life Events 61
Combined Hassles and Uplifts Scale . . . 61
PERI Life Events Scale 61

Neuroticism 62
Neuroticism Scale from the NEO Personality Inventory 62
Physical Illness Measures 63
Seriousness of Illness Rating Scale . . 63
Illness Behaviors 64
Demographic and Background Information Form . 64
Research Hypotheses 65
Confirmatory factor analysis 65
Causal model 65
Data Analysis 66

Results 69
Descriptive Statistics 69
Inferential Statistics 81
Confirmatory factor analyses 81
Personal Views Survey 82
Revised Hardiness Scale 91
Principal components analyses 99
Revised Hardiness Scale 103
Structural Equation Models with Latent Variables 114
Model for the whole sample based on frequency scores 125
Model for men based on frequency scores 128
Model for women based on frequency scores 131
Model for the whole sample based on severity scores 137
Model for men based on severity scores 139
Model for women based on severity scores 143

Discussion 150
Relationships Among the Hardiness Variables . . 152
Unidimensional Versus Multidimensional Construct 153
Relationships Among the Variables Underlying Hardiness Theory 155
The Neuroticism Confound 157
Structural Equation Modeling 159
Model for whole sample based on frequency scores 159
Model for men based on frequency scores . . 160
Model for women based on frequency scores . 160
Model for whole sample based on severity scores 161
Model for men based on severity scores . . 161
Model for women based on severity scores . 162
Conclusions derived from structural models 162
Strengths and Limitations 165
Implications for Future Research and Practice . 166

APPENDICES 170
APPENDIX A 171
Initial Contact Letter 171
APPENDIX B 172
Informed Consent Form 172
APPENDIX C 173
Postcard Follow-Up Contact 173
APPENDIX D 174
Second Follow-Up Letter 174
APPENDIX E 175
Third Follow-Up Letter 175
APPENDIX F 176
Personal Views Survey 176
APPENDIX G 179
Revised Hardiness Scale 179
APPENDIX H 182
Combined Hassles & Uplifts Scale 182
APPENDIX I 185
PERI Life Events Scale 185
APPENDIX J 189
Neuroticism Scale of the NEO Personality Inventory 189
APPENDIX K 191
Seriousness of Illness Rating Scale 191
APPENDIX L 193
Demographic and Background Information Form 193

LIST OF TABLES

Table		Page
1	Sample Demographic Information.	57
2	Sample Employment-Related Information	58
3	Descriptive Statistics for All Variables. . .	70
4	Correlations Among Measures in Structural Equation Model - Frequency	72
5	Correlations Among Measures in Structural Equation Model - Severity.	73
6	Correlations Between Observed Variables . . .	76
7	Correlation Matrix Among Hardiness Variables.	78
8	Internal Consistency of Scales.	79
9	Factor Pattern Results of the Confirmatory Factor Analyses for the Personal Views Survey	84
10	Goodness-of-Fit Indices for Confirmatory Factor Analyses.	88
11	Respecification Steps in Model-fitting Process for PVS.	93
12	Factor Pattern Results of the Confirmatory Factor Analyses for the Revised Hardiness Scale.	94
13	Respecification Steps in Model-fitting Process for RHS.	99
14	Component Loadings for the Personal Views Survey	105
15	Component Loadings for the Revised Hardiness Scale.	111
16	Box's M Test for Gender Based on Frequency Scores	123
17	Box's M Test for Gender Based on Severity Scores.	123
18	Univariate ANOVA by Gender - Frequency Scores	124
19	Univariate ANOVA by Gender - Severity Scores	125
20	Summary of Model Fit Information -- Whole Sample Based on Frequency Scores	127
21	Summary of Model Fit Information -- Men Based on Frequency Scores.	131
22	Summary of Model Fit Information -- Women Based on Frequency Scores.	134

23 Summary of Model Fit Information -- Whole Sample Based on Severity Scores. 139
24 Summary of Model Fit Information -- Men Based on Severity Scores 142
25 Summary of Model Fit Information -- Women Based on Severity Scores 146

LIST OF FIGURES

Figure		Page
1	Proposed Structural Model - Composite Scores	52
2	Proposed Structural Model - Component Scores	53
3	Revised Structural Model - Composite Scores	118
4	Revised Structural Model - No Measurement Error	121
5	Final Structural Model - Whole Sample - Frequency	130
6	Final Structural Model - Men - Frequency Scores	133
7	Final Structural Model - Women - Frequency Scores	137
8	Final Structural Model - Whole Sample - Severity	141
9	Final Structural Model - Men - Severity Scores	145
10	Final Structural Model - Women - Severity Scores	149

CHAPTER I

Introduction

Psychologists have had a longstanding interest in personality factors that mediate adjustment to life stress (e.g., Cohen & Edwards, 1989; Contrada, Leventhal, & O'Leary, 1991; Holroyd & Coyne, 1987; Suls & Rittenhouse, 1987). Interest in this topic was motivated by the inability of physiological theories to consistently explain the effects of life stress (see Contrada et al., 1991 for a review). It was also prompted by evidence which suggested that, even when experiencing similar life changes, not all individuals exhibit illness (Hinkle, 1974).

Hardiness is one personality characteristic proposed to play an important intervening role in the stress-illness relationship (Maddi & Kobasa, 1984). Hardiness theory was developed, in part, as a result of Kobasa's discontent with the overemphasis on unsuccessful coping processes, rather than successful coping processes, in the stress resistance literature. Kobasa noted that although some persons fall victim to the effects of life stress, others appear to benefit from these experiences. It is the latter group of persons which she referred to as stress resistent or hardy persons.

Kobasa's hardiness theory is theoretically grounded in existentialism. One of its basic premises is that an individual's perceptions of and actions in the world play an important part in shaping personality. A second premise is that life situations are always changing; this change provides opportunities for development and growth.

Kobasa substantiated her theory through the research program she developed while she was a graduate student at the University of Chicago. In a sample of mid- to upper-level male business executives, Kobasa identified a group of high stress/low illness (hardy) and high stress/high illness (non-hardy) persons. Hardy executives were those who reported greater levels of commitment, control, and challenge. Commitment is conceptualized as the ability to value oneself and one's life activities, control consists of the perception that one plays an instrumental role in influencing life events, and challenge involves the self-perception that change is a normal part of life and, therefore, is an opportunity for personal growth.

The hardiness personality construct has been studied extensively in the past decade. It has been consistently associated with lower levels of self-reported illness in people reporting highly stressful lives (Kobasa, Maddi, & Courington, 1981; Kobasa, Maddi, & Kahn, 1982; Kobasa, Maddi, & Puccetti, 1982; Kobasa & Puccetti, 1983). Research has identified additional personality and life functioning characteristics which either interact with hardiness or have

an additive effect in decreasing illness reports (Contrada, 1989; Ganellan & Blaney, 1984; Kobasa, Maddi, Puccetti, & Zola, 1985. Hardiness has also been associated with other types of adjustment such as lower levels of depression (Ganellan & Blaney, 1984; Rhodewalt & Zone, 1989) and occupational burnout (Nowack, 1986). According to Kobasa, cognitive processes associated with hardiness can be learned, and worksite wellness programs have been developed to promote these characteristics in employees (Maddi & Kobasa, 1984).

Although these findings have promising implications for health promotion as well as life and work satisfaction, hardiness has recently been criticized on a number of conceptual and methodological grounds. At the conceptual level, critics have questioned the actual number of components underlying hardiness. Although the majority of principal components analyses have identified three components, other studies have identified as few as two and as many as four components. These analyses have been conducted primarily on males, college students, and other homogeneous groups. Second, hardiness has been typically studied using negative indicators. Critics question the validity of research findings that are based on the assumption that it is possible to measure the true opposite of hardiness. Related to this is a third criticism: hardiness may simply reflect the absence of neuroticism. Correlational studies indicate that these two constructs are

strongly correlated but not to the extent that they are identical. Controlling for the effects of neuroticism significantly changes the effects of hardiness on outcome variables. The effects often decrease in magnitude or disappear entirely. There is also evidence that neuroticism may be confounded with life stress and illness-related variables. Fourth, hardiness was originally validated on a sample of men. Although some evidence in support of sex differences is emerging from the literature, little is know about the similarities and differences in how hardiness affects life stress and illness in men and women. Finally, there is inconsistent evidence that hardiness acts as a buffer against the negative effects of life stress.

Numerous methodological criticisms have also recently been raised about hardiness. The first of these criticisms is the tendency of researchers to study composite scores and overlook the possible individual contributions each of the three hypothesized components has on life stress and illness. Second, a variety of questionnaires have been developed to assess hardiness. Limited attention has been given to the psychometric properties of these tools. Third, inappropriate statistical techniques have been used to analyze hardiness effects and hardiness-life stress interactions. These techniques often fail to control for possible confounds or they treat hardiness as a dichotomous rather than a continuous variable.

Problem Statement

There is a need for a more systematic evaluation of existing hardiness theory, its measures, and the relationship between hardiness and other constructs such as neuroticism. Conceptual and empirical clarification is a necessary first step toward understanding the relationship among hardiness, life stress, and neuroticism and how these variables influence physical illness.

The purposes of this study are to clarify a) whether hardiness is a unidimensional or a multidimensional construct, b) differences in the strength of the relationship between the hardiness composite, its components, life stress, and different measures of illness when accounting for the effects of neuroticism, and c) the possible presence of gender differences in the hardiness-life stress paradigm.

Should support be found for the hardiness research paradigm, greater attention can be given to developing hardiness-promotion programs. A lack of support for the hardiness paradigm would suggest that other personality variables, such as neuroticism, should be examined more closely in order to understand why certain people report greater physical illness than others who are experiencing similar degrees of life stress.

CHAPTER II

Review of the Literature

The Relationship Between Life Stress and Health

Professionals in the fields of medicine and psychology have had a longstanding interest in the ability of personality factors to mediate adjustment to life stress (e.g., Cohen & Edwards, 1989; Contrada et al., 1991; Holroyd & Coyne, 1987; Suls & Rittenhouse, 1987). Hippocrates and Galen were among the earliest persons reported to have an interest in the link between personality and illness (see Contrada et al., 1991 for a review). Their conceptualization focused on the relationship between bodily fluids and personality types. These biopsychological characteristics were linked with the tendency to experience certain types of illnesses.

More recently, Selye's general adaptation syndrome (1956) drew attention to the notion that stressful life events can accumulate to the extent that the organism becomes exhausted. This exhaustion can manifest itself in a variety of illnesses and even death. Holmes and Rahe (1967) suggested that life events which require adjustment in a person's daily routine were stressful. As a result of this stress, people were more likely to become ill.

Absent from much of this early work was the acknowledgement that a significant minority of people lead very stressful lives and yet do not report high levels of illness. That is, some people appear to be more resistant to the effects of life stress than others. Prior research indicates that there is a small, yet reliable relationship between life stress and illness symptoms. Correlations average from about 0.20 to 0.40 (Kobasa et al., 1981; Rabkin & Struening, 1976a, 1976b; Roth, Wiebe, Fillingham, & Shay, 1989).

The great variability among these scores (i.e., standard deviations have been as large as eight times the mean) suggests that similar degrees of life stress have substantially different effects on illness behaviors (Kobasa, 1982b; Maddi & Kobasa, 1981). These findings prompted researchers to examine more closely the personality factors that may mediate the stress-illness relationship. One such personality characteristic is hardiness.

Psychological Hardiness: Kobasa's Initial Research

Kobasa's doctoral dissertation provided the basic framework for understanding how one personality characteristic, hardiness, affects the stress-illness relationship (Kobasa 1979a; 1979b). According to Kobasa, hardy people (i.e., people leading highly stressful lives and yet not reporting physical illness symptoms) exhibit three cognitive coping strategies. These strategies or components of hardiness are referred to as commitment,

control, and challenge. Commitment is the tendency to believe in the value of what one does or to have a sense of purpose and meaningfulness in life's endeavors. Control is conceptualized as one's perceived ability to influence life events and to see oneself as influential rather than helpless. Challenge refers to the use of optimistic cognitive appraisal to perceive change rather than stability as being a normal part of life and as being beneficial to one's personal development.

Six personality scales were hypothesized to measure each of the three hardiness components. These scales were selected from both established personality inventories and more recently developed personality assessment tools. Questionnaires containing these eighteen personality scales were mailed to 837 mid- to upper-level executives employed by Illinois Bell Telephone. Of this sample, women (n = 22) and low stress cases (n = 322) were discarded. As such, Kobasa's investigation was based on a high stress/low illness group (n = 86; i.e., hardy) and a high stress/high illness group (n = 75; i.e., nonhardy) of male executives only.

Discriminant function analyses identified two scales for each component which differentiated between hardy and nonhardy executives. For commitment, these scales were Alienation from Self and Alienation from Work, for control, these scales were Locus of Control and Nihilism, and for challenge, these scales were Vegetativeness and

Adventurousness. Somewhat similar results were reported in a later study (Kobasa, Hilker, & Maddi, 1979).

Kobasa's initial work suggested that hardiness "buffered" individuals against the development of illness. That is, persons leading stressful lives and exhibiting high levels of commitment, control, and challenge were less likely to report illness symptoms in comparison to similarly stressed people without the hardiness quality.

Kobasa's Subsequent Research on Hardiness

Kobasa conducted a series of retrospective and prospective studies to further validate the hardiness construct and its buffering effect. Each of these studies explored the relationship between hardiness and other personality and life functioning variables. The majority of these studies were conducted on male mid- to upper-level managerial employees. It is important to note that different combinations of hardiness scales were included in Kobasa's assessment battery. With the exception of one study (i.e., Kobasa, 1982a), composite scores were used as the measure of hardiness. These studies are described briefly below in chronological order.

Kobasa and her colleagues first published a five-year prospective study on the relationship between hardiness and constitutional predisposition (i.e., parents' illness reports) among male executives (Kobasa et al., 1981). The results from this study indicated that hardiness was associated with less illness and constitutional

predisposition was associated with more illness. After controlling for initial levels of illness, however, a relationship was not found between stressful life events and future illness. Hardiness buffering effects were not found in either analysis.

A second study presented the results from concurrent and prospective analyses using initial levels of illness as a covariate (Kobasa et al., 1982a). In both analyses hardiness buffered against the effects of stress on illness. A significant main effect of hardiness on illness was also found. Stress had a direct effect on illness in the concurrent analysis but not in the prospective one.

The role of hardiness and exercise (i.e., involvement and degree of strenuousness of sport and non-sport-related activity) among male executives was also studied (Kobasa et al., 1982b). Higher levels of stressful life events were associated with greater illness reports. Hardiness and exercise functioned independently to decrease illness. Both hardiness and exercise interacted with stressful life events, indicating that these variables are particularly important at minimizing illness as the level of stress increases.

The relationship among commitment, coping, social support, fitness, and stressful life events was studied within a mixed sex sample of general practice lawyers (Kobasa, 1982a). Contrary to Kobasa's previous findings, no significant relationship between the level of stressful life

events and the number of illnesses was found. Stressful life events were, however, predictive of strain (i.e., physical and mental symptoms typically associated with stressful life experiences). People who were either high in commitment or who did not use regressive coping strategies (i.e., efforts to deny, minimize or avoid stressful situations) reported less strain. Social support was only slightly predictive of strain, with greater levels of social support associated with more strain. Exercise was not a significant predictor of strain. Kobasa did not investigate whether there was a commitment-life stress buffering effect in this study.

Kobasa investigated the relationships between hardiness, social support, and resistance to the physical effects of stress among a sample of male executives (Kobasa & Puccetti, 1983). Two separate ANOVAs were conducted; the first analysis included a measure of boss support and the second included a measure of family support. In the analysis that included family support, hardiness had a direct effect on illness, and life stress had a buffering effect on illness. This effect, however, was not identified in the analysis that included boss support. Social assets (e.g., parental occupation, father's educational level, extent of group membership) were not significantly related to illness.

Kobasa and her colleagues also examined the relationship between hardiness and Type A behavior among

male executives (Kobasa, Maddi, & Zola, 1983). Type A behavior is defined as a personality style in which people "display excess achievement striving, competitiveness, impatience, hostility, and vigorous speech and motor mannerisms" (Friedman & Rosenman, 1974). Hardiness and stressful life events were significantly related to illness reports. A work-stress by hardiness interaction effect indicated that people exhibiting Type A behavior pattern were more likely to report high levels of physical illness when they experienced high levels of stress levels and low levels of hardiness.

Most recently, Kobasa and her colleagues conducted a concurrent and a prospective study on the effects of hardiness, exercise, and social support on illness among male executives (Kobasa et al., 1985). The purpose of the study was to determine whether a larger number of resistance resources would be associated with less illness. Both the concurrent and prospective analyses used in this study identified an inverse relationship between the number of resistance resources and the level of illness reported. The greater the number of resources available to people, the less likely they were to report physical illness. Findings from a multiple regression analysis indicated that hardiness, exercise, and social support (in descending order of strength) were significant predictors of less illness. Hardiness made an even larger contribution to the outcome variance when future illness was used as the dependent

measure. Exercise and social support, however, accounted for less of the outcome variance than they did in the concurrent analysis. No hardiness buffering effects were investigated in this study.

In conclusion, six points of clarification should be made about Kobasa's research. First, Kobasa's findings are derived primarily from male professionals. Second, her findings are based on a variety of measures of hardiness. Unfortunately, rationales for the additions, deletions, and scale combinations used to assess hardiness were not consistently provided. Third, with one exception (i.e., Kobasa, 1982a), hardiness was always assessed using composite scores. Kobasa did not investigate the effect of each hardiness component on illness. Fourth, Kobasa used a single factor analysis and correlational evidence to support her three component theory of hardiness. Fifth, with two exceptions (i.e., Kobasa et al., 1981; Kobasa & Puccetti, 1983), the results from these studies are strongly supportive of hardiness's ability to act as a buffer against illness in stressful life circumstances. Sixth, only rarely did Kobasa examine the impact of other personality characteristics on hardiness's effect on illness.

The Hardiness Buffering Effect

By definition, hardiness acts as a buffer when it interacts with life stress to influence the dependent variable of interest. Support for the hardiness buffering effect is inconclusive. After presenting the literatures

that both support and refute the buffering effect, possible reasons for these contradictory findings will be discussed.

Nine studies provided support for the hardiness buffering effect. Four of these studies were conducted by Kobasa (i.e., Kobasa et al., 1981; Kobasa et al., 1982a; Kobasa et al., 1982b; Kobasa & Puccetti, 1983). These studies all used self-reported illness as the dependent variable. In one of these studies, (i.e., Kobasa & Puccetti, 1983), buffering effects were found in an analysis which contained a measure of family support but not when boss support was included in the analysis.

In addition to self-reported illness (Rhodewalt & Zone, 1989; Roth et al., 1989), hardiness and life stress have been shown to buffer against depression (Ganellan & Blaney, 1984; Rhodewalt & Zone, 1989), occupational burnout (Nowack, 1986), and to be associated with positive self-statements (Allred & Smith, 1989).

Results from an equal number of studies, however, do not find support for the hardiness buffering effect. Kobasa published two such studies using self-reported illness as the dependent variable (i.e., Kobasa et al., 1983; Kobasa & Puccetti, 1983). Other studies using illness as the outcome variable found a similar lack of support for the hardiness buffering effect (i.e., Funk & Houston, 1987; Rhodewalt & Zone, 1989; Schmied & Lawler, 1986; Wiebe & McCallum, 1986; Wiebe, Williams, & Smith, 1991). Similarly, studies using depression (Funk & Houston, 1987; Rhodewalt & Zone, 1989),

psychological distress (Nowack, 1986), and occupational burnout (Barry, 1988) as dependent variables failed to identify a hardiness buffering effect.

The inconsistency of these results may be a result of several factors. First, much of the research uses a median split method to identify subgroups of people who are high or low on variables such as hardiness and life stress. This is not an appropriate test of the hardiness buffering effects, because this type of analysis tests for differences in the amount of variance explained (correlation coefficients) rather than for the difference between slopes (regression coefficients; Cohen & Edwards, 1989). Second, differences in the samples studied may contribute to the contradictory findings. Although male business executives (e.g., Kobasa's research) and students (e.g., Funk & Houston, 1987; Ganellan & Blaney, 1984; Wiebe & McCallum, 1986; Wiebe et al., 1991) are frequently studied groups, other samples such as human service workers (e.g., Nowack, 1986), female secretaries (Schmied & Lawler, 1986) and the elderly (Barry, 1988) have also been used to investigate the hardiness research paradigm. Third, the variety of assessment tools used to measure hardiness, life stress, and illness may produce inconsistent hardiness buffering effects. For example, six different measures of hardiness were used in these nineteen studies. Fourth, hardiness may not act as a buffer against all life functioning characteristics (e.g., self-reported illness, depression, occupational burnout) to the same

extent. Finally, buffering effects may be masked through the use of composite scores rather than component scores. Certain of the three hardiness components may interact with life stress to decrease its detrimental effects whereas others may not.

The Factor Structure Underlying the Hardiness Construct

There is a lack of consensus regarding both the number of components underlying the hardiness construct, as well as the predictive strength of each of the components. The results from nine factor analyses using five different measures of hardiness by six research teams will be presented. Following this, research addressing the predictive strength of each component will be presented.

Principal components analyses. Kobasa conducted a second-order principal components analysis on her six-scale measure of hardiness (reported in Kobasa et al., 1981; Kobasa, 1982b). Each of these scales consisted of negative indicators of the hardiness components. A personal communication with Kobasa (as cited in Hull, VanTrueren, & Virnelli, 1987) indicated that the analysis was conducted using an oblique rotation. Items with loadings greater than .30 on the extracted factors were retained. The subject pool consisted of male business executives.

A general hardiness factor accounted for 46.5% of the explained variance. Each of the scales correlated .44 to .89 with the general factor with the exception of the Cognitive-Structure scale ($r = -.01$). The Cognitive-

Structure scale was the sole scale that loaded on the second factor. It accounted for 18.5% of the variance. Kobasa deleted this scale from the hardiness questionnaire since 1) it did not load significantly on the general factor and 2) a review of the item content suggested that it was not measuring her conceptualization of challenge.

Kobasa's justified conceptualizing hardiness as a three factor construct based on her finding that the scales for each construct correlated more highly with themselves than they did with the scales associated with the other constructs. Formal efforts to substantiate this notion (i.e., completing first-order principal components analyses) were not completed.

Hull and his colleagues conducted a total of three factor analyses on a sample of college students (Hull et al., 1987). Hardiness was assessed using Kobasa's original six-scale measure of hardiness as well as her Revised Hardiness Scale (RHS).

A first-order principal components analysis was completed on the six-scale measure of hardiness using an oblique rotation. Items with loadings greater than .30 were retained in this analysis. The commitment, control, and challenge components were identified. Their eigenvalues were 8.93, 3.91, and 3.63, respectively. Collectively, they accounted for 18% of the explained variance.

Four of the six scales loaded somewhat consistently on the hypothesized factors. Alienation from Self and

Alienation from Work loaded on commitment, External Control loaded on control, and Cognitive-Structure loaded on challenge. The remaining three scales did not load consistently on their hypothesized factors. Powerlessness loaded consistently on commitment rather than on control. Security loaded weakly on both commitment and control, and not on the hypothesized challenge component.

Hull and his colleagues compared Kobasa's factor loadings with their own findings on the Revised Hardiness Scale. Of the thirty-six items, only twenty-five loaded on the hypothesized factors. Eleven of the twelve commitment, nine of the sixteen control, and four of the eight challenge items loaded as expected.

As an extension of the same study, data from two college samples were used to conduct a pair of first-order principal components factor analyses on the Revised Hardiness Scale. Results from both samples identified the three hardiness components as commitment, control, and challenge. Eigenvalues from one sample were 4.68, 2.56, and 1.95 for each factor, respectively. The factors accounted for 26% of the variance. The eigenvalues identified from the second sample were 4.93, 2.21, and 2.14, respectively. This model also accounted for 26% of the explained variance. Similar to their earlier findings, not all of the items loaded on the hypothesized factors.

Using data collected from male college students, Funk and Houston (1987) conducted a first-order principal

components analysis on Kobasa's five-scale hardiness measure. Contrary to the results of previous factor analyses, Funk and Houston identified a two-factor solution. The eigenvalues for the two factors were 2.36 and 1.06. Collectively, they accounted for 69% of the variance.

Similar to Hull's research findings, the scales did not load consistently on the predicted components. The two measures of commitment (Alienation from Self; Alienation from Work) and one of the control measures (Powerlessness) loaded most strongly on the first factor. Security (a measure of challenge) and External Control (a measure of control) loaded on the second factor.

McNeil, Kozma, Stones, and Hannah (1986) conducted two sets of principal components analyses on the 20-item Abridged Hardiness Scale. Data were obtained from people who were predominantly over sixty years of age. The two principal component analyses were separated by a one-year time interval.

The initial pair of first-order principal components analyses identified three factors with eigenvalues equal to or greater than 1.5. These analyses accounted for 31% and 32% of the total variance, respectively. After completing a Varimax rotation, thirteen of the twenty items loaded greater than .40 on the three factors. Only ten of the thirteen items loaded as theory predicted (i.e., 3 commitment, 4 control, 3 challenge items). The authors interpreted these findings as being supportive of the three

component hardiness structure. Three of the seven misloaded items loaded as hypothesized in a second factor analysis which was completed on an independent data set.

McNeil and his colleagues went on to conduct a pair of second-order principal components analyses to determine whether the subscales loaded on a single general factor. A single factor with an eigenvalue greater than 1.0 was obtained from the data collected at both time points. This general factor accounted for 49% and 47% of the variance, respectively. All three components loaded .45 or greater on the general hardiness factor.

Morrissey and Hannah (1986) completed a principal components analysis on an adolescent version of the Abridged Hardiness Scale. After eliminating seven items because of their low item-total correlations, the analysis identified four factors. These factors were interpreted as control, challenge, commitment to school, and commitment to self. They accounted for 48.7% of the total variance. Each of these factors loaded greater than .50 on a single second-order factor. This general factor accounted for 40% of the variance.

Pollock and Duffy (1990) developed their own unique measure of hardiness, the Health-Related Hardiness Scale. The item content was developed with the intention of assessing Kobasa's three components of hardiness. Ten of the original fifty-one items were deleted because of their low item-total correlations. A first-order principal

components analysis was then conducted on the remaining forty-one items using an oblique rotation. A two-factor solution was identified with thirty-four of the items loading .35 or greater on the hypothesized factors. The two factors accounted for 32.1% of the variance and had eigenvalues of 8.2 and 2.9. The first factor was identified as a combination of challenge and commitment, and the second was interpreted as control.

A number of conclusions can be drawn from these principal components analyses. First, hardiness is a multidimensional construct which consists of at least two components. Second, the components are not measured equally well. Commitment is the most precisely measured component, followed by control and challenge. Third, six hardiness measures have been factor analyzed using data obtained from a variety of relatively homogeneous populations. The generalizability of these results is questionable.

Predictive strength of the hardiness components. The vast majority of hardiness research has been conducted using composite scores. Composites scores are calculated by combining standardized scores from the three equally-weighted component scores. The frequent use of composite scores may be a result of two considerations. First, Kobasa set a precedent for using composite scores with her own research. Others may have followed her procedure without questioning their potential limitations. Second, composite scores are appealing because they simplify the data analysis

and interpretive aspects of research (Carver, 1989).

The benefit of the enhanced simplicity of using composite scores is tempered by a) the loss of explanatory information about each component, b) their inability to identify possible synergistic (i.e., interaction) effects among the components (Carver, 1989), c) their inability to allow comparisons to be made across samples studied, and d) their inability to develop normative information.

Given that the principal components analyses have consistently identified at least two components underlying hardiness, questions can be raised about each component's ability to predict the outcome variable of interest. For example, does each component possess comparable predictive strength? Is their predictive ability similar across a variety of outcome variables (e.g., illness, depression, occupational burnout)? Unfortunately, little attention has been given to the independent roles that commitment, control, and challenge play in mediating the stress-illness relationship. The studies that have investigated the specific effects of the hardiness components on illness and other outcome variables are reviewed below.

Kobasa herself published only one study in which she investigated the relationship between commitment, coping strategies, and illness-related variables among lawyers (Kobasa, 1982a). She found that lawyers who were more alienated and tended to use regressive rather than active coping styles in stressful situations were more likely to

report strain (i.e., physical symptoms typically associated with physical or mental overexertion).

Manning and his colleagues reported basic correlational information regarding the components' relationship to a variety of health-related outcome measures (Manning, Williams, & Wolfe, 1988). Both commitment and control were consistently correlated in the expected direction with a variety of health and life stress variables whereas challenge was not.

Schmied and Lawler (1986) explored the relationship between hardiness and its components, Type A behavior, life stress, and illness among a sample of female secretaries. Only the Powerlessness scale, a measure of control, was significantly correlated with the frequency of illness reported. When the hardiness variables were entered into a regression equation, however, neither the hardiness composite or any of the three components differentiated between high stress/high illness and high stress/low illness women.

Holt, Fine, and Tollefson (1987) published a second study based on an exclusively female sample. They found that women scoring high on the commitment dimension were less likely to report a high number of stress-related illnesses.

Roth and his colleagues examined the predictive effects of hardiness, life stress, and fitness on illness among college students (Roth et al., 1989). In comparison to the

other two components, commitment was the strongest predictor of illness. Higher levels of commitment were associated with fewer illnesses. Neither control nor challenge appeared to offer any significant health-related benefits.

Contrada (1989) examined the relationship between the hardiness components and cardiovascular functioning (i.e., diastolic blood pressure) among male college students. Only the challenge component was predictive of changes in blood pressure.

One study examined the impact of the particular hardiness components and life stress on the physical and mental health of adolescents (Shepperd & Kashani, 1991). With regard to somatic complaints, adolescents who scored low on commitment and control were more likely to report illness.

The health-related effects of hardiness among members of an agricultural organization were also recently reported (Lee, 1991). Only the control dimension of hardiness was a significant predictor of perceived physical health.

Wiebe and her colleagues (Wiebe et al., 1991) investigated the predictive strength of each hardiness component on self-reported illness among college students. For their mixed-sex sample, challenge was a significant predictor of illness, whereas control's ability to predict illness only approached significance. The effect of commitment was insignificant. A different pattern of results emerged for men and women. These specific findings

are discussed in a subsequent section.

Significant relationships between hardiness components and scale scores with outcome variables other than illness have also been reported in the literature. At the component level, commitment and control have been associated with certain attributional styles (Hull, VanTreuren, & Propsom, 1988; Hull et al., 1987), as well as with increased empathy, cooperation, and friendliness (Leak & Williams, 1989). Commitment has been shown to buffer against the onset of depression (Gill & Harris, 1991; Lee, 1991; Shepperd & Kashani, 1991) and job burnout (Holt et al., 1987). People scoring high on commitment are more likely to have an optimistic outlook on life, have more self-esteem and interest in social activities, and be more introspective (Hull et al., 1987). People reporting a greater degree of control are more likely to be optimistic, report higher levels of self-esteem (Hull et al., 1987), and are less likely to be depressed (Hull et al., 1987; Lee, 1991; Shepperd & Kashani, 1991).

At the scale level, Alienation from Work is positively correlated depression (Funk & Houston, 1987) and occupational burnout (Keane, DuCette, & Adler, 1985). Low scores on the Alienation from Self and Vegetativeness scales are predictive of greater depression (Ganellen & Blaney, 1984).

In summary, research supports the notion that hardiness is a multidimensional construct. However, the number of

components underlying the construct is not clear. There is also some indication that the hardiness components may have a differential effect on illness and other outcome variables. These findings suggest that the continued use of hardiness composite scores may limit the practical utility of the information derived from research on hardiness. One important avenue to pursue is that of investigating the unique contribution of each component on health-related variables.

The Potential Confound Between Hardiness and Neuroticism

The following two sections present research suggesting that neuroticism is a potentially potent confound in the hardiness-illness research paradigm. Neuroticism, one of the five major dimensions of normal personality (Contrada et al., 1991; McCrae & Costa, 1987), is characterized as a tendency to view the world in a negative light (Costa & McCrae, 1987; Eysenck & Eysenck, 1964; Watson & Clark, 1984; Watson & Pennebaker, 1989). Persons high in neuroticism are "prone to experience fear, anger, sadness, and embarrassment; are unable to control cravings and urges; and feel unable to cope with stress" (Costa & McCrae, 1987, p. 301).

The concern that hardiness and neuroticism may be confounded arises, in part, from measurement-related criticisms of hardiness for its use of negative indicators (Funk & Houston, 1987; Hull et al., 1987). Rather than assessing hardiness directly, early measures of hardiness

consisted of negative indicators of the construct. That is, the absence of hardiness was indicated by high scores on alienation from work and self, powerlessness, internal control, and the need for security. The actual content of the hardiness scales appears to be similar to that found in measures of neuroticism (e.g., Commitment: Life is empty and has no meaning; Control: Often I do not know my own mind). These similarities raise the issue that the presence of hardiness, in part, may reflect the absence of neuroticism (Allred & Smith, 1989; Funk & Houston, 1987; Rhodewalt & Zone, 1989; Wiebe et al., 1991).

The relationship between hardiness and neuroticism has been investigated by a number of researchers. Some of these studies simply report the correlations between hardiness and neuroticism. Depending on the measures used, these correlations range from .24 to .62 (Allred & Smith, 1989; Hull et al., 1987; Massey, 1989; Rhodewalt & Zone, 1989; Wiebe et al., 1991).

Others have addressed the issue of confounding more directly by examining both the strength and durability of the hardiness effects after controlling for initial levels of neuroticism. Some of these studies use the traditional dependent variable of self-reported illness. Others have investigated the relationship of hardiness to other psychological variables.

Two research teams did not find differences in their results after controlling for neuroticism. Type A persons

continued to report high levels of psychological distress, and hardy persons reported less distress (Nowack, 1986). Allred and Smith (1989) found no difference in the number of positive self-statements reported after controlling for neuroticism. The significant effect for negative self-statements, however, disappeared once neuroticism was statistically controlled.

Results from these studies counter findings elsewhere in which the hardiness effects either decreased in magnitude or were totally eliminated after neuroticism was controlled (e.g., Allred & Smith, 1989; Funk & Houston, 1987; Rhodewalt & Zone, 1989; Wiebe et al., 1991). Only the three studies that used self-reported illness as a dependent variable are reviewed below.

Funk and Houston (1987) were the first to identify contradictory results depending on whether or not neuroticism was statistically controlled. Correlational analyses identified a significant relationship between hardiness and neuroticism among a sample of male introductory psychology students. The hardiness composite correlated .25 and .40 with two measures of maladjustment (i.e., neuroticism). Correlations between maladjustment and the individual hardiness scales ranged from .00 to .37. A series of ANOVAs and ANCOVAs, as well as multiple regression analyses were completed. Data were collected over an eight week period of time. The findings differed substantially according to whether or not the analysis was retrospective

or prospective in nature.

In the retrospective analysis, the majority of the hardiness effects disappeared after controlling for neuroticism. Specifically, hardiness was no longer associated with differences in health problems, whereas the effect on depression remained significant. In the prospective design, the main effects for hardiness on subsequent depression remained significant regardless of whether or not neuroticism was controlled. No significant effects for hardiness on later illness were found using either ANOVA or ANCOVA.

Finally, retrospective and prospective multiple regression analyses were completed. These results differed from both the ANOVA and ANCOVA findings. No main effects were found for hardiness on either health problems or depression when the retrospective data were used. As was the case with the ANCOVA, a main effect of hardiness on depression was identified in the prospective data analysis even after controlling for one measure of neuroticism. This hardiness effect only approached significance when a second measure of neuroticism was used as a covariate. Hardiness did not have a significant effect on illness. These basic findings were replicated in a study conducted by Rhodewalt and Zone (1989). After controlling for depression, neither hardiness nor life change events predicted illness.

Another extensive evaluation of the potential confound between hardiness and neuroticism was conducted on a sample

of college students (Wiebe et al., 1991). Two measures of both hardiness and neuroticism were used. Neuroticism was significantly correlated with the hardiness composite and each composite score. Correlations ranged from .21 to .61 between hardiness and neuroticism. All correlations were in the expected direction. Results from a multi-trait monomethod analysis indicated that the control and challenge components were more confounded with neuroticism than were the hardiness composite and commitment.

Multiple regression analyses were also completed using these measures in addition to a measure of life stress. The analyses indicated that the hardiness composite, commitment, and control were predictive of fewer illnesses when neuroticism was not statistically controlled. The PVS challenge component was not statistically significant, although the RHS challenge component was significant. After controlling for neuroticism, neither the composite score or any of the three components were predictive of illness for both the PVS and the RHS.

In summary, the correlations among various measures of both hardiness and neuroticism clearly indicate that hardiness is confounded with neuroticism. As such, the relationship between hardiness, life stress, and self-reported illness may be a reflection of neuroticism rather than hardiness. The correlations are not strong enough, however, to suggest that hardiness and neuroticism are completely redundant constructs.

Results from more complex analyses, such as ANCOVA and multiple regression with a covariate, have attempted to clarify the relationship between hardiness and neuroticism. The effects of hardiness on illness reports tend to decrease or disappear when neuroticism is controlled. Rather than viewing hardy people as being particularly adept at overcoming the negative effects of life stress, it may be more accurate to interpret these findings as indicating that non-hardy people are more psychologically maladjusted or neurotic than hardy people.

The Potential Confound Between Neuroticism, Life Stress, and Illness

Psychosomatic research often links neuroticism (i.e., anxiety, depression) to disease (Dohrenwend & Dohrenwend, 1981). Historically, research findings on psychosomatic illness have indicated that emotionally distressed people report higher levels of life stress and illness than do non-distressed people. At first glance, the correlations between neuroticism and symptom reports appear to support this notion. For example, people experiencing greater emotional distress are more likely to report more medical symptoms ($r = .44$; Blazer & Houpt, 1979; Costa & McCrae, 1985a; Costa & McCrae, 1987). This phenomenon has been identified across a variety of populations (Tessler & Mechanic, 1978).

The relationship between life stress and illness has been questioned recently on the grounds that statistically

significant research findings may be the result of a confound with neuroticism. That is, neuroticism may be confounded with the measurement of both life stress (Dohrenwend, Dohrenwend, Dodson, & Shrout, 1984) and illness reports (Costa & McCrae, 1987). As a result, research findings may not be accurately representing the relationship between hardiness, life stress, and illness reports.

Confound with life stress. Monroe (1983) identified possible reasons for the interpretive difficulties in the life stress-psychological distress (i.e., neuroticism) relationship. First, people who experience a larger number of psychological symptoms may be more likely to report greater levels of life stress. Second, the item content of measures of life stress and psychological distress are somewhat similar and, thus, may reflect a common nomological network.

With regard to the Monroe's first issue, neuroticism has been associated with negative affect. This relationship may be responsible for differences in how different people perceive similar life events. That is, relative to non-neurotic (i.e., stable) persons, neurotic individuals may have a greater tendency to view similar life events in a more negative light.

There is both theoretical and empirical evidence to support the notion that emotionally distressed (i.e., neurotic) individuals are more likely to report a higher degree of life stress. From a theoretical perspective, H.J.

Eysenck proposed that neurotic persons are more likely to experience more negative affect than stable persons (refer to Eysenck & Eysenck, 1985). Gray's (1981) psychobiological theory was an expansion of Eysenck's theory. He proposed that there are two neurologically-based motivational systems. One is related to reward (i.e., behavioral activation system) and the other is related to punishment (i.e., behavioral inhibition system). Gray hypothesized that neurotics are more sensitive to the inhibition system than are stable persons. This difference in sensitivity to positive and negative life events has been supported by other theorists and researchers (McCrae & Costa, 1991; Strelau, 1987; Tellegan, 1985), but not until recently has this notion been tested empirically (e.g., Larsen & Ketelaar, 1991).

From an empirical perspective, Monroe's hypothesis that psychologically distressed people report more life stress is well-documented (see Ormel & Wohlfarth, 1991 for a list of articles published on this topic). In general, correlations between measures of neuroticism and life stress have consistently been reported to range from .40 to .58 in magnitude (Dohrenwend & Shrout, 1985; Kanner, Coyne, Schaeffer, & Lazarus, 1981; Kohn, Lafreniere, & Gurevich, 1991; Watson, 1988).

These correlations suggest that neuroticism may influence how life stress is appraised. There is evidence to support this idea. In specific, neurotic persons show

greater emotional reactivity to negative situations and less reactivity to positive events (Larsen & Ketelaar, 1991). Neurotic people may perceive the same events as more demanding or threatening (Lazarus & Folkman, 1984) or they may lack the ability to cope with stressful life events (McCrae & Costa, 1986; Tellegan, 1985). They are more sensitive to minor failures, frustration, and daily events than are stable people (Watson & Clark, 1984). Persons scoring high in neuroticism report a larger number of negative events (Aldwin, Levenson, Spiro, & Bosse, 1989; Watson & Clark, 1984), they perceive the events as having a greater impact on their lives (Watson, 1988; Watson & Clark, 1984), and they perceive the impact of these events as persisting over a longer period of time than do stable people (Watson & Clark, 1984).

Related to Monroe's second issue, the neuroticism confound is clearly related to the content of the items found in life stress questionnaires (Brett, Brief, Burke, George, & Webster, 1990; Dohrenwend et al., 1984; Kohn et al., 1991; Schroeder & Costa, 1984). Item content between measures of major life events and daily hassles with measures of psychological distress are similar. For example, Holmes and Rahe's measure of major life events has been criticized because the majority of its items can be interpreted as symptoms of physical or mental illness (Hudgens, 1974; Schroeder & Costa, 1984). Historically, this confound has led researchers to overestimate the true

relationship between life stress and a variety of outcome measures (Schroeder & Costa, 1984; Watson & Pennebaker, 1989). Thus, life stress measures may be more of an indication of psychological functioning than an actual cause of such problems.

Efforts have been made to evaluate and address this potential confound (e.g., Delongis, Coyne, Dakof, Folkman, & Lazarus, 1982; Monroe, 1983; Rowlison & Felner, 1988; Schroeder & Costa, 1984). In one study, Schroeder and Costa (1984) found that confounded life events correlated with health outcomes whereas there was no significant relationship with unconfounded items. While some researchers found supportive evidence for Schroeder and Costa's results (Brett et al., 1990), others were not able to confirm those findings (Maddi, Bartone, & Puccetti, 1987).

One of the more heated and interesting debates on this issue involved two research teams who are active in the area of life stress assessment. Even after identifying a significant number of items overlapping between the Hassles Scale and the Hopkins Symptom Checklist (a measure of psychological functioning), Delongis and her colleagues decided against deleting these items (Delongis et al., 1982). Their rationale for not modifying the Hassles Scale was that both versions of the questionnaire correlated .99 with each other. Furthermore, the scale was significantly related to psychological distress whether or not those items

were included in the scale. A series of rebuttals followed this publication (e.g., Dohrenwend et al., 1984; Dohrenwend & Shrout, 1985; Lazarus, Delongis, Folkman, & Gruen, 1985).

This debate was never clearly resolved, but was beneficial in that it generated a number of conceptual recommendations for measuring life stress (e.g., Dohrenwend, Link, Kern, Shrout, & Markowitz, 1990; Dohrenwend & Shrout, 1985). First, life stress measures should contain both major and minor life stressors. Second, assessments should cover a brief period of time. Third, measures need to differentiate between events and reactions to events (i.e., whether they are viewed as having a negative or a positive impact on the individual). Fourth, predispositions to life stress (e.g., normal personality characteristics, genetic vulnerability, early experiences) should be included in the assessment process.

In summary, the extent and the actual effects of the neuroticism confound on measures of life stress remains unclear. Further examination of this relationship is warranted.

Confound with illness. There is also evidence indicating that neuroticism is confounded with self-reported illness (Costa & McCrae, 1987; Jorgensen & Richards, 1989; McCrae, Bartone, & Costa, 1976). Correlations range from .30 to .50 (see Watson, 1988 for a review) and persist across a variety of health problems (Costa & McCrae, 1980; Watson & Pennebaker, 1989). The relationship does not

appear to be influenced by the time frame assessed or by the response format used by the questionnaire (Watson & Pennebaker, 1989).

Findings from studies on the relationship between neuroticism and objective measures of illness, however, differ substantially from those based on subjective illness reports. Although there is a clear and consistent relationship between neuroticism and self-reported illness, neuroticism is not correlated with actual disease (Costa & McCrae, 1985a; 1987; Stone & Costa, 1990; Watson & Pennebaker, 1989). In addition, self-reported illnesses are related to physicians' evaluations of health, while neuroticism is not related to physicians' ratings. Furthermore, neuroticism is not usually associated with stress-related deaths, such as those resulting from cancer or heart disease (Keehn, Goldberg, & Beebe, 1974; Shekelle, Raynor, Ostfeld, Garron, Bieliauskas, Liu, et al., 1981).

These findings suggest that subjective illness reports may be tapping into two sources of variance: one that is related to actual health problems and another that is related to a more subjective or psychological phenomenon (Costa & McCrae, 1987). The difference in the relationship between neuroticism with self-reported illness and actual illness suggests that neuroticism is intertwined with the psychological phenomenon. This linkage between neuroticism and illness highlights the importance of differentiating between the "distress-prone" personality and the "disease-

prone" personality (Stone & Costa, 1990).

A number of somewhat overlapping personality-disease models have been posed to more clearly understand the relationship between neuroticism and health reports (e.g., Costa & McCrae, 1985a; Holroyde & Coyne, 1987; Peterson & Seligman, 1987; Suls & Rittenhouse, 1990; Watson & Pennebaker, 1989). Watson and Pennebaker (1989) discussed three such models. The psychosomatic hypothesis states that neuroticism causes health problems. This hypothesis is supported by findings that anxiety, depression, and hostility have been linked to both minor (e.g., headaches, acne) and major (e.g., ulcers, coronary heart disease) health problems (Diamond, 1982; Friedman & Booth-Kewley, 1987; Harrell, 1980). A second model is referred to as the disability hypothesis. This model states that health problems cause emotional distress and dissatisfaction. That is, health problems lead to changes in personality, including an increase in neuroticism. Neuroticism is seen as a negative consequence of disease.

Watson and Pennebaker do not support either of these models because of the absence of a significant relationship between neuroticism and objective measures of physical health. With this in mind, they pose a third model: the symptom perception hypothesis. This model states that the correlation between neuroticism and self-reported illness is spurious. The relationship simply indicates that neurotics are more vocal and attentive to their physical sensations

than are stable persons. Prior research supports this hypothesis (e.g., Costa & McCrae, 1987; McCrae et al., 1976; Tessler & Mechanic, 1978; Watson, 1988).

These findings call into question the results of much of the hardiness research. Self-reported illness is the most commonly used dependent variable and was the outcome variable used by Kobasa. The use of subjective measures of illness is often justified by their significant correlation with more objective ratings of illness (e.g., Kobasa et al., 1981; LaRue, Bank, Jarvik, & Hetland, 1979; Pennebaker, 1982). Although these relationships are statistically significant, they tend to be low in magnitude, typically ranging from .30 to .40 (Tessler & Mechanic, 1978) to as low as .14 (McCrae et al., 1976). One exception to this is Kobasa's mean correlation of .89 between self-reported illness and medical records (Kobasa et al., 1981).

In order to more clearly understand the effects of hardiness on illness, the potential neuroticism confound must be acknowledged. Two options are available for clarifying the relationship between hardiness and illness reports. One option entails statistically controlling for the effects of neuroticism. A second option includes determining whether the strength of the relationship between hardiness and more subjective illness reports is similar to that of hardiness and more objective measures of illness. Recommendations have been made for developing more objective measures of illness (Costa & McCrae, 1987; Stone & Costa,

1990; Watson & Pennebaker, 1989). These include biological markers (e.g., immune system functioning), outcome variables (e.g., objective evidence of pathology, disease incidence and mortality), and illness-related behaviors (e.g., number of physician visits, absences from work). Modifications in research strategies are essential if more valid investigations of hardiness are to be completed.

Sex Differences

Because men and women differ both in physiology and in socialization processes, it seems likely that they would differ in how they cope with life stress and in their propensity to report illness (Baum & Grunberg, 1991; Ratliff-Crain & Baum, 1990). There is evidence suggesting that men and women perceive and cope with life stress in different ways. Women tend to overestimate the frequency of negative events and are more likely to view events as serious (Kessler, Brown, & Broman, 1981). Women also tend to avoid threatening information or to reinterpret it in a less threatening manner (Stone & Neale, 1984). They tend to be more self-critical, to be less self-rewarding of their accomplishments (Carver & Ganellan, 1983; Gottlieb, 1982), and to use emotion-focused coping rather than problem-focused coping styles (Stone & Neale, 1984). Given the large body of research on sex differences and coping, it seems logical that hardiness may be expressed differently in men and women.

With the exception of one study (i.e., Kobasa, 1982a),

Kobasa's scale development and research findings on hardiness were conducted exclusively on male samples. Maddi and his colleagues noted that "males are generally less alienated than females", and that further investigation of this issue was warranted (Maddi, Kobasa, & Hoover, 1979, p. 74). Subsequent research has tended to focus on exclusively male samples (e.g., Allred & Smith, 1989; Contrada, 1989; Funk & Houston, 1987; Westman, 1990), exclusively female samples (e.g., Ganellan & Blaney, 1984; Gill & Harris, 1991; Holt et al., 1987; Rhodewalt & Zone, 1989; Schmied & Lawler; 1986) or mixed-sex samples in which the data were not analyzed separately (e.g., Hull et al., 1987; McNeil et al., 1986; Nowack, 1986; Rhodewalt & Agustsdottir, 1984; Wiebe & McCallum, 1986). As a result, there is limited knowledge about the similarities and differences in how hardiness is expressed in men and women.

There is inconclusive evidence from mixed-sex samples that hardiness is exhibited differently in men and women. Some studies identify sex differences with regard to self-reported illness (e.g., Holahan & Moos, 1985; Wiebe et al., 1991) and others do not (e.g., Manning et al., 1988; Roth et al., 1989). Sex differences have been identified regarding the relationship between hardiness and other outcome variables such as attributional style (Hull et al., 1988), psychological symptoms (Holahan & Moos, 1985; Shepperd & Kashani, 1991), the development of hardiness (Hannah & Morrissey, 1987), and physiological indices (Wiebe, 1991).

No sex differences were identified in a study evaluating the relationship between hardiness and a number of mental health-related outcome variables (e.g., depression, anxiety, quality of life; Manning et al., 1988). The hardiness studies which analyzed data separately for both males and females and used self-reported illness as a primary outcome variable are presented below.

Roth and his colleagues examined the relationship between hardiness, life events and a number of physical fitness-related variables among college students (Roth et al., 1989). Men and women did not differ in their degree of hardiness, but significant differences were found in the degree of distress experienced, fitness, exercise, and physical illness. In specific, women reported more physical illnesses and negative life experiences and lower levels of exercise activities and physical fitness than men.

Shepperd and Kashani (1991) identified sex differences among a sample of adolescents. Although a stress by hardiness interaction was identified for males, no such relationship was found for females. Males who experienced lower levels of stress reported fewer physical symptoms regardless of their level of commitment or control in comparison to high stress males who reported more symptoms when they were low in commitment or control.

Wiebe (1991) examined whether hardiness influenced the appraisal of stressful situations using a controlled laboratory task. No sex differences were identified on

perceptions of the task as threatening, positive or negative affect, or frustration tolerance. There were sex differences, however, in physiological responses to the threatening task. Hardy men exhibited lower heart rates than non-hardy men when exposed to the stressful situation. No such differences were found for women.

The most extensive evaluation of sex differences in how hardiness is expressed was investigated by Wiebe et al., 1991. Two measures of both hardiness and neuroticism were used. This study identified a number of sex differences among a college sample. Males scored lower than females on neuroticism and illness, and higher than females on a measure of challenge. The hardiness composite was a more valid measure for females than for males. Commitment was equally valid for both sexes. Neuroticism was confounded with the control and challenge components to a relatively equal extent for both men and women.

Regression analyses of self-reported illness scores were conducted separately for males and females, with some of the analyses controlling for the effects of neuroticism. No sex differences were identified when neuroticism was not used as a covariate. Results from the Personal Views Survey (PVS) indicated that the hardiness composite, commitment, control, and life stress were predictive of illness. No buffering effects were identified.

Controlling for neuroticism, however, produced somewhat different results. Data from the PVS indicated that stress

continued to be a significant predictor of illness reports, and there continued to be no hardiness buffering effects for both males and females. The hardiness composite, commitment, and control were no longer significant for women whereas they continued to be important predictors of illness for men.

A similar pattern of results emerged from the Hardiness Scale data for females. The results for the male sample changed somewhat in that the control and challenge effects were no longer significant after neuroticism was statistically controlled. The challenge component, however, continued to act as a buffer against the effects of stress even after controlling for neuroticism.

In summary, only a handful of studies have addressed the issue of possible sex differences in how hardiness is expressed. The limited amount of research coupled with the inconsistency in the findings warrants further exploration of potential sex differences.

Criticisms of the Hardiness Construct and Hardiness Research

Kobasa's theory that hardiness plays an important role in the stress-illness relationship has stimulated much research in the past decade. Over time, however, numerous concerns about the validity of the research findings have been raised. These criticisms can be categorized into measurement issues and the inappropriate use of statistical designs variables.

Measurement issues. Three measurement-related criticisms have been made against hardiness research. These include the use of negative indicators to measure each component, numerous modifications in the hardiness questionnaires, and the variety of tools available to measure hardiness.

Kobasa's initial measurement of hardiness (Kobasa, 1979a; 1979b) included both positive (e.g., Adventurousness, Endurance, Leadership Orientation) and negative indicators (e.g., Alienation from Self; Powerlessness). Her six-scale measure of hardiness and the Revised Hardiness Scale, however, only consisted of negatively phrased items. With the exception of the Personal Views Survey, hardiness has continued to be measured solely through the use of negative indicators. That is, hardiness is defined as the absence of alienation, powerlessness, security, and external locus of control. This measurement strategy may be responsible, in part, for the potential confound with neuroticism.

There are conceptual and empirical limitations associated with the use of negative indicators (Funk & Houston, 1987). Attempting to measure the presence of characteristics through negative indicators may be erroneous because one cannot be certain that the scales are measuring the true opposite of that particular characteristic. An alternative explanation is that low scores on a particular scale may be indicative of a neutral response rather than the opposite response.

The numerous modifications in the measurement of hardiness scales lend themselves to great confusion when attempting to interpret the research findings. Within a six year period of time, Kobasa used four different combinations of scales to measure hardiness. Eighteen scales were initially selected to measure the three components of hardiness (Kobasa 1979a; 1979b). The results from Kobasa's initial research identified six scales which significantly discriminated between hardy and nonhardy male executives. Although some of these scales were used in subsequent research by Kobasa, she also used scales not previously found to differentiate between hardy and nonhardy people (e.g., Kobasa et al., 1981; Kobasa et al., 1982a; Kobasa et al., 1982b; Kobasa et al., 1983; Kobasa & Puccetti, 1983; Kobasa et al., 1985). With the exception of the deletion of the Cognitive-Structure scale (Kobasa et al., 1981; Kobasa et al., 1982a), Kobasa did not provide a rationale for these modifications.

Kobasa's research on hardiness has stimulated the development of four variations of her initial 18-scale assessment battery. Each of these questionnaires assesses general hardiness as well as the commitment, control and challenge components. The original measure of hardiness consisted of six of the initial eighteen scales. Kobasa later deleted the Cognitive-Structure scale, which resulted in a five scale measure referred to as the Hardiness Scale. A 36-item Revised Hardiness Scale was later developed as a

result of a principal components factor analysis of the original six scales. This questionnaire contains items from the Cognitive-Structure scale. Finally, a 20-item Abridged Hardiness Scale was developed. Nine items from this questionnaire overlap with the Revised Hardiness Scale.

A number of other questionnaires have been developed to measure hardiness. The Personal Views Survey contains both positive and negative indicators of hardiness (Hardiness Institute, 1985). The Health-Related Hardiness Scale (Pollock, 1989) was developed to assess people with specific types of health problems. The Abridged Hardiness Scale has been modified to assess an adolescent population (Morrissey & Hannah, 1986). Others have chosen to use a subset of Kobasa's scales in conjunction with other measures hypothesized to assess some aspect of hardiness (e.g., Holt et al., 1987; Nowack, 1986; Zika & Chamberlain, 1987).

The availability of such a large variety of hardiness assessment instruments lends itself to at least two research-related problems. First, it calls into question the validity of the research findings. Different measures may not be assessing the same construct or they may be assessing the same construct but in varying degrees. Second, an inability to replicate research findings may be a result of differences in the measures used.

Inappropriate use of statistical methods. Hardiness research has also been criticized for its frequent use of ANOVA or ANCOVA designs (e.g., Cohen & Edwards, 1989; Funk &

Houston, 1987). These designs are less than optimal for at least two reasons. First, the basic underlying assumption of independence is violated because many of the variables in hardiness research are correlated with each other. Second, many of these variables are continuous in nature. In studies employing ANOVA and ANCOVA, however, hardiness scores are typically dichotomized using a median split method.

Multiple regression, path analysis, and structural equation modeling are more appropriate statistical techniques for hardiness research. These methodological designs a) measure the effects of each variable while controlling for the effects of others, b) are designed to be used with continuous variables, and c) are therefore more sensitive (i.e., powerful) methods for hypothesis testing (Wampold & Freund, 1987). Funk and Houston's (1987) reanalysis of their hardiness data using ANOVA, ANCOVA, and multiple regression techniques highlights this point. The significant hardiness effects found using ANOVA and ANCOVA were not replicated using multiple regression.

Summary

There continues to be an interest in the role personality characteristics play in minimizing the effects of life stress. Hardiness is one such personality characteristic. Kobasa's research provided a basic framework for understanding the relationship between hardiness, life stress, and self-reported illness. Other

researchers have continued with this line of research. As a result of these investigations, a number of criticisms and unanswered questions have surfaced.

First, should hardiness be conceptualized and studied as a unidimensional or a multidimensional construct? Factor analyses have produced a two-, three-, or four-factor solutions underlying a single general hardiness factor. Most researchers have followed Kobasa's method of using hardiness composite scores to explore the stress-illness relationship. There is, however, evidence that some of the hardiness components may play a more salient role in protecting people against the effects of stress than other components. Studying the relationship of the components on illness reports may prove to be more enlightening that simply using composite scores.

Second, to what degree are hardiness, life stress, and illness-related variables confounded with neuroticism? Correlational investigations indicate that these constructs overlap and yet are not redundant. With regard to hardiness and subjective illness reports, statistically controlling for neuroticism tends to minimize or eliminate the effects of hardiness.

Third, is hardiness expressed differently in men and women? The development of measures to assess hardiness and the majority of the research has been conducted on males. Recent studies are beginning to highlight similarities and differences in how hardiness is expressed in men and women.

Hypothesized Model

To address the above questions, the present study developed and tested a model incorporating measures of hardiness, life stress, and neuroticism in predicting self-reported illness and illness behaviors.

The basic structural equation model to be tested consisted of Kobasa's original research paradigm with modifications suggested by recent theoretical and empirical criticisms. The basic hardiness model posits that hardiness has a direct effect on illness and an indirect (i.e., buffering) effect on illness through life stress.

Two major modifications were made in Kobasa's original model. First, a more objective measure of illness behaviors (i.e., number of days absent from work for health-related problems; number of visits to a physician; number of hospitalizations) was used in conjunction with a standard measure of self-reported illness. Hardiness and life stress were also expected to have an effect on illness behaviors. Second, a measure of neuroticism was added to the model. Neuroticism was expected to be correlated with hardiness, as well as to have an effect on life stress, self-reported illness, and illness behaviors.

Confirmatory factor analyses of the Personal Views Survey and the Revised Hardiness Scale were to be completed to determine the number of components underlying the hardiness construct. The results of these analyses would then influence the design of the structural equation models

to be tested.

Depending on the results of the factor analyses and evaluation of the covariance matrices for men and women, the structural equation model would be tested in a variety of ways. First, one model would explore hardiness effects based on composite scores for the two measures of hardiness, whereas a second model would be based on composite scores. Second, covariance matrices of the male and female data would be examined to identify possible sex differences. The models would then be tested separately for males and females if such differences are identified. Third, the model would be tested using both frequency scores and severity scores derived from the life stress and self-reported illness measures. The models designed to test the modified hardiness theory based on both composite and component scores are depicted in Figure 1 and Figure 2, respectively.

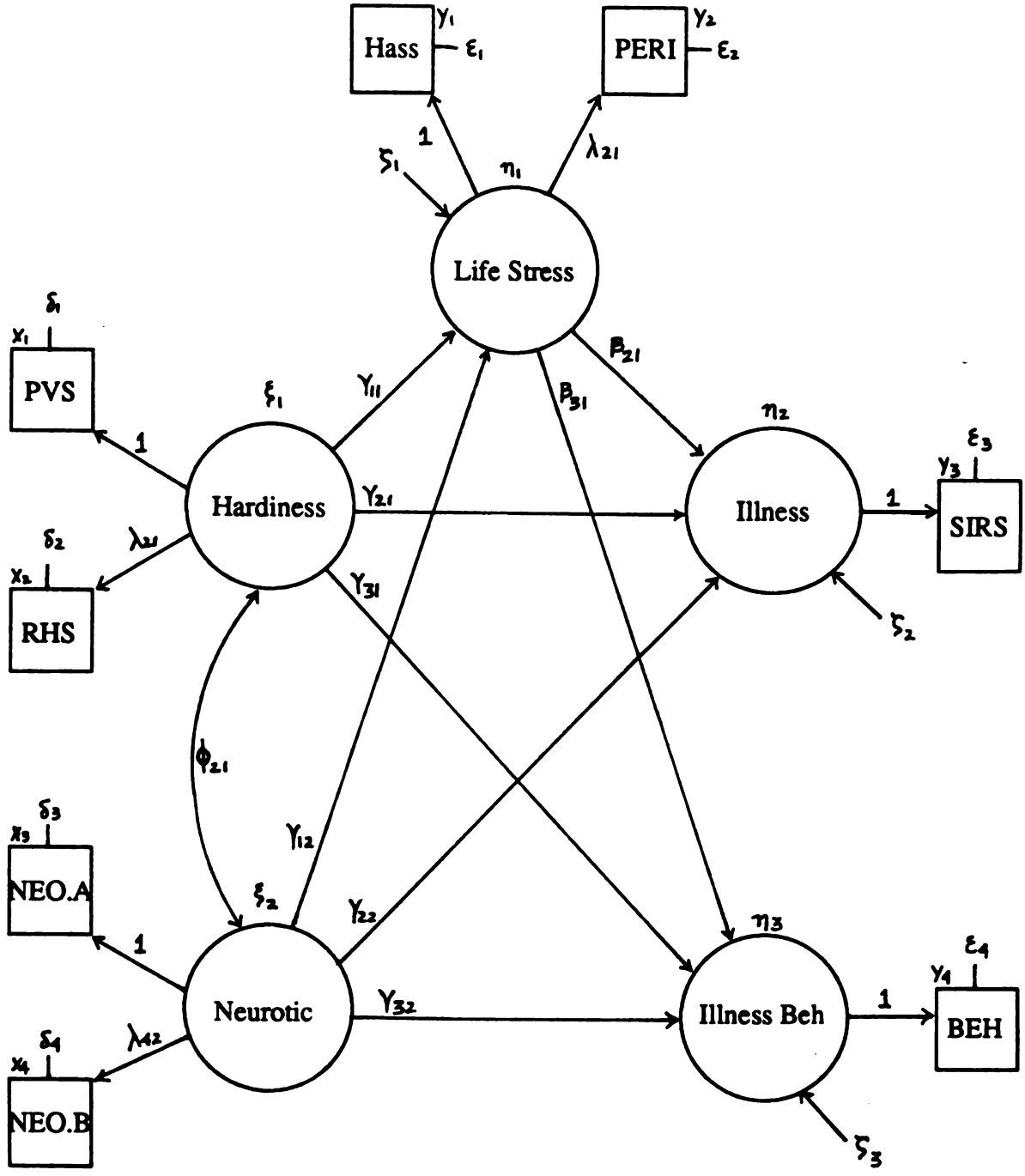

Figure 1. Proposed Structural Model - Composite Scores

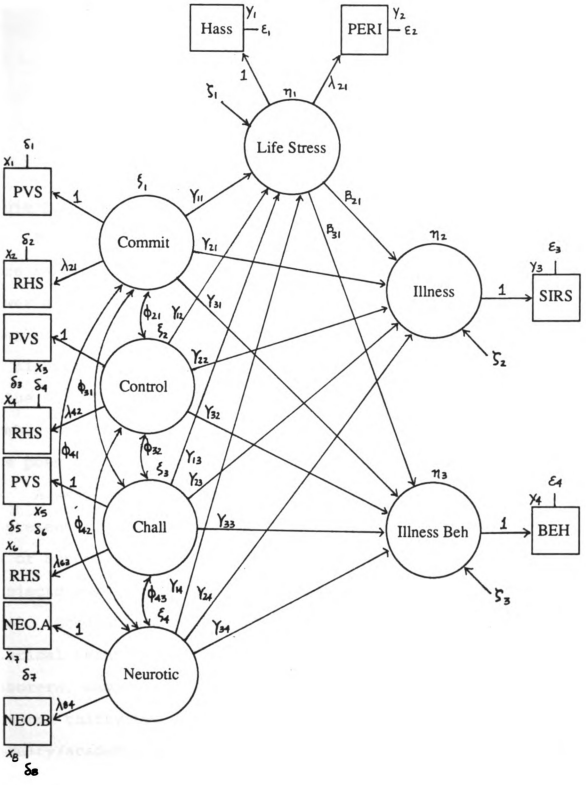

Figure 2. Proposed Structural Model - Component Scores

CHAPTER III

Methodology

Subjects

Three hundred Michigan State University (MSU) employees were randomly selected to participate in this study. A power analysis was completed to determine the appropriate sample size (Cohen, 1988). This calculation (i.e., based on an alpha level of .05, an effect size of .10, and a power value of .79) estimated a sample size of 130 subjects. This number was then increased to 300 subjects to compensate for the possibility of obtaining a moderate return rate.

A weighted sampling procedure was used to obtain a representative sample of the overall MSU employee population as of September 1, 1991. One hundred sixty-eight (168) subjects were obtained from the university support staff pool. Occupations represented in this sub-sample include clerical-technical personnel, maintenance and skilled trades laborers, campus police, and operating engineers. One hundred thirty-two (132) subjects were obtained from the faculty/academic staff pool. Occupations represented in the second sub-sample include professors, coaches, administrators, extension personnel, and library staff. Because the subjects were randomly selected from their

respective populations, the sample, by definition, is representative of MSU employees.

Procedures

Four versions of the survey were developed. One version was randomly assigned to each subject. The four versions differed only with respect to the ordering of the measures. The purpose of the four versions was to minimize possible fatigue effects. Each survey contained two measures of each of the following variables: hardiness, life stress, and neuroticism. In addition, subjects completed a measure of self-reported illness and a demographic form. The demographic form contained three items designed to assess illness behaviors.

Subjects were contacted by mail approximately three weeks after the beginning of the Fall 1991 semester. This initial mailing consisted of a) a letter explaining the purpose of the study and requesting their participation (see Appendix A), b) an informed consent form (see Appendix B), c) one of four versions of the survey, and d) a stamped return envelope.

As recommended by Dillman (1988), three follow-up contacts were completed. A postcard was sent to each of the subjects exactly one week after the initial mailing was completed. The purpose of the postcard was thank those persons who had returned their surveys and to serve as a reminder for those who had not yet returned them. The content of this postcard can be found in Appendix C. A

second follow-up mailing to the nonrespondents was completed exactly three weeks after the initial mailing. This mailing included a cover letter informing subjects that their survey had not yet been received and reiterated the information found in the original cover letter (see Appendix D). A second copy of the same version of the survey and another stamped return envelope were also included in this mailing. The final follow-up contact to the nonrespondents occurred seven weeks after the initial mailing. This mailing contained another cover letter (see Appendix E), a copy of the survey, and a stamped return envelope.

Tables 1 and 2 contain descriptive information on the demographic and employment-related characteristics of the sample. An overall response rate of 70% and 72% was obtained from the support staff and the faculty/academic staff samples, respectively. Of this overall response rate, completed surveys were returned by 63% of the support staff and 61% of the faculty/academic staff.

Of the 185 returned surveys, 105 (56.8%) were returned by support staff and 80 (43.2%) by faculty/academic personnel. With regard to sex differences, 94 (51%) were completed by men and 91 (49%) by women. The sample ranged in age from 23 to 66 years with an average age of 44 years. The majority of the sample was white (90%), married or remarried (75%), and affiliated with either a Protestant (48%) or Catholic (20%) faith.

With regard to employment-related variables, the sample

Table 1. Sample Demographic Information

Variable	#	%
Overall Response Rate		
Support Staff	118/168	70%
Faculty & Academic Staff	95/132	72%
Survey Completion Rate		
Support Staff	105/168	63%
Faculty & Academic Staff	80/132	61%
Sex		
Males	94	51%
Females	91	49%
Age		
20 - 27 years	11	6%
28 - 35 years	37	20%
36 - 44 years	44	24%
45 - 53 years	52	28%
54 - 62 years	29	15%
63 years or more	12	7%
Ethnicity		
Caucasian	166	90%
African American	7	4%
Native American	3	2%
Asian American	4	2%
Hispanic, Mexican American	2	1%
Other	3	2%
Marital Status		
Married	126	68%
Remarried	13	7%
Widowed	5	3%
Separated	2	1%
Divorced	17	9%
Never Married	22	12%
Religious Affiliation		
Protestant	88	48%
Catholic	36	20%
Jewish	8	4%
Latter-Day Saints	2	1%
Other	12	7%
None	38	21%

Note. N = 185. Numbers and percentages do not sum to 185 when all subjects did not respond to a given item.

Table 2. Sample Employment-Related Information

Variable	#	%
Educational Level		
High School	10	5%
Some College or Specialized Training	29	16%
Associate's Degree	11	6%
Bachelor's Degree	28	15%
Master's Degree	27	15%
Doctorate	78	42%
Other	2	1%
Occupational Category		
Major Professional	86	47%
Lesser Professional	22	12%
Administrative Personnel	33	18%
Semi-Professional	17	9%
Clerical or Sales	1	1%
Technical	11	6%
Skilled Manuals	7	4%
Machine Operators & Semi-Skilled	1	1%
Unskilled	6	3%
Income		
$00,000 - $ 9,999	1	1%
$10,000 - $19,999	13	7%
$20,000 - $29,999	52	28%
$30,000 - $39,999	37	20%
$40,000 - $49,999	17	9%
$50,000 - $59,999	15	8%
$60,000 - $69,000	17	9%
$70,000 or greater	30	16%
Length of Time at Present Occupation		
0 - 5 years	61	33%
6 - 10 years	36	20%
11 - 15 years	26	14%
16 - 20 years	18	10%
21 - 25 years	22	12%
26 - 30 years	9	5%
31 - 35 years	7	4%
36 or more years	6	3%

Note. N = 185. Numbers and percentages do not sum to 185 when all subjects did not respond to a given item.

tended to be relatively well-educated and employed in more professional roles within the university. The average annual income ranged from $30,000 to $39,999, and the average length of time at their present occupation was twelve years.

Instruments

The survey included two measures of hardiness (Personal Views Survey; Revised Hardiness Scale) and life stress (Combined Hassles and Uplifts Scale; PERI Life Events Scale), one measure of neuroticism (Neuroticism scale from the NEO Personality Inventory), two measures of illness (Seriousness of Illness Rating Scale; a measure of illness behaviors), and a demographic and background information form.

Hardiness. The Personal Views Survey (PVS; Hardiness Institute, 1985) consists of 50 statements which assess the commitment, control, and challenge components of hardiness. Each statement is answered using a 4-point Likert scale (0 = Not at all true; 3 = Completely true). Higher scores indicate a greater degree of each component. In contrast to the Revised Hardiness Scale, the PVS contains both positive and negative indicators of hardiness. Composite scores are calculated by combining the three component scores.

The internal consistency for the composite score range from 0.87 (Wiebe et al., 1991) to 0.90 (Hardiness Institute, 1985). The internal consistency reliability for commitment, control, and challenge are .72, .62, and .70, respectively

(Wiebe et al., 1991). Similar values are reported by the Hardiness Institute (1985). Test-retest reliabilities of the PVS over time periods of two weeks or more have been reported to be in the .60's (Hardiness Institute, 1984). A copy of the PVS is found in Appendix F.

The Revised Hardiness Scale (RHS) is a 36-item measure consisting of negative indicators of hardiness. The RHS was developed from a factor analysis conducted on Kobasa's original six-scale measure of hardiness (reported in Kobasa et al., 1981; Kobasa, 1982b). All items are answered using a 4-point Likert scale (0 = Not at all true; 3 = Completely true). Higher scores indicate lower levels of hardiness. Subjects receive commitment, control, challenge, and composite scores.

The internal consistency for the hardiness composite score is .86 (S. Kobasa, personal communication, November, 1990). Average internal consistency reliabilities for commitment, control, and challenge are .73, .72, and .43, respectively (Hull et al., 1987). Test-retest reliabilities over a three week period of time are .74, .79, .78, and .64 for the composite, commitment, control, and challenge components, respectively (Hull et al., 1987). Findings from the RHS duplicate all the major findings obtained using the original six-scale measure of hardiness (S. Kobasa, personal communication, March, 1991). With the exception of the challenge component, convergent validity for the RHS is demonstrated by its correlation with optimism (range = -.41

to -.43), with depression (range = .21 to .45), and with emotional distress (range = .26 to .39). All correlations are in the expected direction. A copy of the RHS is found in Appendix G.

Stressful Life Events. The 53-item Combined Hassles and Uplifts Scale measures the frequency and severity of daily hassles and uplifts (Lazarus & Folkman, 1989). Only the Hassles responses will be used in this study. Daily hassles are defined as "irritating, frustrating, and distressing demands that to some degree characterize everyday transactions with the environment (Kanner et al., 1981; p. 3). Subjects respond to each item regarding the severity of the event in the past six months. Responses are scored using a 4-point Likert scale (0 = None or not applicable; 3 = A great deal). A copy of this measure is found in Appendix H.

This scale correlates moderately with its parent instrument, the Hassles Scale [i.e., .45 for frequency of events and .54 for the severity of events (Young, 1987)]. Predictive validity is demonstrated through research indicating that increases in daily hassles precede increases in dysphoric mood (Kanner et al., 1981) and illness symptoms (DeLongis et al., 1982).

The PERI Life Events Scale is the second measure of life stress used in this study (Dohrenwend, Krasnoff, Askenasy, & Dohrenwend, 1978). This scale was originally developed as an interview but has also been administered in

a questionnaire format by its developers. The PERI contains 101 statements assessing a variety of major life events. These events are organized into the categories of school, work, love and marriage, having children, family, residence, crime and legal matters, finances, social activities, and health. Subjects respond to each item using a 4-point Likert scale indicating the impact a given life event had on their lives in the past six months (0 = Not at all severe; 3 = Extremely severe). Scores can be used to provide both measures of both the frequency and severity of life stressors. A copy of the PERI is found in Appendix I.

Because this measure is typically used in an interview format, limited psychometric data is available on the questionnaire version of the PERI Life Events Scale. The test-retest reliability for this scale across ten one-month time periods is .25 (Raphael, Cloitre, & Dohrenwend, 1991).

Neuroticism. The Neuroticism Scale from the NEO Personality Inventory (NEO-PI; Form S) is the measure of neuroticism used in this study (Costa & McCrae, 1985b; Costa & McCrae, 1989). Statements from this 48-item scale were randomly split into two 24-item measures of neuroticism. Items are answered using a 5-point Likert scale (-2 = Strongly disagree; +2 = Strongly agree). Persons scoring high on neuroticism are prone to experience anger, anxiety, disgust, sadness, embarrassment and other negative emotions. High scores are indicative of persons who are experiencing psychological distress, unrealistic ideas, excessive

cravings or urges, and maladaptive coping responses. Items which assessed physical symptoms were intentionally excluded from this questionnaire when it was developed. A copy of this scale is found in Appendix J.

Internal consistency reliabilities for the neuroticism scale are .91 and .93 for men and women, respectively (Costa & McCrae, 1985b). Test-retest reliabilities are .87 over a six-month time period (Costa & McCrae, 1985b) and .83 over a six-year time period (Costa & McCrae, 1989). The Neuroticism Scale demonstrates good construct validity. It correlates .75 and .84 with the neuroticism scales of the Eysenck Personality Inventory and the Eysenck Personality Questionnaire (McCrae & Costa, 1985). In addition, it correlates -.70 with the Emotional Stability scale of the Guilford Zimmerman Temperament Survey (Costa & McCrae, 1985b). Predictive validity for this scale is demonstrated by its significant relationship with such coping styles as escapist fantasy, self-blame, withdrawal, and passivity (McCrae & Costa, 1986).

Physical Illness Measures. A modified version of the Seriousness of Illness Rating Scale (SIRS; Wyler, Masuda, & Holmes, 1968) was used to assess commonly recognized physical and mental symptoms. Subjects responded to items with regard to the illnesses experienced in past six months. Each item is weighted to indicate the threat to life, discomfort, and disruptiveness of each of the illnesses. This revised self-report checklist contains 111 items.

Items excluded were those pertaining to psychiatric disorders, infrequent health problems (e.g., depression, shark bite), and gender-specific disorders (e.g., painful menstruation). Four additional items were added to the SIRS: herpes, Alzheimer's disease, cumulative trauma disorders, and HIV infection. The revised checklist is similar to illness questionnaires used by other researchers interested in hardiness (e.g., Rhodewalt & Zone, 1989; Wiebe et al., 1990). With the exception of minor illnesses (e.g., common cold), there is an 89% agreement rate between the SIRS and medical records (Kobasa et al., 1981). A copy of the SIRS is found in Appendix K.

As recommended by Watson and Pennebaker (in press), three items were developed to assess Illness Behaviors. These items include the number of a) appointments with health care professionals in the past six months, b) days absent from work due to physical health problems in the past six months, and c) times hospitalized for physical health problems in the past six months. Responses to these three items are summed to yield an overall score of illness-related behaviors. These can be found in Appendix L as items J, K, and L.

Demographic and Background Information Form. Subjects were asked to provide the following demographic information: age, sex, ethnicity, marital status, religious preference, highest level of occupation completed, length of time at present occupation, and income. In addition to demographic

information, this form contained the measure of illness behaviors mentioned above and an item inquiring about permanent handicaps and disabilities. A copy of this form can be found in Appendix L.

Research Hypotheses

Confirmatory factor analysis. The results of a confirmatory factor analysis (CFA) are expected to identify three components underlying hardiness. The following scales are predicted to load on the stated components: commitment will consist of the Revised Hardiness Scale (RHS) and Personal Views Survey (PVS) Commitment scales, control will consist of the RHS and PVS Control scales, and challenge will consist of the RHS and PVS Challenge scales.

Causal model. Two causal models (represented in Figure 1 and Figure 2) will test the relationship between hardiness, life stress, neuroticism, self-reported illness and illness behaviors. These models depict that life stress mediates the relationship between hardiness and illness. That is, life stress serves as a third variable through which hardiness influences physical illness (for reviews on this concept see Baron & Kenny, 1986; James & Brett, 1984).

Figure 1 represents the model derived using hardiness composite scores. Figure 2 represents the model derived from Kobasa's three dimensional conceptualization of hardiness. This is also the model hypothesized to be identified from this study's CFA. Each of these models will be tested separately for men and women. The overall fit of

these models will be assessed. Since the proposed model is exploratory and the relationships hypothesized are tentative, the models will be revised as necessary.

Data Analysis

1. Descriptive statistics (i.e., mean, standard deviation, skewness, and range) will be calculated for each of the measures of the latent variables as well as for the appropriate demographic variables (i.e., age, education, length of time at present occupation, and annual income).
2. Coefficient alpha, a measure of internal consistency reliability, will be computed for the appropriate measures used in this study.
3. Correlation matrices will be computed to examine to relationship between the variables.
4. The first stage of data analysis will consist of a confirmatory factor analysis (CFA) of the hardiness items to determine their underlying factor structure. This analysis will be completed using LISREL 7.
5. The second stage of the data analysis will consist of developing two structural models, one based on hardiness composite scores and one based on component scores). Data from these models will be analyzed using LISREL 7. The design of the structural model depicted in Figure 2 will be determined by the results of the CFA. To account for measurement error, either two measures or a split scale will be used to assess each

variable. The exception to this is the measure of self-reported illness and illness behaviors. One measure will be used to assess each of these variables. A chi-square statistic and other tests provided by the LISREL program will be used to assess the goodness-of-fit of the models. Additional tests of fit will also be used since the chi-square statistic is sensitive to the effects of sample size (Fassinger, 1987; Kerwin, Howard, Maxwell, & Borkowski, 1987; Loehlin, 1987; Marsh, Balla, & McDonald, 1988).

Structural equation modeling provides an analysis of causal patterns among latent variables represented by multiple measures (Fassinger, 1987). A full structural model consists of two elements: a structural model which delineates the hypothesized causal structure among the latent variables and a measurement model that identifies relationships between measured variables and latent variables (Fassinger, 1987; Francis, 1988; Kerwin et al., 1987). The data are then transformed into correlation or covariance matrices and a series of regression equations. Next, the model is analyzed to examine its fit with the population. Finally, further modifications and testing of the theoretical model are indicated by the parameter estimates and goodness-of-fit information (Fassinger, 1987).

Structural equation modeling offers a number of

advantages over either multiple regression or path analysis. First, structural equation model does not assume that observed variables are measured without error. Second, structural equation modeling allows the researcher to examine how closely the overall model fits the data collected. Third, this type of statistical analysis can be used to identify either simultaneous or bidirectional causation.

6. Post hoc analyses will consist of respectively examining the goodness-of-fit of the model for males and females.

CHAPTER IV

Results

Descriptive Statistics

Prior to beginning the analysis, each variable was examined for missing values, skewness, outliers, and accuracy of data entry. Six data entry errors were identified and subsequently corrected. One error resulted from entering incorrect data, two were due to entering out-of-range values, and three resulted from entering the incorrect number of responses for a given questionnaire. The number of missing values for a scale item ranged from 1 to 13. With regard to the demographic information, missing values were also found for religious affiliation (n = 1), occupation (n = 1), and annual income (n = 3).

Table 3 contains the full name, abbreviated name, mean, standard deviation, skewness, and range for each of the variables contained in the proposed analyses. The distribution of the majority of the variables was fairly normal. Positively skewed variables included frequency and severity of illness, illness behaviors, and length of time at the present occupation. The skewness of self-reported illness is expected and indicates that the majority of the sample reported fewer and less severe physical illnesses. A

Table 3. Descriptive Statistics for All Variables

Variable Name	Abbreviation	M	SD	SK	Range
Personal Views Survey (Composite)	PVSCOMP	2.31	.26	-1.01	1.20 - 2.78
Personal Views Survey (Commitment)	PVSCOMM	2.49	.32	-1.17	1.31 - 3.00
Personal Views Survey (Control)	PVSCONT	2.34	.28	-0.98	1.13 - 2.88
Personal Views Survey (Challenge)	PVSCHALL	2.09	.29	-0.66	1.12 - 2.65
Revised Hardiness Scale (Composite)	RHSCOMP	1.71	.19	-0.68	1.03 - 2.13
Revised Hardiness Scale (Commitment)	RHSCOMM	2.79	.25	-1.74	1.67 - 3.00
Revised Hardiness Scale (Control)	RHSCONT	1.21	.23	-1.08	0.44 - 1.63
Revised Hardiness Scale (Challenge)	RHSCHALL	1.14	.36	.11	0.25 - 2.13
Hassles (Frequency)	HASS.FQ	28.28	10.49	-.28	0.00 - 52.00
Hassles (Severity)	HASS.SV	1.49	.34	.89	1.00 - 3.00
PERI Life Events Scale (Frequency)	PERI.FQ	8.08	3.84	.69	0.00 - 20.00
PERI Life Events Scale (Severity)	PERI.SV	1.31	0.68	-.10	0.00 - 2.78
NEO (Total Score)	NEOTTL	71.78	22.87	.25	22.00-132.00
NEO (Random Split #1)	NEO.A	31.69	11.86	.28	5.00 - 65.00
NEO (Random Split #2)	NEO.B	40.09	12.01	.22	13.00 - 68.00
Seriousness of Illness Survey (Frequency)	ILLSX.FQ	7.45	4.20	.71	0.00 - 20.00
Seriousness of Illness Survey (Severity)	ILLSX.SV	214.36	133.05	.73	0.00-608.00
Illness Behaviors	ILLBEH	1.80	1.27	1.90	1.00 - 6.00

few subjects reported a large number of illness behaviors. Inspection of these individuals' surveys indicated that their high scores were a result of having more serious llnesses such as cancer. The distribution of Illness Behaviors is similar to that expected in the general population. The skewness associated with the length of time at the present occupation may be a reflection of the higher degree of education completed by the sample and the relatively young age of this population (Mean = 44 years). More highly educated people enter the job market at a later age and may be less likely to have a lengthy employment history with the institution.

Negatively skewed variables include RHS Commitment and educational level. The Commitment scores may reflect the value that subjects place on their work. The skewness associated with educational level is expected given that subjects are employed in a university setting in which a greater percentage of jobs require more skills and training. Income level was rectangularly distributed, indicating that relatively equal proportions of employees were earning a broad range of annual incomes.

Table 4 and Table 5 contain the zero-order correlation matrices for the variables used in the proposed structural equation models based on frequency and severity scores, respectively. With regard to frequency scores, hardiness composites were negatively correlated with the frequency of hassles, neuroticism, and the frequency of illness reported.

Table 4. Correlations Among Measures in Structural Equation Model - Frequency

Variable	1	2	3	4	5	6	7	8	9
1. PVS Composite	1.0								
2. RHS Composite	.66**	1.0							
3. Hassles Frequency	-.31**	-.19*	1.0						
4. PERI Frequency	-.14	-.16*	.28**	1.0					
5. NEO Total Score	-.53**	-.38**	.26**	.06	1.0				
6. NEO Random Split #1	-.52**	-.37**	.25**	.09	.96**	1.0			
7. NEO Random Split #2	-.49**	-.36**	.25**	.03	.96**	.84**	1.0		
8. Frequency of Illness	.20**	-.20**	.22**	.28**	.27**	.28**	.24**	1.0	
9. Illness Behavior	-.01	.01	-.06	.09	-.01	-.02	-.05	.09	1.0

Significance levels: $^{**}p < .01$; $^{*}p < .05$.

Table 5. Correlations Among Measures in Structural Equation Model - Severity

Variable	1	2	3	4	5	6	7	8	9
1. PVS Composite	1.0								
2. RHS Composite	.66**	1.0							
3. Hassles Severity	-.24**	-.26**	1.0						
4. PERI Severity	-.20**	-.22**	.46**	1.0					
5. NEO Total Score	-.53**	-.38**	.29**	.20**	1.0				
6. NEO Random Split #1	-.52**	-.37**	.30**	.19**	.96**	1.0			
7. NEO Random Split #2	-.49**	-.36**	.27**	.19**	.96**	.84**	1.0		
8. Severity of Illness	-.28**	-.27**	.34**	.26**	.32**	.33**	.29**	1.0	
9. Illness Behavior	.01	.01	.25**	.10	-.01	.02	-.05	.24**	1.0

Significance levels: $^{**}p < .01$; $^{*}p < .05$.

These relationships were expected. No significant relationship, however, was found between hardiness and the frequency of PERI life events and the frequency of illness behaviors. As expected, daily hassles were positively associated with neuroticism and the frequency of illness. These scores were not related to the frequency of illness behaviors reported. Unexpectedly, the PERI measure of stressful life events was only correlated with the frequency of self-reported illness. Finally, neuroticism was significantly related to the frequency of self-reported illness but not to the frequency of illness behaviors. Self-reported illness and illness behaviors were positively related to each other.

With the exception of the PERI measure, the relationships among the variables in this model are within the magnitude and the direction expected given previous research findings. The frequency of illness behaviors, which is intended to be a more objective illness-related measure, was positively related to the frequency of self-reported illness but not to any other variable contained in the structural model.

Somewhat different results were identified with the variables contained in the structural equation model based on severity scores. As expected, significant relationships among hardiness, the severity of life stress, neuroticism, and the severity of illness was identified. Hardiness was not related to illness behaviors. With regard to the

measures assessing the severity of life stress, hassles was significantly correlated to neuroticism, the severity of self-reported illness, and illness behaviors. With the exception of illness behaviors, the PERI measure of life stress was also related to these variables. Neuroticism was positively correlated with the severity of self-reported illness but not with illness behaviors. As expected, the severity of self-reported illness was positively related to illness behaviors.

A larger number of significant relationships was found among the variables contained in the model based on severity scores than in the model based on frequency scores. These relationships were within the expected magnitude and direction. Somewhat different from the variables found in the frequency model, illness behaviors were significantly related to the severity of hassles as well as to the severity of self-reported illness reported.

The correlations between the two measures of each of the underlying latent variables are reported in Table 6. All of the correlations are in the expected direction and are significant at the $p < .01$ level. The highest correlation was between the two scales measuring neuroticism ($r = .84$). The lowest correlation was between the two measures of challenge ($r = .24$). The low magnitude of the correlations between the frequency and severity of life stress suggests that these measures are assessing somewhat similar but not identical constructs. This finding is

Table 6. Correlations Between Observed Variables

Variable	Variable	r
PVS Composite	RHS Composite	.66**
PVS Commitment	RHS Commitment	.72**
PVS Control	RHS Control	.67**
PVS Challenge	RHS Challenge	.24**
Hassles Frequency	PERI Frequency	.28**
Hassles Severity	PERI Severity	.46**
NEO Random Split #1	NEO Random Split #2	.84**
Frequency of Illness	Illness Behavior	.09
Severity of Illness	Illness Behavior	.24**

Significance levels: **$p < .01$.

expected given that the Hassles Scale tends to measure minor daily stressors whereas the PERI Life Events Schedule assesses major life events.

Table 7 contains the correlations between the composite scores and the components of the two hardiness measures. With the exception of the challenge component of the Revised Hardiness Scale (RHS), the correlations are significant and in the expected direction. The component scores of the Personal Views Survey (PVS) are more highly correlated with their composite scores (r's = .78 to .90) than are the RHS component scores with their respective composite score (r's = .65 to .70). The correlations among the PVS components range from .49 to .75, with the commitment and control components being the most highly correlated. The commitment and control components of the RHS are also the most highly correlated (r = .57). The relationship between the RHS composite and the challenge component was substantially higher (r = .65) than what has been reported elsewhere (r = .41, .46; Hull et al., 1987). All other relationships among the RHS components did not reach statistically significant levels. The lack of statistical significance in the correlations of the RHS challenge component with the RHS commitment and challenge components is disappointing and yet expected given recent criticisms of the challenge measure.

The internal consistency reliabilities (i.e., coefficient alphas) for all but two of the measures used in this study are reported in Table 8. An internal consistency

Table 7. Correlation Matrix Among Hardiness Variables

Variable	1	2	3	4	5	6	7	8
1. PVS Composite	1.0							
2. PVS Commitment	.90**	1.0						
3. PVS Control	.87**	.75**	1.0					
4. PVS Challenge	.78**	.53**	.49**	1.0				
5. RHS Composite	.66**	.63**	.50**	.54**	1.0			
6. RHS Commitment	.68**	.72**	.61**	.36**	.66**	1.0		
7. RHS Control	.71**	.64**	.67**	.50**	.70**	.57**	1.0	
8. RHS Challenge	.07	.03	-.11	.24**	.65**	-.05	.03	1.0

Significance levels: **p < .01; *p < .05.

Table 8. Internal Consistency of Scales

Questionnaire Scale Name	# of items	Coefficient Alpha
PVS Composite	50	.84
PVS Commitment	16	.77
PVS Control	17	.62
PVS Challenge	17	.62
RHS Composite	36	.73
RHS Commitment	12	.72
RHS Control	16	.74
RHS Challenge	08	.39
Hassles Frequency	53	.92
Hassles Severity	53	.93
PERI Frequency	101(80)	.62
PERI Severity	101(80)	.59
NEO Total Score	48	.91
NEO Random Split #1	24	.84
NEO Random Split #2	24	.84
Frequency of Illness	111(81)	.72

Note. The value in parentheses indicates the actual number of items on which coefficient alpha was calculated. Items having a 0 variance (i.e., those items not experienced by any of the subjects) were not included in the analysis.

reliability was not calculated for the severity of self-reported illness measure since its items are proportionally weighted and are ordinal in nature. The coefficient alpha also is not reported for illness behaviors since this measure is only a three-item behavioral indicator of illness-related behaviors.

With regard to the measures of hardiness, the coefficient alphas were .84 and .73 for the PVS and the RHS composite scores, respectively. The PVS value is similar to that reported in other research (i.e., alpha = .87 to .90), and the RHS value is somewhat lower (alpha = .86). The values reported in this study are within the acceptable range (i.e., alpha = .70 or greater; Nunnally, 1978) and indicate that the items are adequately assessing a common construct.

For the hardiness component scores, the coefficient alphas ranged from .62 to .77 for the PVS and from .39 to.73 for the RHS. The PVS values are similar to and slightly higher than those reported by other researchers. The internal consistency reliabilities for the control (alpha = .62) and challenge (alpha = .62) components of the PVS are slightly below an acceptable level. The RHS values are similar to those reported by previous researchers. The internal consistency of the RHS challenge component is clearly below the acceptable standard (i.e., r = .39). This low value may be an indication that the items are not assessing a similar construct or that the scale is too short

to adequately assess the construct (Nunnally, 1978).

The coefficient alphas for the frequency and severity of daily hassles were well above the acceptable range (alpha = .92, .93, respectively). However, alpha values were somewhat questionable for the PERI frequency and severity measures (frequency alpha = .62; severity alpha = .59). One possible reason for the lower internal consistency values for the PERI is that this scale assesses a somewhat wider range of life events than does the Hassles Scale.

The coefficient alphas for the neuroticism measures (i.e., the split half scales) were .84 for each of the halves. This is well above the acceptable range for internal consistency indices.

The coefficient alpha was .73 for the frequency of self-reported illness. This value is also within the acceptable range of values.

Inferential Statistics

Confirmatory factor analyses. Five principal components factor analyses have been completed on the different versions of the Revised Hardiness Scale (RHS) since Kobasa's initial publication in 1979. Although these analyses did not replicate Kobasa's findings identically, the results of all but two of these analyses (i.e., Funk & Houston, 1987; Morrissey & Hannah, 1986) identified a three-factor solution.

The consistency of these findings provided the support for conducting a confirmatory factor analysis on the Revised

Hardiness Scale. Although researchers have yet to attempt to replicate the three-factor solution of the Personal Views Survey (PVS), it is logical to conduct a confirmatory factor analysis on this questionnaire for two reasons. First, the PVS was developed by Kobasa in response to criticisms voiced about the RHS and, second, the PVS is hypothesized to consist of the same three constructs of commitment, control, and challenge.

Confirmatory factor analyses were conducted on the Personal Views Survey (PVS) and the Revised Hardiness Scale (RHS) using LISREL 7 (Joreskog & Sorbom/SPSS Inc, 1989). The PRELIS program (Marija J. Norusis/SPSS Inc., 1989), a preprocessor of LISREL, was used to prepare the data for the confirmatory factor analyses.

The assessment of fit between the hypothesized models and the sample data was completed using a number of goodness-of-fit indices. As recommended, (i.e., Byrne, 1989; Joreskog & Sorbom/SPSS Inc., 1989), the fit of each model was evaluated by examining the a) feasibility of the parameter estimates, b) adequacy of the measurement model, c) goodness-of-fit of the overall model, d) subjective goodness-of-fit indices for the overall model, and e) goodness-of-fit of the individual model parameters.

Personal Views Survey. A confirmatory factor analysis was completed on the fifty-item Personal Views Survey (PVS). These findings were based on a sample size of 157 subjects. The resulting factor loadings associated with each of the

items for commitment, control, and challenge can be found in Table 9. The h^2 values are similar to communalities and represent the amount of variance accounted for by each item of the questionnaire.

The first step in establishing the fit of the model was to determine whether the parameter estimates were reasonable. Negative variances, correlations greater than 1.0, matrices that are not positive definite, large standard errors (which estimate the precision of each item), and highly correlated parameter estimates indicate that the model is wrong or that there are problems with the data.

Examination of the PVS data indicated that, overall, all of the LISREL estimates were reasonable. There were no negative variances, no correlations greater than 1.0, and no positive definite matrices. The standard errors for each of the fifty PVS items ranged from .015 to .124. These small values indicate good precision for each of the items. Only one parameter estimate was correlated greater than .30 with another estimate. These findings supported further exploration of the fit of the model.

The second step in evaluating the goodness-of-fit was to establish the adequacy of the measurement model. This was done by examining the squared multiple correlation (R^2) for each observed variable and the coefficient of determination for all of the observed variables simultaneously. These measures show how well the observed variables (i.e., the items) act, both individually and

Table 9. Factor Pattern Results of the Confirmatory Factor Analyses for the Personal Views Survey

Commitment Items (Comm)		Factor Loadings			h^2
		Comm	Cont	Chall	
1.	I often wake up eager to take up my life where it left of the day before.	.94	----	----	.88
2.	I find it difficult to imagine getting excited about working.	.73	----	----	.53
3.	Most people who work for a living are just manipulated by their bosses.	.88	----	----	.77
4.	No matter how hard you work you never really seem to reach your goals.	.86	----	----	.74
5.	It doesn't matter if you work hard at your job since only the bosses profit.	.94	----	----	.88
6.	The most exciting thing for me is my own fantasies.	.65	----	----	.42
7.	I really look forward to my work.	.60	----	----	.36
8.	It's exciting for me to learn something about myself.	.22	----	----	.05
9.	Thinking of yourself as a free person just makes you feel frustrated and unhappy.	.44	----	----	.19
10.	I feel no need to try my best at work since it makes no difference anyway.	.57	----	----	.32
11.	Most of my life gets wasted doing things that don't mean anything.	.90	----	----	.81
12.	Lots of times I don't really know my own mind.	.66	----	----	.44
13.	Ordinary work is just too boring to be worth doing.	.34	----	----	.12
14.	I find it hard to believe people who tell me that the work they do is of value to society.	.50	----	----	.25
15.	I think people believe in individuality only to impress others.	.55	----	----	.30
16.	Politicians run our lives.	.51	----	----	.26

Note. Dashes indicate not applicable.

Table 9 (cont'd).

		Factor Loadings			h^2
Control Items (Cont)		Comm	Cont	Chall	
1.	Most of the time my bosses or superiors will listen to what I have to say.	----	.91	----	.83
2.	Planning ahead can help avoid most future problems.	----	.06	----	.00
3.	I usually feel that I can change what might happen tomorrow by what I do today.	----	.24	----	.06
4.	No matter how hard I try, my efforts will accomplish nothing.	----	.71	----	.50
5.	I feel that it's almost impossible to change my spouse's or partner's mind about something.	----	.75	----	.56
6.	When you marry and have children you have lost your freedom of choice.	----	.47	----	.22
7.	I believe most of what happens in life is just meant to happen.	----	.56	----	.31
8.	Most of the time it just doesn't pay to try hard since things never turn out right anyway.	----	.76	----	.58
9.	When I make plans, I'm certain I can make them work.	----	.07	----	.00
10.	When I am at work performing a difficult task, I know when I need to ask for help.	----	-.03	----	.00
11.	I find it's usually very hard to change a friend's thinking about something.	----	.70	----	.49
12.	When I make a mistake, there's very little I can do to make things right again.	----	.61	----	.37
13.	One of the best ways to handle most problems is just not to think about them.	----	.33	----	.11
14.	I believe that most athletes are just born good at sports.	----	.42	----	.18
15.	When other people get angry at me it's usually for no good reason.	----	.67	----	.45
16.	I feel that if people try to hurt me there's usually not much that I can do to stop them.	----	.56	----	.31
17.	When I'm reprimanded at work it usually seems to be unjustified.	----	.45	----	.20

Note. Dashes indicate not applicable.

Table 9 (cont'd).

Challenge Items (Chall)		Factor Loadings			h^2
		Comm	Cont	Chall	
1.	I like a lot of variety in my work.	----	----	.80	.64
2.	I feel uncomfortable if I have to make any changes in my everyday schedule.	----	----	.71	.50
3.	No matter what you do, the "tried and true" ways are always the best.	----	----	.24	.06
4.	New laws shouldn't be made if they hurt a person's income.	----	----	.25	.06
5.	A person whose mind seldom changes can usually be depended on to have reliable judgment.	----	----	.13	.02
6.	I don't like conversations when others are confused about what they mean to say.	----	----	.36	.13
7.	I won't answer people's questions until I am very clear as to what they are asking.	----	----	.21	.04
8.	It doesn't bother me to step aside for a while from something 'm involved in, if I'm asked to do something else.	----	----	.47	.22
9.	I enjoy being with people who are predictable.	----	----	-.25	.06
10.	It bothers me when something unexpected interrupts my daily routine.	----	----	.91	.83
11.	I respect rules because they guide me.	----	----	.24	.06
12.	I don't like things to be uncertain or unpredictable.	----	----	.77	.59
13.	People who do their best should get full financial support from society.	----	----	.31	.10
14.	I have no use for theories that are not closely tied to facts.	----	----	.21	.04
15.	Changes in routine bother me.	----	----	.83	.69
16.	Most days, life just isn't very exciting for me.	----	----	.38	.14
17.	I want to be sure someone will take care of me when I get old.	----	----	.25	.06

Note. Dashes indicate not applicable.

together, as measurement instruments for the latent variables (i.e., the factors). The values range from 0 to 1.0 with larger values indicating that the model is a good representation of the data.

The R^2 indicates the reliability of each observed variable with respect to its underlying latent construct. It indicates the strength of the linear relationship. The fifty PVS R^2 values ranged from 0.001 to 0.606. The large number of R^2 values that were low in magnitude (i.e., 28 items had R^2 values $\leq$ .30) indicate that the model was poorly fitted.

The coefficient of determination demonstrates how well the observed variables simultaneously assess the latent variable or factor. The coefficient of determination for the hypothesized model was 0.988, suggesting that the model is fit well. This high value is misleading in that the coefficient of determination is a biased estimator. It is important to compare this index to the other goodness of fit indices.

The third step in evaluating the model was to establish the goodness-of-fit for the overall model. This was done by examining the chi-square statistic (X^2), goodness-of-fit index, adjusted goodness-of-fit index, and the root mean square residual. These statistics and other supplemental indicators of goodness-of-fit can be found in Table 10.

The X^2 is a likelihood ratio statistic that tests the

Table 10. Goodness-of-Fit Indices for Confirmatory Factor Analyses

Model	X^2	df	GFI	AGFI	RMR	X^2/df	TLI
Personal Views Survey	2361.30	1175	.620	.587	.214	2.01	.35
Revised Hardiness Scale	1071.59	594	.720	.686	.138	1.80	.47

Note. df= degrees of freedom; GFI = Goodness-of-Fit Index; AGFI = Adjusted Goodness-of-Fit Index; RMR = Root Mean Square Residual; TLI = Tucker-Lewis Index.

fit between the proposed model and the actual data. Large X^2 values indicate that the fit of the model is poor, whereas small values indicate good fit. The degrees of freedom serve as a standard by which to judge whether the X^2 is large or small. The X^2 measure is sensitive to sample size and departures from multivariate normality in the observed variables. Large sample sizes and departures from normality tend to inflate the X^2 statistic. A significant p value indicates that the hypothesized model did not generate the data. The X^2 value for the PVS confirmatory factor analysis model was 2361.30 and significant at the $p \leq .0001$ level. This indicated that the model was poorly fitted.

The goodness-of-fit index (GFI) indicates the amount of variance and covariance jointly explained by the model. The adjusted goodness-of-fit index (AGFI) is a similar indicator except that it adjusts for the number of degrees of freedom in the model. Both indices range in value from 0.0 to 1.0 with larger values indicating a good fit. The GFI and AGFI were 0.620 and 0.587, respectively. These values indicate that the fit of the model was questionable.

The root mean square residual (RMR) assesses the average discrepancy between the covariance matrices and the hypothesized values of these matrices. Values range from 0.0 to 1.0 with smaller values indicating a better fitted model. Byrne (1989) recommends values of less than .05, although she states that erroneous models may have values less than .05. She also cautions that the RMR should not be

interpreted in isolation of other indicators for this reason. The RMR of the proposed PVS model was .214, indicating a poorly fitted model.

Next, the subjective goodness-of-fit indices for the overall model were examined. Because the X^2 ratio is influenced by sample size, other goodness-of-fit indices have been proposed (see Marsh, Balla, & McDonald, 1988 for a discussion and recommendations regarding this issue). Two commonly used indices are the X^2/df ratio and the Tucker-Lewis Index (TLI; Tucker & Lewis, 1973). Values less than 2.0 for the X^2/df ratio suggest an adequate model. For the TLI, absolute values of .90 or greater provide support for the fit of the model.

The X^2/df ratio for the proposed model was 2.01, suggesting that the fit of the model is questionable. The TLI is a more valid indicator of goodness-of-fit because it is not as sensitive to sample size as the X^2/df ratio. The TLI was .35, indicating that the model was poorly fitted.

Because the X^2, GFI, AGFI, RMR, X^2/df, and TLI are measures of overall fit, they do not identify specific parts of the model that may be misspecified. T-values, normalized residuals along with their associated Q-plot, and the modification indices provide more specific information about the fit of the model.

T-values consist of the parameter estimates divided by their standard error. They indicate whether or not a

parameter is significantly different from zero. Values greater than 2.0 are considered statistically significant (Byrne, 1989). The PVS t-values ranged from 1.52 to 12.82 with four of the items failing to reach significance. Three of these items were hypothesized to load on the control factor and one on the challenge factor. These weaknesses were corroborated by the factor loadings and h^2 values in Table 9. Using h^2 values equal to or less than .25 as a criterion, there are a total of 24 items that only account for minimal variance. Commitment appears to be the strongest factor, whereas challenge appears to be the weakest.

The standardized residuals were also examined to identify items that may have been contributing to the lack of fit in the model. This information indicates the discrepancy of fit between the sample and the hypothesized covariance matrices. These values are analogous to z-scores and represent the number of standard deviations the observed residuals are away from the residuals that would be found in a perfectly fitted model. Values greater than 2.00 provide clues as to which items may be misspecified. There were 427 of a possible 1250 PVS items (34%) with values greater than 2.0. The Q-plot, a graphical depiction of the normalized residuals, provided further support for the lack of fit of the model.

The modification indices provide a third indication of the goodness-of-fit for the individual model parameters.

These values represent the expected drop in the X^2 if a particular parameter (i.e., the item with the largest modification index) is set free. According to Long (1983), respecification and reestimation of these values should be guided by theory and not simply driven by the modification indices alone. The improvement of the model fit is suggested by the reduction in the X^2 statistic.

In an effort to improve the fit of the model, the modification indices were used to identify items to be set free in the LISREL program. The results of this specification search are found in Table 11. The hypothesized three-factor model was revised four times. Although each modification resulted in an improvement in the model, the changes were not large enough to support the model. This was most clearly indicated by the change in the TLI. There was only a .08 improvement in the model across the four modifications. The fourth TLI value of .43 (i.e., the value associated with Model 5) was a clear indication of a deficient model.

Revised Hardiness Scale. A parallel set of steps was used to evaluate the factor structure of the Revised Hardiness Scale (RHS). This confirmatory factor analysis was completed on a sample size of 152. The resulting factor loadings and the h^2 values can be found in Table 12.

The first step in evaluating the fit of the RHS model was to screen the output for negative variances, correlations greater than 1.0, matrices that were not

Table 11. Respecification Steps in Model-fitting Process for PVS

	Competing Models for PVS	X^2	df	Ch-X^2	Ch-df	X^2/df	TLI
0	Null Model - Personal Views Survey	3136.68	1225	----	----	2.56	----
1	Three Factor Model	2361.30	1175	----	50	2.01	.35
2	Model with Lambda X (46,1) free	2307.44	1174	53.86	1	1.97	.38
3	Model with Lambda X (46,1), (1,2) free	2272.71	1173	34.73	1	1.94	.39
4	Model with Lambda X (46,1), (1,2), (3,2) free	2241.67	1172	31.04	1	1.91	.41
5	Model with Lambda X (46,1), (1,2), (3,2), (23,2) free	2206.22	1171	35.45	1	1.88	.43

Note. df= degrees of freedom; Ch-X^2 = Change in X^2 Ch-df = Change in df; TLI = Tucker-Lewis Index.

Table 12. Factor Pattern Results of the Confirmatory Factor Analyses for the Revised Hardiness Scale

		Factor Loadings			h^2
Commitment Items (Comm)		Comm	Cont	Chall	
1.	Life is empty and has no meaning in it for me.	.89	----	----	.79
2.	Most of life is wasted in meaningless activity.	.52	----	----	.27
3.	I find it hard to believe people who actually feel that the work they perform is of value to society.	.55	----	----	.30
4.	No matter how hard I try, my efforts will accomplish nothing.	.82	----	----	.67
5.	I find it difficult to imagine enthusiasm concerning work.	.43	----	----	.18
6.	The human's fabled ability to think is not really such an advantage.	.55	----	----	.30
7.	I am really interested in the possibility of expanding my consciousness through drugs.	.21	----	----	.04
8.	The most exciting thing for me is my own fantasies.	.56	----	----	.31
9.	I wonder why I work at all.	.61	----	----	.37
10.	The attempt to know yourself is a waste of effort.	.44	----	----	.19
11.	I long for a simple life in which bodily needs are the most important things and decisions don't have to be made.	.67	----	----	.45
12.	If you have to work, you might as well choose a career where you deal with matters of life and death.	.35	----	----	.12

Note. Dashes indicate not applicable.

Table 12 (cont'd).

		Factor Loadings			h^2
Control Items (Cont)		Comm	Cont	Chall	
1.	Politicians control our lives.	----	.80	----	.64
2.	Most of my activities are determined by what society demands.	----	.42	----	.18
3.	No matter how hard you work, you never really seem to reach your goals.	----	.55	----	.30
4.	I upsets me to go into a situation without knowing what I can expect from it.	----	.34	----	.12
5.	Those who work for a living are manipulated by their bosses.	----	.60	----	.36
6.	In the long run, people get the respect they deserve in this world.	----	.63	----	.40
7.	The idea that most teachers are unfair to students is nonsense.	----	.30	----	.09
8.	Capable people who fail to become leaders have not taken advantage of their opportunities.	----	.36	----	.13
9.	Becoming a success is a matter of hard work; luck has little or nothing to do with it.	----	.58	----	.34
10.	In my case, getting what I want has little or nothing to do with luck.	----	.54	----	.29
11.	Getting people to do the right thing depends upon ability; luck has little to do with it.	----	.57	----	.32
12.	There is really no such thing as "luck."	----	.46	----	.21
13.	With enough effort we can wipe out political corruption.	----	.30	----	.09
14.	It is impossible for me to believe that chance and luck play an important role in my life.	----	.63	----	.40
15.	What happens to me is my own doing.	----	.68	----	.46
16.	In the long run, the people are responsible for bad government on a national as well as on a local basis.	----	.35	----	.12

Note. Dashes indicate not applicable.

Table 12 (cont'd).

Challenge Items (Chall)		Factor Loadings			h^2
		Comm	Cont	Chall	
1.	There are no conditions that justify endangering the health, food, and shelter of one's family or of one's self.	----	----	.75	.56
2.	Pensions large enough to provide for dignified living are the right of all when age or illness prevents one from working.	----	----	.46	.21
3.	I very seldom make detailed plans.	----	----	.01	.00
4.	I tend to start working on a new task without spending much time thinking about the best way to proceed.	----	----	.06	.00
5.	Before I ask a question, I figure out exactly what I know already and what it is I need to find out.	----	----	.07	.00
6.	One who does one's best should expect to receive complete economic support from one's society.	----	----	.16	.03
7.	My work is carefully planned and organized before it is begun.	----	----	.24	.06
8.	I like to be with people who are unpredictable.	----	----	.03	.00

Note. Dashes indicate not applicable.

positive definite, large standard errors, and highly correlated parameter estimates. No such problems wereidentified. The standard errors ranged from .076 to .104, suggesting that there was adequate precision. Only two of the parameter estimates were correlated greater than .30 with other estimates. Overall, these findings suggest that the LISREL estimates were reasonable and that it was appropriate to proceed in examining the fit of the RHS model.

Second, the adequacy of the measurement model was explored using the squared multiple correlation (R^2) for each observed variable and the coefficient of determination for all of the observed variables simultaneously. The RHS R^2 values ranged from 0.000 to 0.547. Of the 36 RHS items, 24 of them had R^2 values less than .30, indicating that the model is poorly fitted. The coefficient of determination for the RHS model was 0.980 indicating that the proposed model is excellent. Because it is a biased estimate, however, this value is compared to other goodness-of-fit indices.

The third step in evaluating the model was to establish the goodness-of-fit for the overall model using the X^2 statistic, goodness-of-fit index (GOF), adjusted goodness-of-fit index (AGOF), and the root mean square residual (RMR). All four of these indices concur that the model is poorly fitted. The X^2 statistic was 1071.59 ($p < .0001$), the GFI and AGFI were 0.720 and 0.686, respectively, and the

RMR was 0.138. These results can be found in Table 10.

Fourth, the subjective goodness-of-fit indices for the overall model were examined. The X^2/df ratio for the proposed model is 1.80, just falling into the acceptable range. Again, because the X^2/df ratio is biased, the TLI was calculated. The TLI of .47 indicated that the model clearly was poorly fitted.

Finally, the individual parameters were evaluated in an attempt to identify specific parts of the model that were misspecified. The RHS t-values ranged from 0.071 to 10.694. All five of the non-significant items identified were hypothesized to load on the challenge factor. The items hypothesized to load on the commitment and control components all were statistically significant and thus appear to be important to the hypothesized model. Additional weaknesses were identified after examining the factor loadings and h^2 values (see Table 12). Eighteen of the 36 items accounted for less than 25% of the variance. Challenge was clearly the weakest factor.

With regard to the standardized residuals, only 104 of a possible 648 RHS items (16%) had values greater than 2.0. The Q-plot of the normalized residuals provided further support for the lack of fit of the model.

Next, the modification indices were examined. A series of items were freed in an effort to improve the fit of the model. The results of these respecifications can be found in Table 13. The four modifications in the model did not

Table 13. Respecification Steps in Model-fitting Process for RHS

	Competing Models for RHS	X^2	df	Ch-X^2	Ch-df	X^2/df	TLI
0	Null Model - Revised Hardiness Scale	1577.38	630	----	----	2.50	----
1	Three Factor Model	1071.59	594	----	36	1.80	.47
2	Model with Lambda X (6,1) free	1050.15	593	21.44	1	1.77	.49
3	Model with Lambda X (6,1), (4,1) free	1027.46	592	22.69	1	1.74	.51
4	Model with Lambda X (6,1) (4,1), (8,1) free	1009.77	591	17.69	1	1.71	.53
5	Model with Lambda X (6,1) (4,1), (8,1), (3,2) free	984.04	589	9.85	1	1.68	.54

Note. df= degrees of freedom; Ch-X^2 = Change in X^2; Ch-df = Change in df; TLI = Tucker-Lewis Index.

improve its fit substantially. This is demonstrated by a small improvement in the TLI (i.e., a .07 increase) across the four revisions in the model.

In summary, the initial results of the confirmatory factor analyses for both the Personal Views Survey and the Revised Hardiness Scale did not support a three-factor solution. Additional attempts to respecify the model did not improve either of the models significantly. As a logical next step, principal components analyses were completed in an effort to clarify the actual factor structure suggested by this data.

Principal components analyses (PCA). Given the results of the confirmatory factor analyses, principal components analyses were conducted in an effort to understand the underlying component structure of both the Personal Views Survey (PVS) and the Revised Hardiness Scale (RHS). These analyses were conducted using SPSS (SPSS, Inc., 1990). An oblique factor rotation was used given that a) hardiness theory suggests that the components overlap with each other conceptually and b) the hardiness components are correlated with each other.

A principal components analysis (PCA) consists of three basic phases. First, relevant statistics and the correlation matrices are examined to determine the viability of conducting a PCA. Second, the number of components underlying the measure are estimated. Third, the components are rotated to aid in their interpretation.

Personal Views Survey (PVS). Two criteria were used to determine whether there was preliminary support for conducting a principal components analysis on the PVS. First, the Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy was examined. The KMO compares the observed correlation coefficients to the partial correlation coefficients. Small differences indicate that principal components techniques should not be used since the correlations between the items cannot be accounted for by other items. KMO values of .60 or greater are required for good principal components analyses (Tabachnik & Fidell, 1983). The KMO value generated on this initial analysis of the PVS was an acceptable .74.

The Bartlett Test of Sphericity (BTS) was the second statistic examined. The BTS indicates whether the correlation matrix among the items is an identity matrix. A significant Bartlett statistic indicates that it is appropriate to conduct a principal components analysis. The statistic generated for the PVS was significant at the $p < .0001$ level and, thus, was supportive of conducting a PCA.

The second stage in conducting a PCA is the component extraction process. The three criteria examined in this stage of the analysis are the number of eigenvalues greater than 1.0, the size of these eigenvalues, and the scree plot.

The SPSS program identified sixteen components with eigenvalues greater than 1.0. Greater attention was then given to those components that accounted for larger amounts

of the variance. These components provide a more accurate representation of the data. When taken as a whole, five components accounted for 36.4% of the variance. A five-component solution was further supported by the scree plot (i.e., plotted eigenvalues). A distinct change in the slope of the plotted values is an indication of the actual number of components present. There appeared to be a distinct change in the slope between the fifth and sixth components.

Communalities were then examined in an effort to improve the fit of the five-component model. A communality is the squared multiple correlation coefficient between an item and all other items in the model. Low values (i.e., < .25) indicate that a particular item is not accounting for a significant proportion of variance in the model and, thus, should be eliminated from the analysis. The results of the five-component solution identified nine items with communalities less than .25. These items were deleted from the measure and the analysis was completed again for the model. The resulting components were then rotated using an oblique rotation. The rotation process emphasizes differences in the loadings and aides in the interpretation of the components.

The model appeared to be improved with the nine items deleted. The KMO increased to .76 and the Bartlett test statistic remained statistically significant. The amount of variance accounted for by this model was 41.9%, an increase of 5.5%.

Four empirical criteria were also supportive of the five-component model. First, there was an overall increase in the magnitude of the communalities. All the values were greater than .25. Second, the residual correlation matrix was examined. In a good principal components analysis, the values of this matrix are small when there is little difference between the original correlation matrix and the correlation matrix generated by the component loadings. Fifty-eight percent of these values were less than .05. Third, the matrix of partial correlation coefficients, referred to as the anti-image correlation (AIC) matrix, was examined. A partial correlation coefficient is the relationship between two items after controlling for the effects of the other items in the measure. Partial correlation coefficients can be thought of as correlations between the unique components. Small coefficients lend support to the results of the principal components analysis. Only 7.9% of these coefficients were greater than .09 in magnitude. Fourth, the values found on the diagonal of the AIC, an indication of sampling adequacy, were examined. Large values lend support to the adequacy of the analysis, whereas small values indicate that certain items are not contributing significantly to the model. The PVS values ranged from .55 to .89 with a mean value of .73, indicating that the data supported a principal components analysis.

More important than the empirical support for the five-component structure is whether the components are

conceptually sound. Only items with component loadings of .30 or greater were examined (Tabachnik & Fidell, 1983). Table 14 contains the items associated with each component, their respective loadings, and the components they were originally hypothesized to assess according to Kobasa's theory. The first component accounted for 18.1% of the variance and appeared to measure some combination of external locus of control, hopelessness, or helplessness. This component primarily contained items identified by Kobasa as assessing the control and commitment components. The second component accounted for 7.1% of the variance and assessed internal locus of control over upcoming life events. It was also comprised of a combination of commitment and control items. Component 3 measured adherence to authority or security. It accounted for 6.9% of the variance and was comprised primarily of challenge items. The fourth component contained only challenge items and assessed the degree of comfort with a lack of predictability in life. This component accounted for 5.4% of the variance. The fifth and final component assessed a sense of alienation or a "just world" philosophy of life. It accounted for 4.4% of the variance of the five-component model and was comprised primarily of control and commitment items.

Revised Hardiness Scale (RHS). A parallel analysis was completed on the Revised Hardiness Scale (RHS). Two statistics were examined to determine the viability of

Table 14. Component Loadings for the Personal Views Survey

	Component 1					
Theoretical Component	Item	Component Loading C1	C2	C3	C4	C5
Cont	I feel that it's almost impossible to change my spouse's or partner's mind about something. (10)	.67				
Cont	I feel that if people try to hurt me, there's usually not much I can do to stop them. (45)	.62				
Cont	When you marry and have children you have lost your freedom of choice. (13)	.61				
Comm	Lots of times I really don't know my own mind. (39)	.58				
Cont	When I make a mistake, there's very little I can do to make things right again. (31)	.53				
Chall	Most days, life just isn't very exciting for me. (46)	.52				
Comm	I find it difficult to imagine getting excited about working. (8)	.51				
Comm	No matter how hard you work, you never really seem to reach your goals. (14)	.50				
Comm	Most people who work for a living are just manipulated by their bosses. (11)	.47				
Cont	I find it's usually very hard to change a friend's thinking about something. (28)	.39				
Comm	Ordinary work is just too boring to be worth doing. (41)	.32				

Note. Comm = Commitment; Cont = Control; Chall = Challenge.

Table 14 (cont'd).

Theoretical Component	Item	Component Loading C1	C2	C3	C4	C5
	Component 2					
Comm	I really look forward to my work. (23)		-.75			
Comm	I often wake up eager to take up my life where it left off the day before. (1)		-.73			
Cont	I usually feel that I can change what might happen tomorrow by what I do today. (5)		-.63			
Cont	Planning ahead can help avoid most future problems. (4)		-.50			
Cont	No matter how hard I try, my efforts will accomplish nothing. (7)		-.46			
Cont	Most of the time, my bosses or superiors will listen to what I have to say. (3)		-.43			

Note. Comm = Commitment; Cont = Control; Chall = Challenge.

Table 14 (cont'd).

Theoretical Component	Item	Component 3 Component Loading C1	C2	C3	C4	C5
Chall	I respect rules because they guide me. (33)			-.57		
Chall	New laws shouldn't be made if they hurt a person's income. (12)			-.55		
Chall	No matter what you do, the "tried and true" ways are always the best. (9)			-.53		
Cont	When I am at work performing a difficult task, I know when I need to ask for help. (25)			.53		
Chall	It doesn't bother me to step aside for a while from something I'm involved in if I'm asked to do something else. (24)			.51		
Cont	I believe most of what happens in life is just meant to happen. (16)			-.43		
Comm	Politicians run our lives. (50)			-.42		

Note. Comm = Commitment; Cont = Control; Chall = Challenge.

Table 14 (cont'd).

Theoretical Component	Item	Component Loading C1	C2	C3	C4	C5
	Component 4					
Chall	Changes in routine bother me. (43)				.80	
Chall	It bothers me when something unexpected interrupts my daily routine. (30)				.73	
Chall	I feel uncomfortable if I have to make any changes in my everyday schedule. (6)				.72	
Chall	I don't like things to be uncertain or unpredictable. (36)				.65	
Chall	It doesn't bother me to step aside for a while from something I'm involved in if I'm asked to do something else. (24)				.50	
Chall	I like a lot of variety in my work. (2)				.39	

Note. Comm = Commitment; Cont = Control; Chall = Challenge.

Table 14 (cont'd).

Theoretical Component	Item	Component Loading C1	C2	C3	C4	C5
	Component 5					
Cont	Most of the time it just doesn't pay to try hard, since things never turn out right anyway. (19)					.61
Cont	When I'm reprimanded at work, it usually seems unjustified. (48)					.58
Comm	It doesn't matter if you work hard at your job since only the bosses profit. (17)					.54
Chall	A person whose mind seldom changes can usually be depended on to have reliable judgment. (15)					.51
Cont	One of the best ways to handle most problems is just not to think about them. (34)					.49
Comm	I find it hard to believe people who tell me that the work they do is of value to society. (44)					.49
Comm	I feel no need to try my best at work since it makes no difference anyway. (32)					.47
Comm	Most of my life gets wasted doing things that don't mean anything. (38)					.45
Cont	When other people get angry at me, it's usually for no good reason. (42)					.36
Comm	The most exciting thing for me is my own fantasies. (20)					.35
Chall	I have no use for theories that are not closely tied to facts. (40)					.34

Note. Comm = Commitment; Cont = Control; Chall = Challenge.

conducting a principal components analysis (PCA). The Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy was .73 and, thus, was within the acceptable range. The Bartlett Test of Sphericity was significant ($p < .001$). Similar to the results of the PVS, these two statistics indicate that it was appropriate to proceed with the PCA.

During the component extraction phase, the results from the initial PCA identified twelve components with eigenvalues greater that 1.0. A three-component solution was suggested after examining both the amount of variance accounted for by these components and the scree plot. The initial three-component solution accounted for 28.6% of the variance.

Next, the communalities for each of the RHS items were examined. Fourteen items with communalities less than .25 were deleted from the measure, and the PCA was completed again. The results from this second analysis were supported by an increase in the KMO (i.e., .78), a significant Bartlett Test of Sphericity, and an increase in the amount of variance accounted for by the model (i.e., 39.4%). Table 15 contains the items associated with each component, their respective loadings, and the components they were originally thought to assess according to Kobasa's theory.

Efforts to conceptualize the components, however, indicated that the RHS was actually comprised of two rather than three components. The first two components were clearly identifiable, whereas the third component was not.

Table 15. Component Loadings for the Revised Hardiness Scale

	Component 1			
Theoretical Component	Item	C1	C2	C3
Comm	Most of life is wasted in meaningless activity. (5)	.64		
Comm	I find it hard to believe people who actually feel that the work they perform is of value to society. (9)	.63		
Cont	No matter how hard you work, you never really seem to reach your goals. (11)	.59		
Comm	No matter how hard I try, my efforts will accomplish nothing. (12)	.59		
Chall	I very seldom make detailed plans. (6)	-.59		
Comm	I long for a simple life in which bodily needs are the most important things and decisions don't have to be made. (24)	.58		
Chall	I tend to start working on a new task without spending much time thinking about the best way to proceed. (8)	-.55		
Cont	Most of my activities are determined by what society demands. (7)	.53		
Comm	The most exciting thing for me is my own fantasies. (18)	.48		
Cont	Those who work for a living are manipulated by their bosses. (21)	.47		
Comm	If you have to work, you might as well choose a career where you deal with matters of life and death. (25)	.42		
Comm	The human's fabled ability to think is really not such an advantage. (14)	.41		
Cont	What happens to me is my own doing. (35).	.32		

Note. Comm = Commitment; Cont = Control; Chall = Challenge.

Table 15 (cont'd).

Theoretical Component	Item	Component 2 C1	C2	C3
Cont	Becoming a success is a matter of hard work; luck has little or nothing to do with it. (29)		.76	
Cont	Getting people to do the right thing depends upon ability; luck has little to do with it. (31)		.73	
Cont	There is really no such thing as "luck." (32)		.70	
Cont	It is impossible for me to believe that chance and luck play an important role in my life. (34)		.65	
Cont	In my case, getting what I want has little or nothing to do with luck. (30)		.54	
Cont	Capable people who fail to become leaders have not taken advantage of their opportunities. (28)		.52	
Cont	In the long run, people get the respect they deserve in this world. (26)		.43	

Note. Comm = Commitment; Cont = Control; Chall = Challenge.

Table 15 (cont'd).

	Component 3			
Theoretical Component	Item	C1	C2	C3
Chall	My work is carefully planned and organized before it is begun. (19)			.67
Cont	Politicians control our lives. (3)			.60

Note. Comm = Commitment; Cont = Control; Chall = Challenge.

The first component was a combination of external locus of control, hopelessness, or helplessness. The second component measured internal locus of control. The third component only consisted of two items, both of which have relatively high component loadings. They did not, however, make sense conceptually. As such, data from this study suggest that a two-component model best describes the underlying structure of the RHS.

In addition to the conceptual clarity of the two-component model, other empirical criteria were also supportive. First, two items continued to have communalities less than .25. These items, however, had reasonable component loadings (e.g., .41, .42) indicating that they should not be deleted from the RHS. Second, the residual correlation matrix identified 48% of the values as being less than .05. Closer examination of this matrix suggested that, overall, the coefficients greater than .05 were relatively low in magnitude. Third, 16% of the AIC coefficients were greater than .09. Finally, the coefficients assessing sampling adequacy ranged from .70 to .87 with a mean value of .77. These statistics provide support for the adequacy of the principal components model.

On the basis of these results, it can be concluded that hardiness is not a unidimensional construct. Although neither of the principal components analyses directly supported Kobasa's three component theory, there was some degree of conceptual overlap. The PVS assessed external and

internal locus of control, challenge, and alienation, and the RHS measured both external and internal locus of control.

Structural Equation Models with Latent Variables

The purpose of testing structural equation models in this study was to critically evaluate Kobasa's hardiness theory in light of recent criticisms. These criticisms include a lack of attention to measurement issues, the use of homogenous samples, a lack of attention to the role neuroticism plays in this research paradigm, and the need for a more objective measure of illness.

Hardiness composite models (Figure 1) and hardiness components models (Figure 2) were proposed to be tested using both frequency and severity scores of the life stress and self-reported illness measures. The analysis, conducted using LISREL 7, was based on listwise deletion using a covariance matrix and a maximum likelihood solution.

The results of both the confirmatory and the principal components analyses indicated that the three hypothesized hardiness components could not be identified from the data. This finding indicated that it was premature to examine the relationship among each of the hardiness components, life stress, neuroticism, and illness using the proposed structural equation models based on component scores. As such, only the models based on hardiness composite scores were tested.

Efforts to analyze the data using the structural

equation models with latent variables were unsuccessful. That is, the LISREL 7 program was not able to identify an admissible solution. The error messages indicated that the program was not able to converge to a solution because certain matrices were not positive definite (i.e., PS matrix: the variance-covariance matrix of the errors associated with the latent endogenous variables, the PH matrix: the variance-covariance matrix associated with the latent exogenous variables, and/or the TE matrix: variance-covariance matrix associated with the error for the observed endogenous variables). A non-positive definite matrix indicates that the model is misspecified in some way (Joreskog & Sorbom/SPSS Inc., 1989). The results of this model indicated that it was a poor fit (X^2 = 620.55; df = 11; $p < .0001$).

A variety of possible problematic issues may have been contributing to LISREL's inability to converge to an admissible solution. First, non-positive definite error matrices sometimes occur when the model is underidentified. A model is identified when the unknown parameters are mathematical functions of the known parameters and when these functions can be used to obtain unique solutions (Bollen, 1989). When a model is underidentified there are an infinite number of equations that could generate the observed data (Long, 1983). Or, stated differently, there are too many unknowns in the model and not enough information to solve the underlying mathematical equations.

Examination of the proposed model indicated that it was underidentified. The model was revised in an attempt to make the matrices either just identified (i.e., to allow for a single unique solution) or overidentified (i.e., to allow for a goodness-of-fit test of the model). Paths were deleted in a manner that was consistent with both hardiness theory and the mathematical criteria necessary to obtain a just identified or an overidentified model. As a result of addressing these identification issues, Kobasa's basic research paradigm (i.e., the relationship between hardiness and illness and the buffering relationship between hardiness and life stress) was maintained. This model (Figure 3) also failed to pass the admissability test, and its fit was also poor ($X^2 = 587.44$; $df = 13$; $p < .0001$).

Second, identification problems also arise when the correlations or covariances that link the latent variables are small (Long, 1983). To determine whether or not this might be interfering with the analysis, the standard errors of the estimates were evaluated. Large values indicate that this may be a problem with the model. One method for alleviating this situation is to set the residuals equal to one another. This strategy also did not produce an acceptable model.

Third, it was hypothesized that the LISREL program may have reached a local minimum and, thus, was not able to find a solution. A local minimum can be conceptualized as LISREL's unsuccessful attempt to identify a solution when

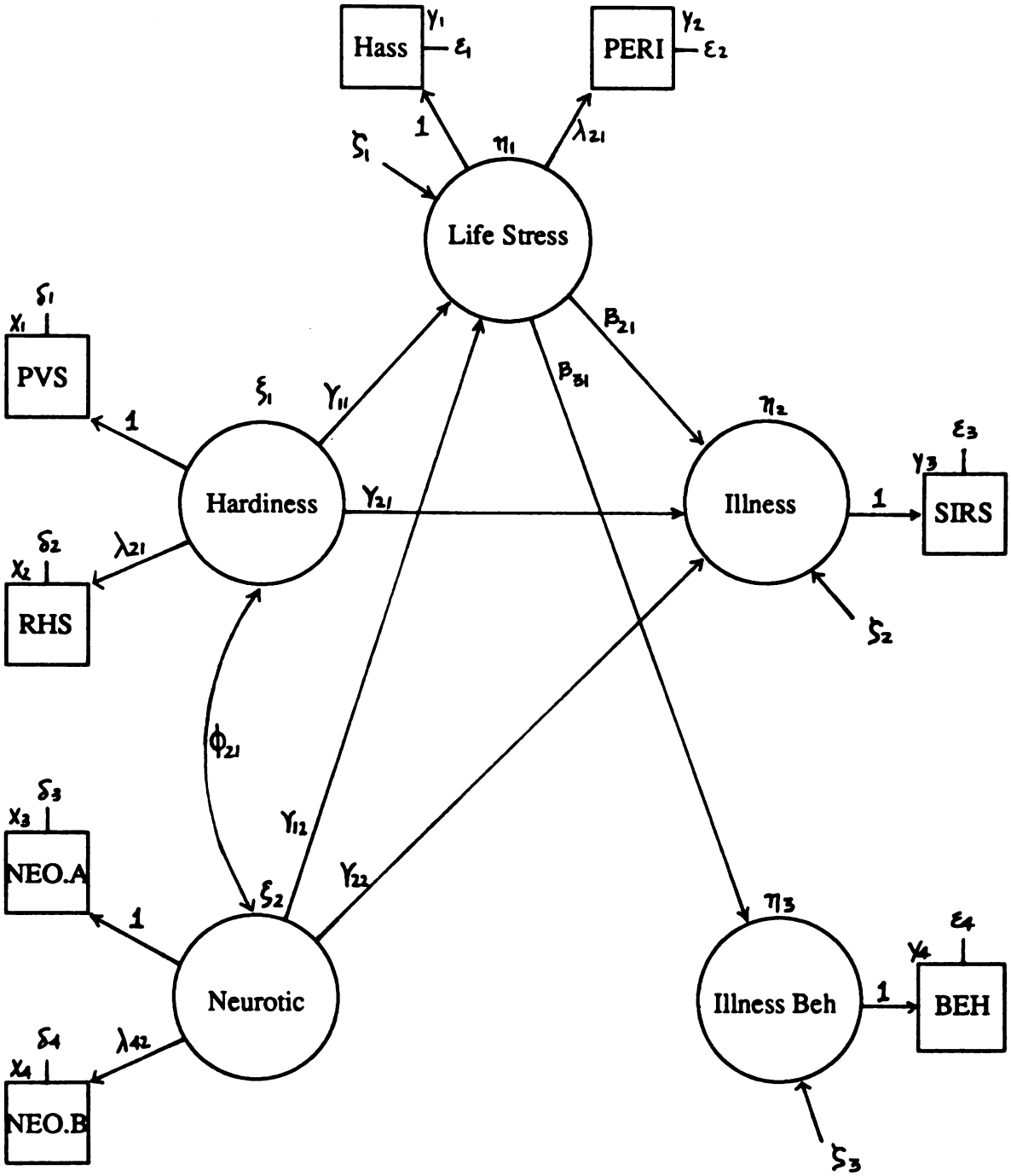

Figure 3. Revised Structural Model - Composite Scores

there are several possible options (i.e., local minima) available (Joreskog & Sorbom/SPSS Inc., 1989). The program gets 'stuck' in one of these possible solutions and is not able to converge to the most appropriate solution. A local minimum sometimes results when variables or measures in a model are scaled very differently from one another or when they have variances that are very different from one another (C. Turner, personal communication, September, 1992). To address this possibility, the LISREL program was configured to enter a correlation matrix (i.e., a matrix of standardized correlation coefficients) rather than a covariance matrix. The solution still was not admissible.

Another possible problem with the model was that two of the latent endogenous variables, self-reported illness and illness behaviors, were being measured using a single indicator. The initial version of the model specified the path between the observed and the latent constructs to be set at 1.0, indicating that the questionnaires had no measurement error. As described by Joreskog and Sorbom (1989), the model was respecified to contain an estimate of measurement error. When this did not alleviate the error statement, the model was revised to include two indicators of illness. That is, both self-reported illness and illness behaviors were specified as measuring the single latent construct of illness. Neither of these strategies produced an admissible solution or an adequate model fit.

Convergence problems and the presence of negative

variances occur when sample sizes or the number of indicators per latent variable are inadequate (Loehlin, 1987; Fassinger, 1987). The present study had an adequate sample size (n = 176), but only had two indicators per variable. A larger number of indicators is preferable. It was at this point in the analysis process that the measurement portion of the model was deleted and a structural model with observed variables (i.e., single rather than multiple indicators of each variable) was conducted. The NEO split scales were combined and the most internally consistent measures of hardiness (i.e., Personal Views Survey) and life stress (i.e., Hassles Scale) were used in this analysis.

The structural equation model was revised slightly prior to beginning the analysis. This revision was based upon a reconceptualization of the illness process and the results of the zero-order correlation matrix. Illness behaviors was placed as the final endogenous variable in the model since people are more likely to experience illness prior to missing work, visiting their physician, or being hospitalized due to physical illness. This revised model is depicted in Figure 4.

Structural Equation Models with Observed Variables

The structural model analyses were completed using LISREL 7. They were based on a listwise deletion process, correlation matrices, and maximum likelihood solutions. The coefficients presented in the models are standardized

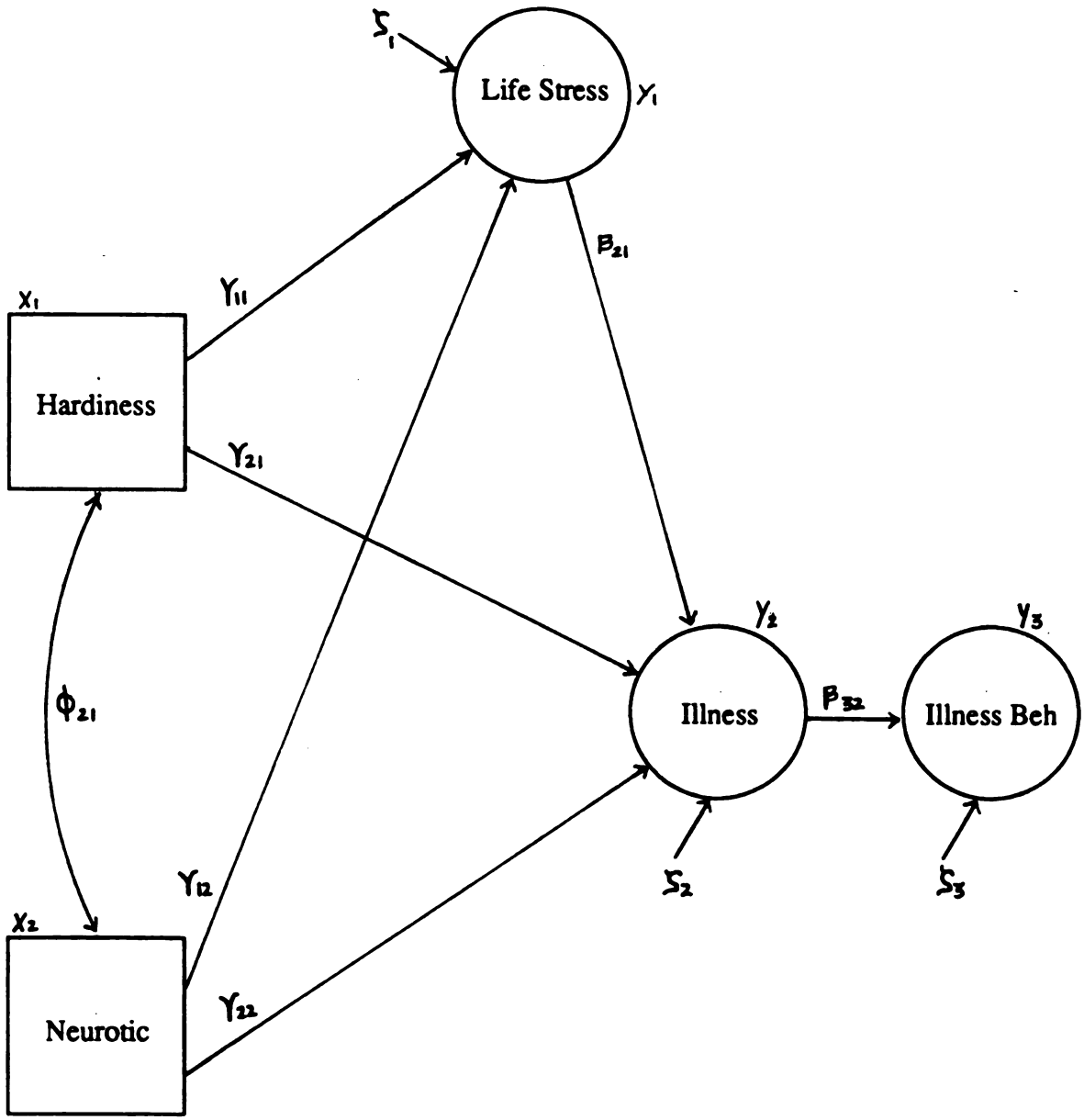

Figure 4. Revised Structural Model - No Measurement Error

values. Models based on both frequency and severity scores were explored for the overall sample.

A Box's M test was conducted to determine whether the frequency and severity models should be fitted separately for men and women. This analysis compares the variance ovariance matrices for males and females to determine whether or not they are homogenous (Tabachnik & Fidell, 1983). Results from these analyses can be found in Tables 16 and 17. These global results suggest that there were no differences between men and women with regard to the frequency models, but that there were differences in the models based on severity scores.

In order to obtain a clearer understanding of these differences, univariate analysis of variance of each variable by sex was completed for the frequency model (df = 1,180) and the severity model (df = 1,179). These results are presented in Tables 18 and 19. With regard to the variables contained in the model based on frequency scores, women reported higher levels of neuroticism ($p < .05$), more illness ($p < .001$), and more illness behaviors ($p < .05$) than men. With regard to the variables contained in the severity model, women reported more neuroticism ($p < .05$) and illness behaviors ($p < .01$), as well as more severe life stress ($p < .01$) and illness ($p < .01$) than did men. Men and women did not differ in their level of hardiness.

The results of the Box's M test and the univariate analysis of variance suggested that there were sex

Table 16. Box's M Test for Gender Based on Frequency Scores

Box's M	F	df	p	X^2	df	p
17.43	1.13	15,129902	.324	16.91	15	.324

Table 17. Box's M Test for Gender Based on Severity Scores

Box's M	F	df	p	X^2	df	p
29.09	1.88	15,128697	.020	28.22	15	.020

Table 18. Univariate ANOVA by Gender - Frequency Scores

Variable	M Men	M Women	F	Significance Level
Hardiness	2.29	2.33	1.49	.223
Neuroticism	67.69	75.54	5.56	.019*
Life Stress	27.71	29.10	.81	.371
Illness Symptoms	6.47	8.62	12.53	.001***
Illness Behaviors	1.59	1.99	4.50	.035*

Note. Significance levels: *p < .05; ***p <.001.

Table 19. Univariate ANOVA by Gender - Severity Scores

Variable	M Men	M Women	F	Significance Level
Hardiness	2.29	2.33	1.52	.219
Neuroticism	67.78	75.54	5.38	.022*
Life Stress	1.42	1.57	9.89	.002**
Illness Symptoms	186.79	244.88	9.01	.003**
Illness Behaviors	1.54	1.99	6.00	.015*

Note. Significance levels: *p < .05; **p < .01.

differences in the hardiness paradigm. In addition to exploring the hardiness paradigm with the whole sample based on both frequency and severity scores, structural models were explored separately for men and women. The results from these analyses are provided below.

Model for the whole sample based on frequency scores. The overall and detailed fit information for the Initial and Final models based on frequency scores for the whole sample can be found in Table 20. The Initial model produced a non-significant X^2 (X^2 = 1.33, df = 3, $p < .722$). A non-significant X^2 indicates that the proposed model is similar to that which is expected in the population. Since the X^2 statistic is influenced by sample size, other test statistics [i.e., adjusted goodness-of-fit (AGOF) index and root mean square residual (RMR)] were also examined to evaluate the fit of the model. The AGOF and the RMR for this model were .985 and .025, respectively. These values were indicative of a good model. However, as mentioned above, these indices are biased and should be interpreted in conjunction with other goodness-of-fit indices.

The detailed fit information contained in Table 20 indicates where improvements in the model could be made. The total coefficient of determination for the structural equations was .165. This suggests structural weaknesses in the model as a whole. The equations predicting stress, self-reported illness, and illness behaviors had low squared multiple correlations (e.g., .114, .101 and .011,

Table 20. Summary of Model Fit Information -- Whole Sample Based on Frequency Scores

Model	X^2	df	p	Adjusted Goodness-of-Fit Index	Root Mean Square Residual	Coefficient of Determination Structural Equation	Squared Multiple Correlations* Equations	Standardized Residuals*	Modification Indices*	t-values*
Initial	1.33	3	.722	.985	.025	.165	LS = .114 IllSx = .101 IllBeh = .011	--	--	Hardy/ILLSX = -.366 LS/ILLBEH = 1.861 ILLSX/ILLBEH = 1.401
Final	1.46	4	.833	.988	.025	.165	LS = .114 IllSx = .100 IllBeh = .011	--	--	ILLSX/ILLBEH = 1.401

Note 1. LS = Life Stress; ILLSX = Illness Symptoms; ILLBEH = Illness Behaviors.
Note 2. * = Reported values are those which indicate a need for modification of the model.
Note 3. n = 182.

respectively). These low values also indicate structural weaknesses in the model. None of the standardized residuals were greater than 2.0, indicating that there were no serious problems with regard to the relationships between the pairs of variables.

T-values and modification indices generated by the LISREL 7 program provide additional clues for improving the fit of the model. T-values less than 2.0 identify paths that are not statistically significant and, if deleted, may improve the overall fit of the model (Fassinger, 1987). The paths between hardiness and illness ($t = -.366$) as well as illness and illness behaviors ($t = 1.401$) were not significant. Large modification indices indicate possible measurement error in that particular variable (Joreskog & Sorbom/SPSS Inc., 1989). No large modification indices were identified for this model.

Based on the above fit information, one modification was made in the model. The path between hardiness and illness was deleted because it was far from being statistically significant. As a result of this respecification, the overall fit of the model improved. The X^2 continued to be non-significant ($X^2 = 1.46$, $df = 4$, $p < .883$). The AGOF, RMR, total coefficient of determination, and squared multiple correlations remained virtually the same. The path between life stress and illness became statistically significant.

Thus, although the overall fit information was

supportive of the model, there was still clear indication of structural weaknesses. Despite the suspicion of such weaknesses between the variables, other changes in the model did not seem either statistically or theoretically justified. The Final model is presented in Figure 5 with its associated parameter values.

Model for men based on frequency scores. The overall and detailed fit information for the Initial and Final models based on frequency scores for men can be found in Table 21. The initial model produced a non-significant X^2 (X^2 = .76, df = 3, p < .859), indicating that the proposed model was similar to that which is expected in the population. The AGOF index and the RMR (.984 and .020, respectively) were also supportive of the fit of the model. The detailed fit information contained in Table 21 indicates where improvements in the model could be made. The total coefficient of determination for the structural equations was .208, suggesting structural weaknesses in the model. The equations predicting stress, illness, and illness behaviors also had low squared multiple correlations (e.g., .203, .042, .002, respectively). None of the standardized residuals were greater than 2.0.

Although there were no large modification indices identified in this model, the t-values for five of the paths clearly indicated deficiencies in the model. The paths between hardiness and illness (t = -.050), neuroticism and life stress (t = 1.084), neuroticism and illness (t = .672),

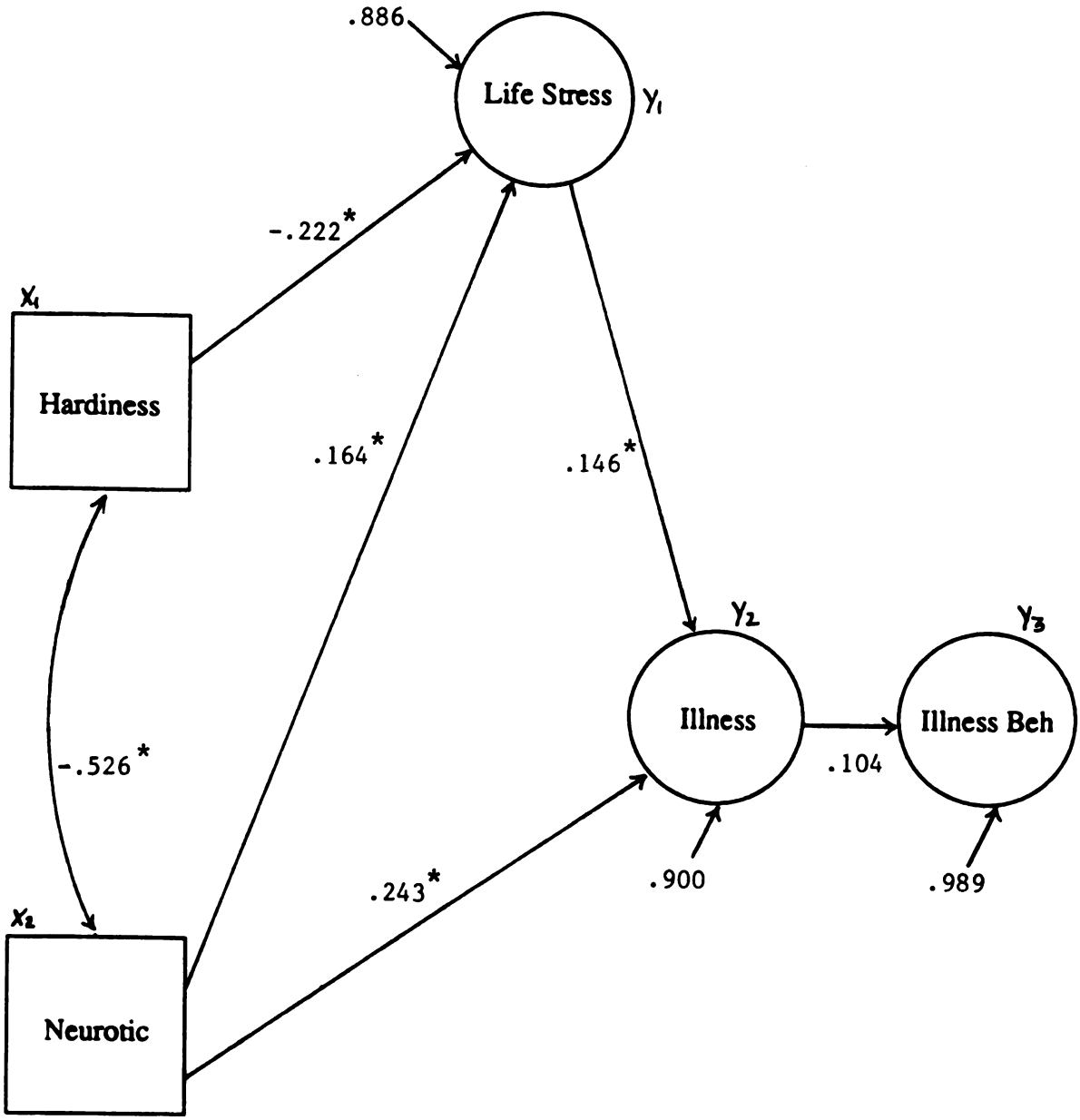

Figure 5. Final Structural Model - Whole Sample - Frequency

Note. Significance level: $p^* < .05$.

Table 21. Summary of Model Fit Information -- Men Based on Frequency Scores

Model	X^2	df	p	Adjusted Goodness-of-Fit Index	Root Mean Square Residual	Coefficient of Determination Structural Equation	Squared Multiple Correlations* Equations	Standardized Residuals*	Modification Indices*	t-values*
Initial	.76	3	.859	.984	.020	.208	LS = .203 ILLSX = .042 ILLBEH = .002	--	--	Hardy/ILLSX = -.050 Neurotic/LS = 1.084 Neurotic/ILLSX = .672 LS/ILLSX = 1.366 ILLSX/ILLBEH = .413
Final	.76	4	.943	.988	.020	.208	LS = .203 ILLSX = .042 ILLBEH = .002	--	--	Neurotic/LS = 1.084 Neurotic/ILLSX = .794 LS/ILLSX = 1.463 ILLSX/ILLBEH = .413

Note 1. LS = Life Stress; ILLSX = Illness Symptoms; ILLBEH = Illness Behaviors.
Note 2. * = Reported values are those which indicate a need for modification of the model.
Note 3. n = 93.

life stress and illness (t = 1.366), and illness and illness behaviors (t = .413) were not statistically significant.

Based on the fit information, one modification was made in the model. The path between hardiness and illness was deleted from the model. As a result, the overall fit improved slightly. The X^2 continued to be non-significant (X^2 = .76; df = 4; p < .943). The AGOF improved slightly. The RMR, the total coefficient of determination, and the squared multiple correlations remained unchanged. According to the t-values, two paths improved (i.e., neuroticism to illness; life stress to illness), but they did reach statistical significance. Elimination of other non-significant paths produced models that were fit more poorly. Overall, these findings indicate that the model continued to have structural weaknesses.

In summary, although the overall fit is supportive of the model, there were still clear indications of serious structural weaknesses in the model. Four of the paths in the model did not reach statistical significance. Despite these concerns, additional changes in the model did not seem justified. The Final model is presented in Figure 6 with its associated parameter values.

Model for women based on frequency scores. The overall and detailed fit information for the Initial, Revised, and Final models based on frequency scores for women can be found in Table 22. The Initial model produced a non-significant X^2 (X^2 = 3.93, df = 3, p < .270). The AGOF

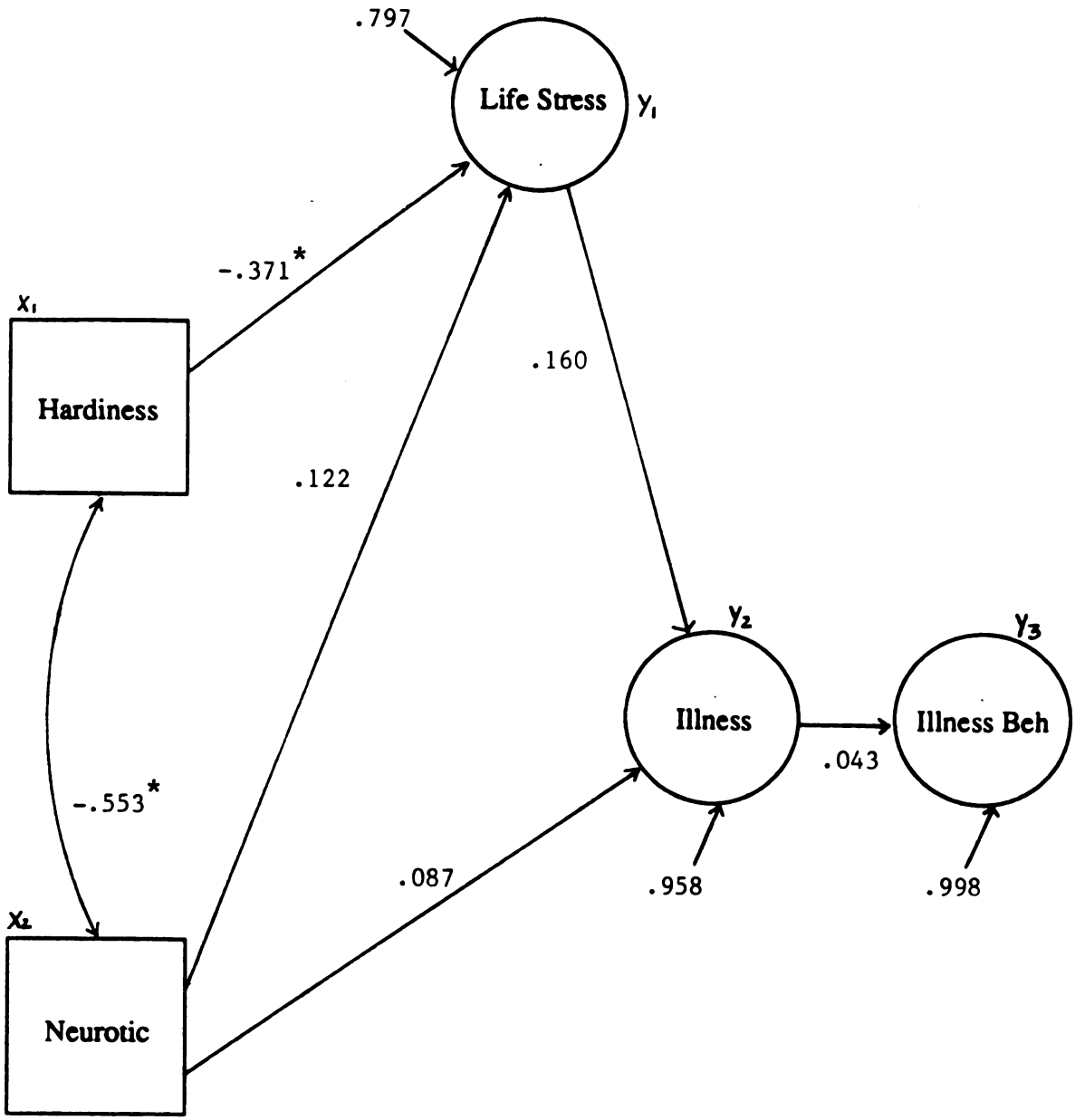

Figure 6. Final Structural Model - Men - Frequency Scores

Note. Significance level: $p^* < .05$.

Table 22. Summary of Model Fit Information -- Women Based on Frequency Scores

Model	X^2	df	p	Adjusted Goodness-of-Fit Index	Root Mean Square Residual	Coefficient of Determination Structural Equation	Squared Multiple Correlations* Equations	Standardized Residuals*	Modification Indices*	t-values*
Initial	3.93	3	.270	.914	.054	.173	LS = .051 ILLSX = .171 ILLBEH = .007	--	Neurotic/IllBeh = 2.99	Hardy/LS = -.442 Hardy/ILLSX = -1.744 Neurotic/LS = 1.493 Neurotic/ILLSX = 1.656 LS/ILLSX = 1.416 ILLSX/ILLBEH = .805
Revised	.88	2	.643	.970	.023	.201	LS = .051 ILLSX = .171 ILLBEH = .041	--	--	Hardy/LS = -.442 Hardy/ILLSX = -1.744 Neurotic/LS = 1.493 Neurotic/ILLSX = 1.656 Neurotic/ILLBEH = -1.739 LS/ILLSX = 1.416 ILLSX/IILBEH = 1.371
Final	1.08	3	.781	.976	.025	.200	LS = .049 ILLSX = .169 ILLBEH = .041	--	--	Hardy/ILLSX = -1.746 Neurotic/ILLSX = 1.648 Neurotic/ILLBEH = -1.739 LS/ILLSX = 1.416

Note 1. LS = Life Stress; ILLSX = Illness Symptoms; ILLBEH = Illness Behaviors.
Note 2. * = Reported values are those which indicate a need for modification of the model.
Note 3. n = 89.

(.914) and the RMR (.054) were also supportive of the fit of the model.

The detailed fit information contained in Table 22 indicates where some improvements in the model could be made, however. The total coefficient of determination for the structural equations was .173, suggesting serious structural weaknesses in the model. The equations predicting stress, illness, and illness behaviors had low squared multiple correlations (e.g., .051, .171, and .007, respectively), another indication of structural weaknesses. None of the standardized residuals were greater than 2.0, indicating that the relationships between the pairs of variables were being fit well.

The modification index suggested that the fit of the model might be improved if a path between neuroticism and illness behaviors was added. Based upon this information, a path was added to the model connecting neuroticism to illness behaviors. It is possible that there is a relationship between neuroticism and illness behaviors.

Adding this additional path improved the fit of the Revised model (X^2 = .88; df = 2; p = .643). The AGOF increased to .970 and the RMR decreased to .023. The overall coefficient of determination improved slightly as did the squared multiple correlation for illness behaviors. The magnitude of these values, however, continued to indicate structural weaknesses in the model. The new path approached statistical significance, and the path between

illness and illness behaviors improved somewhat.

Aside from the improvement in the model, none of the paths in the model were statistically significant. In the Final model, the path between hardiness and life stress was deleted model because it was particularly weak. This revision resulted in some improvement in the model. The model remained non-significant, as is desirable (X_2 = 1.08; df = 3; p < .781). The total coefficient of determination for the structural equations and the squared multiple correlations remained virtually the same. The importance of the path between neuroticism and life stress improved greatly, reaching statistical significance. The other paths did not reach statistical significance. The modification index did not indicate that further revisions would be helpful.

Again, although the overall fit information was supportive of the model, there were still indications of serious structural weaknesses. The Final model is presented in Figure 7 with its associated parameter values.

In summary, the results of the models based on frequency scores indicated that the hardiness research paradigm was expressed differently in men and women. Confidence intervals were calculated to determine whether the strength of the common paths in these models were statistically different from each other. Results of these analyses indicated that there were no differences in the strength of the relationship among the common paths.

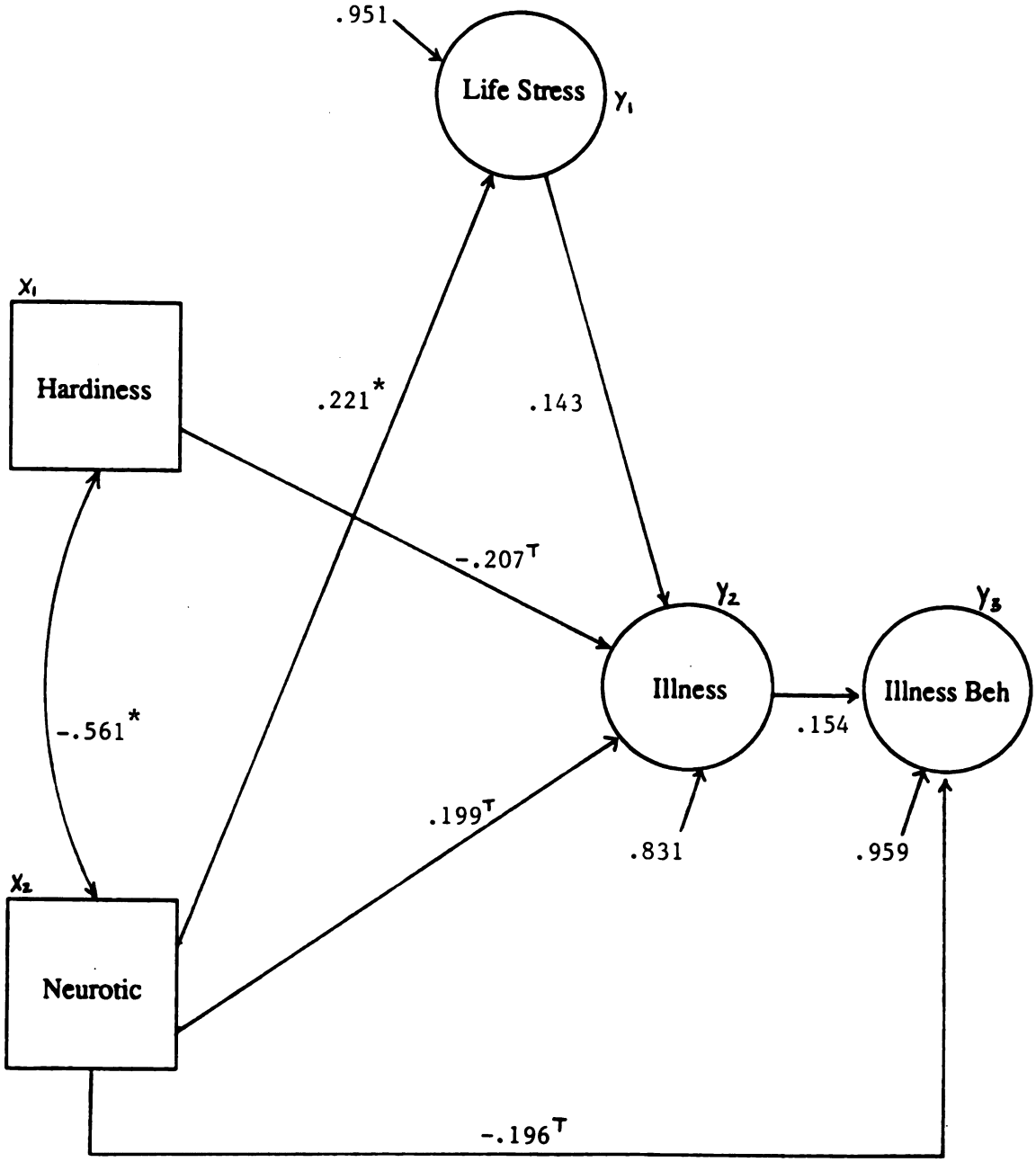

Figure 7. Final Structural Model - Women - Frequency Scores

Note. Significance level: $p^* < .05$.

Model for the whole sample based on severity scores. A similar model based on the severity of life stress and illness was tested. The overall and detailed fit information for the Initial and Final models can be found in Table 23. The Initial model produced a significant X^2 (X^2 = 9.86, df = 3, $p < .020$), indicating that the model is poorly fitted. The AGOF and the RMR were .896 and .052, respectively, and thus were supportive of the model.

The detailed fit information contained in Table 23 indicates where improvements in the model could be made. The total coefficient of determination for the structural equations was .175, suggesting serious structural weaknesses in the model. The equations predicting life stress, illness, and illness behaviors also had low squared multiple correlations (e.g., .100, .192 and .056, respectively). This was another indication of structural weaknesses. In addition, the standardized residual between life stress and illness behavior was greater than 2.0, indicating that the relationship between these variables were not being fit well. The t-values associated with this model indicate that the paths between hardiness and life stress (t = -1.386) and hardiness and illness (t = -1.422) were not significant. There was also a high modification index for one indicator, the relationship between life stress and illness behaviors.

Based upon this fit information, the model was modified by adding a path connecting illness behaviors to life stress. It seemed possible that experiencing more sick

Table 23. Summary of Model Fit Information -- Whole Sample Based on Severity Scores

Model	X^2	df	p	Adjusted Goodness-of-Fit Index	Root Mean Square Residual	Coefficient of Determination Structural Equation	Squared Multiple Correlations* Equations	Standardized Residuals*	Modification Indices*	t-values*
Initial	9.86	3	.020	.896	.052	.175	LS = .100 ILLSX = .192 ILLBEH = .056	LS/ILLBEH = 2.368	ILLBEH/LS = 8.31	Hardy/LS = -1.386 Hardy/ILLSX = -1.422
Final	1.40	2	.497	.977	.027	.200	LS = .169 ILLSX = .193 ILLBEH = .054	--	--	Hardy/LS = -1.446 Hardy/ILLSX = -1.473

Note 1. LS = Life Stress; ILLSX = Illness Symptoms; ILLBEH = Illness Behaviors.
Note 2. * = Reported values are those which indicate a need for modification of the model.
Note 3. n = 181.

days, visits to physicians, and hospitalizations would influence the severity of life stress experienced. As a result of this modification, the fit of the Final Model improved greatly. The X^2 became non-significant (X^2 = 1.40, df = 2; p < .497). The AGOF increased to .977, and the RMR decreased to .027. In general, there were improvements in the total coefficient of determination and the squared multiple correlations associated with life stress. The magnitude of these values, however, continued to indicate the presence of structural weaknesses in the model. The standardized residuals were all less than 2.0, indicating that the relationships between the variables were now being fit well in this model. Finally, the t-values improved, but they did not reach statistical significance. Eliminating these paths negatively influenced the fit of the model. For this reason, these paths were not deleted.

Although the overall fit information is supportive of this model, there is still some indication of structural weaknesses. Despite these suspicions, additional changes in the model did not seem statistically or theoretically warranted. The final model is presented in Figure 8 with its associated parameter estimates.

Model for men based on severity scores. The overall and detailed fit information for the Initial, Revised, and Final models based on severity scores for men can be found in Table 24. The Initial model produced a non-significant X^2 (X^2 = 2.87, df = 3, p < .412), indicating that the model

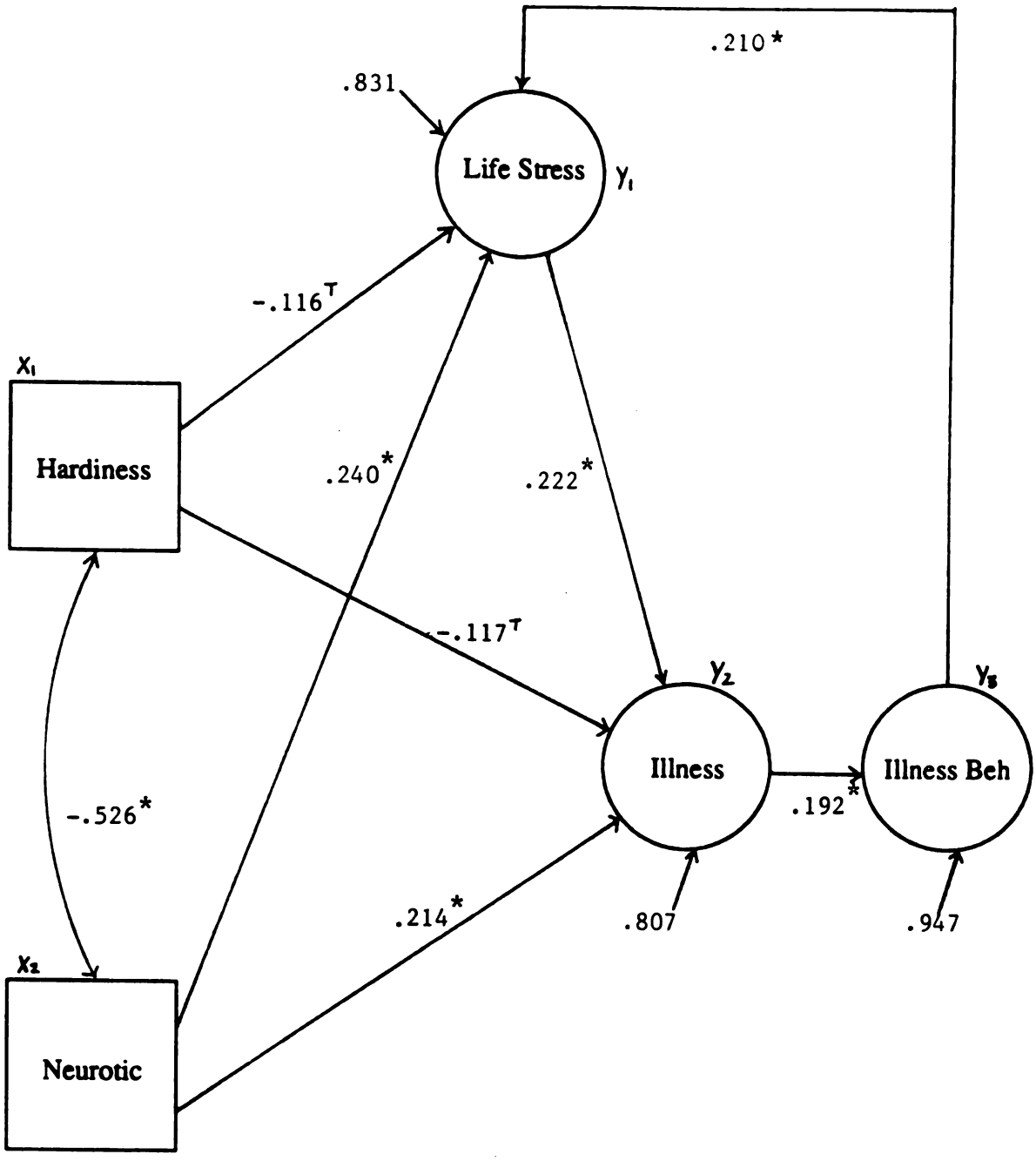

Figure 8. Final Structural Model - Whole Sample - Severity

Note. Significance level: $p^* < .05$.

Table 24. Summary of Model Fit Information -- Men Based on Severity Scores

Model	X^2	df	p	Adjusted Goodness-of-Fit Index	Root Mean Square Residual	Coefficient of Determination Structural Equation	Squared Multiple Correlations* Equations	Standardized Residuals*	Modification Indices*	t-values*
Initial	2.87	3	.412	.939	.035	.232	LS = .186 ILLSX = .147 ILLBEH = .056	--	ILLBEH/LS = 2.58	Hardy/ILLSX = -.340 Neurotic/LS = -.365 Neurotic/ILLSX = 1.764
Revised	1.02	2	.601	.967	.020	.232	LS = .186 ILLSX = .147 ILLBEH = .075	--	--	Hardy/ILLSX = -.340 Neurotic/LS = -.365 Neurotic/ILLSX = 1.764 LS/ILLBEH = 1.352 ILLSX/ILLBEH = 1.783
Final	.71	4	.950	.988	.015	.245	LS = .220 ILLSX = .148 ILLBEH = .055	--	--	LS/ILLBEH = 1.565 ILLSX/ILLBEH = 1.911

Note 1. LS = Life Stress; ILLSX = Illness Symptoms; ILLBEH = Illness Behaviors.
Note 2. * = Reported values are those which indicate a need for modification of the model.
Note 3. n = 92.

was fitting the data well. The AGOF (.939) and the RMR (.035) were also supportive of the fit.

The detailed fit information contained in Table 24 indicates where improvements in the model could be made. The total coefficient of determination for the structural equations was .232. This suggests structural weaknesses in the model. The equations predicting life stress, illness, and illness behaviors had low squared multiple correlations (e.g., .186, .147, .056, respectively), another indication of structural weaknesses. None of the standardized residuals were significantly greater than 2.0, indicating that the relationships between the pairs of variables were being fit well.

The Revised model was based on the modification index; it consisted of adding a path connecting illness behaviors to life stress. It made conceptual sense that increased illness behaviors could lead to higher levels of perceived life stress. As a result of this modification in the model, the overall fit of the model improved somewhat (X^2 = 1.02; df = 2; $p < .601$). The fit indices remained virtually the same and continued to indicate the presence of structural weaknesses in the model.

The Final model was respecified by deleting the paths between hardiness and illness and between neuroticism and life stress. These two paths were clearly not approaching statistical significance in the model. This model appeared to be a slight improvement over the previous one (X^2 = .71;

df = 4; p < .950). Global and specific fit indices improved somewhat. In specific, the squared multiple correlation associated with life stress improved. The paths between illness behaviors and life stress and between illness and illness behaviors also improved slightly but still failed to reach statistical significance.

Thus, although the overall fit information is supportive of the model, there are still indications of structural weaknesses in the model. Despite these concerns, other changes in the model did not seem to be statistically or theoretically warranted. The Final model is presented in Figure 9 with its associated parameter values.

Model for women based on severity scores. The overall and detailed fit information for the Initial, Revised, and Final models based on severity scores for women can be found in Table 25. The Initial model produced a significant X^2 (X^2 = 10.15, df = 3, p < .017), indicating that the model was not fit well. The AGOF (.791) and the RMR (.071) also suggested that the model could be improved upon.

The detailed fit information contained in Table 25 indicates where some improvements in the model could be made. The total coefficient of determination for the structural equations was .244, suggesting structural weaknesses in the model. The equations predicting stress, illness, and illness behaviors had low squared multiple correlations (e.g., .123, .224 and .033, respectively), another indication of structural weaknesses. In addition,

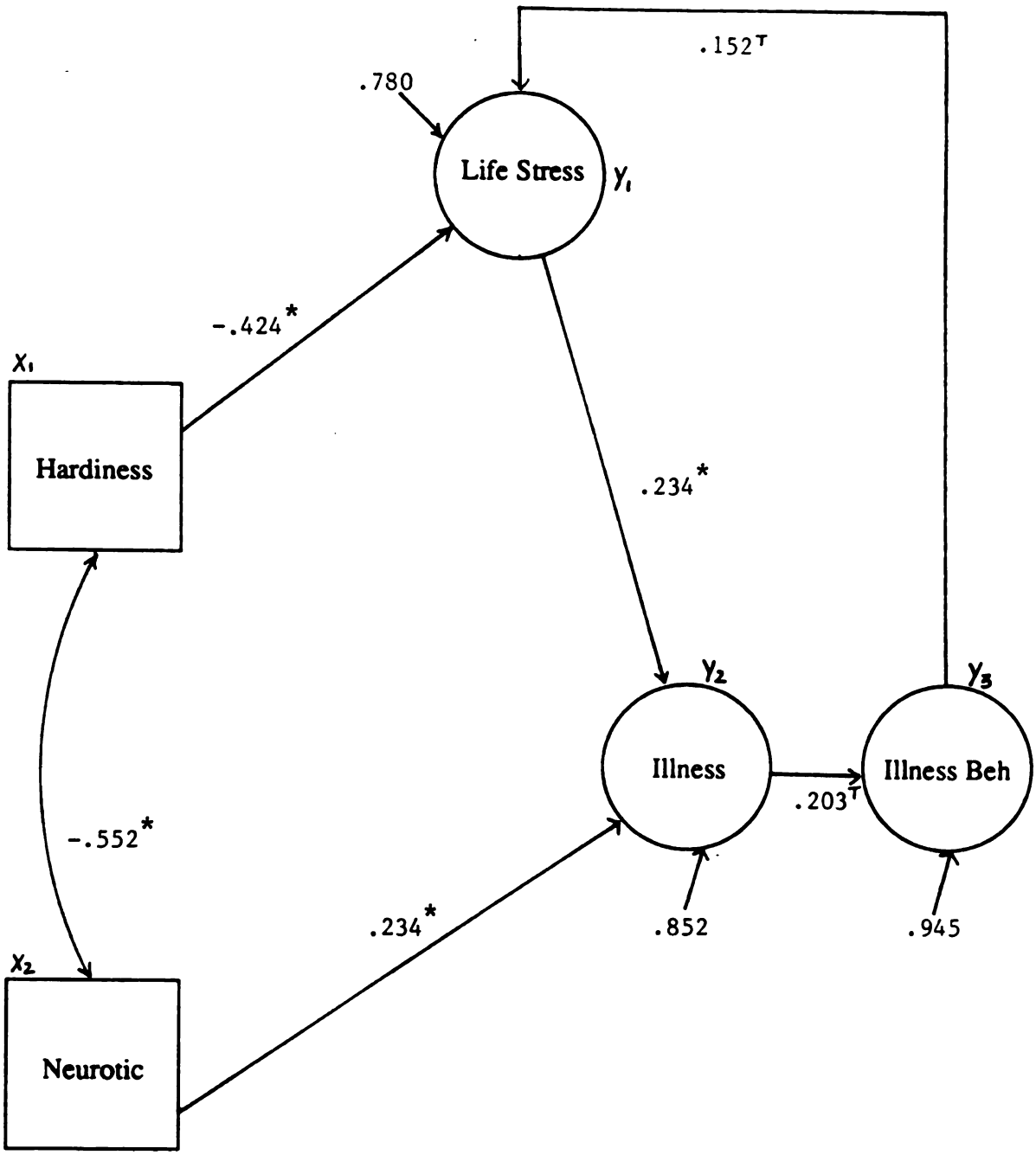

Figure 9. Final Structural Model - Men - Severity Scores

Note. Significance level: $p^* < .05$.

Table 25. Summary of Model Fit Information -- Women Based on Severity Scores

Model	X^2	df	p	Adjusted Goodness-of-Fit Index	Root Mean Square Residual	Coefficient of Determination Structural Equation	Squared Multiple Correlations* Equations	Standardized Residuals*	Modification Indices*	t-values*
Initial	10.15	3	.017	.791	.071	.244	LS = .123 ILLSX = .224 ILLBEH = .033	Neurotic/IllBeh = 2.054	IllBeh/LS = 5.91	Hardy/LS = 1.116 Neurotic/ILLSX = .802 ILLSX/ILLBEH = 1.711
Revised	.09	1	.767	.994	.007	.320	LS = .200 ILLSX = .222 ILLBEH = .078	--	--	Hardy/LS = 1.354 Neurotic/ILLSX = .947 Neurotic/ILLBEH = -1.933 ILLSX/ILLBEH = 1.802
Final	1.01	2	.604	.966	.020	.315	LS = .197 ILLSX = .216 ILLBEH = .083	--	--	Hardy/LS = 1.350 ILLSX/ILLBEH = 1.772

Note 1. LS = Life Stress; ILLSX = Illness Symptoms; ILLBEH = Illness Behaviors.
Note 2. * = Reported values are those which indicate a need for modification of the model.
Note 3. n = 89.

the standardized residual between neuroticism and illness behaviors was slightly greater than 2.0. This indicates that the relationship between these two variables is not being fit well.

Modification indices as well as the t-values indicated that the model could be better fitted. The modification indices suggested that adding paths between illness behaviors and life stress and between illness behaviors and neuroticism would improve the fit of the model. It was plausible illness behaviors in and of themselves would influence the degree of perceived life stress and the degree of neuroticism experienced. The paths between hardiness and life stress, neuroticism and illness, and illness and illness behaviors were also not significant in this model.

Based on the modification indices, two changes were made in the Revised model. Paths connecting illness behaviors to life stress and illness behaviors to neuroticism were added. As a result, the overall fit of the model improved (X^2 = .09; df = 1; p < .767). The X^2 was no longer significant and the global and specific indicators suggested that the fit of the model was greatly improved. More of the variance was accounted for with regard to the equations associated with life stress and illness behaviors. The paths between hardiness and life stress, neuroticism and illness, and illness and illness behaviors also became somewhat stronger.

Following these modifications, however, the path from

neuroticism to illness was far from reaching statistical significance. Thus, this path was deleted in the Final model (X^2 = 1.01; df = 2; p < .604). As a result, the paths between illness behaviors and neuroticism became statistically significant. The path between illness and illness behaviors became slightly weaker and was still not statistically significant. These findings suggested that this more parsimonious model more accurately reflected the data.

Although the overall fit information is supportive of the model, there is still some indication of structural weaknesses in the model. Despite the suspicion of structural weaknesses between the variables, other changes in the model did not seem statistically or theoretically justified. The Final model is presented in Figure 10 with its associated parameter values.

In summary, the results of the models based on severity scores indicated that the hardiness research paradigm was expressed differently in men and women. One crucial difference in the models was the relationship between hardiness and life stress. For men, there was a negative relationship between these variables, whereas a positive relationship was identified for women. It is important to note that this relationship did not reach statistical significance for women. The data from the structural equation analysis suggested that it was important to include this path since it was associated with a more stable model.

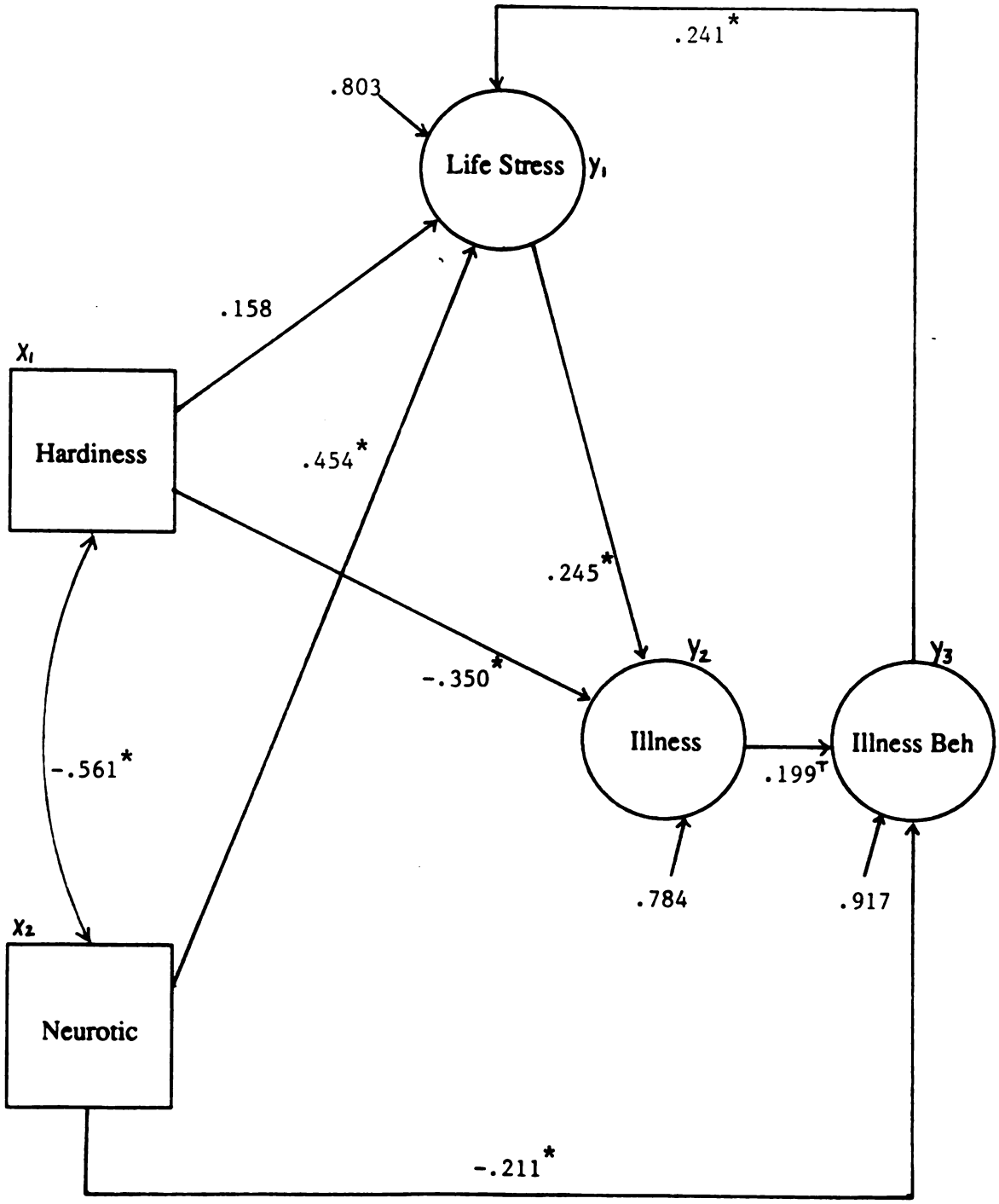

Figure 10. Final Structural Model - Women - Severity Scores

Note. Significance level: $p^* < .05$.

Confidence intervals were calculated to determine whether the strength of the common paths in these models were statistically different from each other. The path between hardiness and life stress was found to be statistically different. There were no differences among the other common paths in the model.

CHAPTER V

Discussion

The overall purpose of this study was to critically evaluate Kobasa's hardiness theory. Hardiness theory postulates that when certain people (i.e., those who exhibit hardiness) encounter stressful live events, they do not report negative physical side effects. More specifically, hardiness has both a direct and indirect (i.e., buffering) impact on illness.

Kobasa's theory postulates that hardiness consists of three cognitive appraisal processes: commitment, internal control, and challenge. These components were developed more out of Kobasa's theoretical conception of the construct than from a formally published, empirically-validated perspective. First-order principal components analyses on two measures of hardiness, the Personal Views Survey (PVS) and the Revised Hardiness Scale (RHS) have identified either two- or three-factor solutions. Unfortunately, a substantial percentage of the items contained in the questionnaires did not load on the hypothesized components.

Although Kobasa and other researchers have found support for the hardiness research paradigm, criticisms of hardiness began to emerge in 1987. One serious challenge to

the efficacy of hardiness was the finding that its effects either decreased in magnitude or disappeared entirely when neuroticism was statistically controlled. This suggests that hardiness may not be the primary impetus underlying the life stress-illness relationship. Instead, hardy people may simply be less neurotic. A second and yet related issue concerned the possible limitation of using subjective illness reports rather than more objective ones. Third, the research designs used in the past have been criticized for using a median split method to categorize people into high and low levels of hardiness rather than conceptualizing hardiness as a continuous variable. Few studies have employed structural equation modeling which readily lends itself to conceptualizing the hardiness research paradigm as a process. Finally, Kobasa's research program was based almost exclusively on data derived from male business executives. Recent publications have begun to report preliminary differences in how hardiness is expressed in men and women.

The following research questions were addressed in this study in response to both Kobasa's proposed theory and recent criticisms. First, is hardiness a unidimensional or a multidimensional construct? Second, is Kobasa's research paradigm supported when accounting for the effects of neuroticism and a more objective measure of illness? Third, are sex differences identified?

Relationships Among the Hardiness Variables

The correlations between the composite and component scores of the PVS and the RHS were somewhat lower than would be expected given that both measures are intended to assess the same construct and were both developed by Kobasa. The intercorrelation of the two challenge components was surprisingly low, indicating that, at best, these subscales share only 6% of the variance in common.

The relationships between the PVS composite and its components were stronger than those for the RHS, suggesting that the PVS components are more strongly assessing a general hardiness factor than are the RHS components. For the RHS, the magnitude of the correlations between the composite and each of the components was consistent with previously reported findings (e.g., Hull et al., 1987) with the exception of the challenge component. The relationship between the RHS composite and challenge scores were substantially higher than what has been reported previously. This difference may be a result of the population used in this study. A broad range of adult employees are likely to be more developmentally advanced than other groups such as college students. As such, they may be more likely to reflect upon challenging life experiences and respond to these hardiness items in a more thoughtful or personal manner.

Additional differences between the two hardiness questionnaires began to emerge when looking at the

interrelationships among the components within each questionnaire. The moderate correlations between the PVS components indicate that they are measuring somewhat overlapping and yet not identical constructs. This was not the case for the RHS components. Control and commitment were moderately associated with each other, whereas the challenge component was clearly independent of the commitment and control dimensions.

These results indicate that the PVS is the better overall measure of hardiness. First, the correlations among the components are more fitting with Kobasa's conceptualization of hardiness. That is, the components are somewhat related to, rather than independent of, each other. Second, the internal consistencies also indicate that the items contained in the PVS are more readily assessing the same general hardiness construct.

Unidimensional Versus Multidimensional Construct

Hardiness appears to be a multidimensional construct. Kobasa's three component model of hardiness, however, was not supported by the results of the confirmatory factor analyses completed in this study. Two principal components analyses were conducted in an effort to clarify the underlying factor structure.

The principal components results for the PVS identified a five-factor structure. Kobasa was the only other researcher to formally explore the factor structure of the PVS. The results of her analyses are only vaguely discussed

in a supplement to the PVS questionnaire. She claims to have identified a three-factor solution.

Numerous principal components analyses have been conducted and formally documented, however, on the various forms of the RHS. These results typically identify a three component solution, although there is some evidence supporting two and four component solutions as well. The results from the present study identified a two-factor solution. These two factors, internal and external locus of control, were different from other two-factor solutions presented in previous studies which identified control and commitment factors.

The factor analytic solutions identified in this study were only partially supportive of Kobasa's conceptualization of hardiness. Both measures identified the control component. However, rather than converging to a single factor, the control component split into external and internal locus of control.

Other results from the PVS analysis were somewhat supportive of hardiness theory. A predictability factor was identified. This factor fits with Kobasa's conceptualization of challenge: change is an expected part of life. An alienation factor was also identified. This factor is somewhat similar to Kobasa's commitment component in which one wants their life activities to be valued by others.

The identification of both a five- and a two-factor

solution raises serious questions about the viability of assessing hardiness. This study's results may differ as a result of the population sampled. Kobasa and others based their results on relatively homogenous populations such as male business executives, college males, and female secretaries. Data for this study were obtained from relatively highly functioning adults employed in a wide range of university-related occupations.

It is clearly premature to explore the role of the hardiness components within the life stress-illness research paradigm. Many researchers have conducted principal components analyses and also found that a significant percentage of the hardiness items did not load consistently on the hypothesized constructs. Unfortunately, they continued to conduct research on hardiness while ignoring the empirical weaknesses that are clearly evident in the assessment tools. Ignoring the serious measurement weaknesses of the hardiness questionnaires only serves to generate misleading research results. Improvements in both the PVS and the RHS are strongly recommended before continuing with hardiness research.

Relationships Among the Variables Underlying Hardiness Theory

The correlations among hardiness, life stress, and self-reported illness were within the expected range given prior research findings (e.g., Manning et al., 1988; Nowack, 1986; Roth et al., 1989; Schmied & Lawler, 1986; Shepperd &

Kashani, 1991). One important finding was that, with the exception of the severity of hassles, the measure of illness behaviors was not consistently related to other variables in this study. The illness behaviors measure was added to the model as a result of prior criticisms that extant wellness research has been biased by the use of overly subjective illness assessment measures (e.g., Costa & McCrae, 1987; Watson & Pennebaker, 1989). To control for this, it has been suggested that wellness research include more objective measures of illness.

The relative absence of a relationship between illness behaviors and the other variables in this study is not surprising. One would expect that a) a more objective measure of illness would not be confounded with hardiness and neuroticism or b) that the relationships among these variables would be significant but weaker than those involving more subjective measures of illness.

An alternative explanation of the lack of relationship between illness behaviors and the other variables in the model is that the illness behaviors measure was not an adequate objective measure. Although the items contained in this measure were developed in response to previous recommendations (e.g., Watson & Pennebaker, 1989), the relationship between the two measures of illness was weaker than expected. The measure of illness behaviors used in this study might be improved by adding additional items and validating the revised questions with other measures of

illness (i.e., physician's diagnoses of illness).

The Neuroticism Confound

The possible confounding of neuroticism with the variables contained in Kobasa's hardiness research paradigm was also explored. The degree of confounding with hardiness was as expected given prior findings (Allred & Smith, 1989; Funk & Houston, 1987; Wiebe et al., 1991). The confounding problem appeared to be more extensive for the PVS than for the RHS. This was unexpected given that the PVS was developed in response to criticisms of the RHS's exclusive use of negative indicators of hardiness. These negative indicators were thought to be more confounded with neuroticism than the degree of confounding expected in positively phrased items. One possible explanation for this finding is that even though the PVS was revised in an effort to make it a more valid measure of hardiness, two of the components scales (i.e., Control, Commitment) still lack adequate internal consistency reliability.

Neuroticism was also significantly related to life stress. Interestingly, neuroticism was more consistently associated with the severity of life stress than it was to the frequency of stressors reported. In general, this same pattern of results was found between the measures of hardiness with severity and frequency of life stress. Persons exhibiting more symptoms of neuroticism and less hardiness are more likely to perceive life events as being more disruptive to their lives.

Others advocate the notion that it is not the event per se which impacts the person, but that it is the self-perceived impact of the event on the individual's life (Allred & Smith, 1989; Rhodewalt & Agustsdottir, 1984; Rhodewalt & Zone, 1989; Thompson, 1981). In addition to reporting a greater number of negative events (Aldwin et al., 1989; Watson & Clark, 1984), neurotic persons are more disturbed by negative events (Larsen & Ketelaar, 1991) and more sensitive to minor failures (Watson & Clark, 1984) than are healthier people.

Rhodewalt and his colleagues evaluated the role neuroticism plays with regard to hardiness. No differences were found between the number of stressful events reported by hardy and non-hardy people (Rhodewalt & Agustsdottir, 1984). They did differ, however, in how desirable and controllable they perceived these events to be. Hardy persons were more likely to perceive the events in a more desirable light and as being less disruptive to their lives than did less hardy persons. A subsequent publication suggests that these findings may be a result of neurotic personality characteristics rather than the presence of hardiness (Rhodewalt & Zone, 1989).

A similar theme was identified with regard to the relationship between neuroticism and self-reported illness. Neuroticism was more strongly related to the severity of the illness reported than it was to the frequency of illness. This indicates that neurotic people are more likely to

report more severe physical symptoms than less neurotic people. Again, the perceptual mindset of neurotic people may predispose them to be more adversely affected by stressful life events. This notion is supported by a wealth of research findings which indicate that personality characteristics, including neuroticism and perceived control, are associated with the suppression of the immune system (Cohen & Williamson, 1991; Contrada et al., 1991; Dienstbier, 1989; O'Leary, 1990; Wiedenfeld, O'Leary, Bandura, Brown, Levine, & Raska, 1990).

Structural Equation Modeling

In addition to examining the confounding of neuroticism, life stress, and illness using simple correlations, the hardiness paradigm was examined in a process-oriented manner using structural equation modeling. Based on the results of the factor analyses, only models based on hardiness composite scores were examined.

Model for whole sample based on frequency scores. For the entire sample of university employees, hardiness did not directly influence the frequency of self-reported illness. However, it did have a buffering effect on illness through life stress. Neuroticism had both a direct and buffering effect on illness. The frequency of self-reported illness was related to the number of illness behaviors reported. This relationship was not significant, however.

These findings indicate that hardiness plays a somewhat different role in the life stress-illness relationship than

does neuroticism. Hardiness plays an important role in decreasing the frequency of illnesses reported in persons who are experiencing a greater frequency of life stressors. This relationship was also found for neuroticism. However, people who are more neurotic are also more likely to report a greater number of illnesses regardless of the number of stressors they are experiencing.

Model for men based on frequency scores. A similar model was identified for men. Again, hardiness did not directly affect self-reported illness, and a hardiness-life stress buffering effect on illness was identified. Neuroticism had both a direct and indirect effect on illness. This model differed from the one based on the entire sample, however, in that many of the paths did not reach statistical significance.

Model for women based on frequency scores. The model differed substantially for women. The hardiness-life stress buffering effect was not identified in this model. Instead, hardiness had a direct impact on the frequency of illnesses reported. Neuroticism had both a direct and a buffering effect on self-reported illness. Interestingly, there was a tendency for more neurotic women to exhibit fewer illness behaviors. Neurotic women may be more likely to verbalize a number of physical complaints but they are not likely to seek actual medical help to have them evaluated by a medical professional.

Model for whole sample based on severity scores. The structural models based on severity scores differed from those based on frequency scores. For the overall sample, hardiness had both a direct and a buffering effect on the severity of self-reported illness. These relationships only approached significance, however. Neuroticism played a more salient role in this model. It had a significant effect on both the severity of life stress and severity of illness reported. This model also differed from those based on frequency scores in that a significant relationship was found between the severity of self-reported illness and illness behaviors. Furthermore, an increase in illness behaviors was directly related to the severity of life stress reported.

These findings tentatively support a direct and buffering hardiness effect on the severity of illness reported. Neuroticism appears to play a more important role in this model in that persons who report more neuroticism in conjunction with a greater severity of life stress are more likely to report more severe illnesses which disrupt their lives. In turn, these illness behaviors appear to compound the severity of life stress that they experience.

Model for men based on severity scores. Differences between men and women emerged when exploring the model separately for each sex. Although neuroticism had a direct effect on the severity of illness reported for men, no such relationship was found for hardiness. Only a hardiness

buffering effect was identified. Illnesses tended to influence illness behaviors which in turn influenced the severity of life stress experienced by these men.

Model for women based on severity scores. This study identified a very different model for women. Prior research findings, as well as the results from the other structural models in this study, identified a negative relationship between hardiness and life stress. Quite unexpectedly, a positive, non-significant relationship between these variables was found for women. Hardiness had both a direct and a buffering effect on the severity of self-reported illness. Only the direct effect was statistically significant, however. Although a buffering effect was identified for neuroticism, it did not directly influence illness. Similar to the model based on men's scores, there was a weak relationship between the severity of self-reported illness and illness behaviors. An increase in illness behaviors also was associated with increases in the severity of life stress reported. In contrast to the men's model, neuroticism directly affected illness behaviors.

Conclusions derived from structural models. Five important general conclusions can be drawn from the results of the structural equation models. First, the results from the structural models indicate that the hardiness paradigm is more fitting for models based on severity scores than they are for frequency scores. This finding has been supported by research that indicates that perceiving events

as interfering with life in a negative way has a greater impact than the simple frequency of events (Allred & Smith, 1989; Rhodewalt & Agustsdottir, 1984; Rhodewalt & Zone, 1989; Thompson, 1981).

Second, hardiness appears to affect the lives of men and women differently. The models based on frequency scores indicated that hardiness appears to have a buffering effect for men who are experiencing a larger number of life stressors. This relationship was not identified for women. Hardier women were more likely to report fewer illnesses regardless of the number of life stressors encountered. This finding was not identified for men.

With regard to severity scores, a hardiness buffering effect was identified for both men and women. This effect, however, appeared to be quite different for men and women. As expected, men reporting lower levels of hardiness were more likely to report greater severity of life stressors. For women, however, a non-significant positive relationship between these variables was found. Given that the path was not statistically significant, it is not reasonable to interpret the meaning of this coefficient. One additional sex difference was that hardiness did not directly impact the frequency of illness reported in men, whereas it did in women.

Third, neuroticism also appears to be expressed differently in men and women. The models based on frequency scores indicated that neuroticism had both a direct and a

buffering effect on self-reported illness. These effects were more salient among women than among men. With regard to severity scores, neurotic men report more severe illnesses regardless of the severity of life stress they experience. However, women who report both higher degrees of neuroticism and life stress are more likely to identify more illnesses. Women who are more neurotic, however, are not more likely to obtain medical assistance or be absent from work because of their illnesses.

Fourth, support for the hardiness buffering effect was not consistently identified. Models based on the entire sample support Kobasa's research paradigm. The support for the buffering effect, however, decreases somewhat when the data are examined separately for men and women. The buffering effect is supported for both men and women when the severity of life stress and illness are considered. As noted above, however, this effect is minimal for women. In models based on frequency scores, however, the buffering effect is found for men but not for women.

Finally, although the models were statistically significant, they did not have strong explanatory power, indicating that the relationships among the variables are significant but of questionable practical utility. These weaknesses were more serious for the models based on frequency scores than they were for those based on severity scores. The psychometric weaknesses identified in the factor analyses of hardiness may be contributing to the

weaknesses in the models.

Strengths and Limitations

This study addressed a number of the weaknesses observed in the earlier research on hardiness. First, the results are derived from a more heterogenous population than is typically studied. As a result, the findings are more generalizable than findings generated from highly specific populations. Second, in reaction to recent criticisms, this study included a measure of neuroticism and a more objective measure of illness. Third, unlike the majority of the hardiness studies, this study examined the relationship among the three hypothesized hardiness components. Fourth, efforts were made to identify differences and similarities in how hardiness was expressed in men and women. Finally, a more appropriate and sophisticated statistical analysis was used to explore the hardiness research paradigm. Path analysis is preferable to ANOVA and ANCOVA given that this procedure does not artificially dichotomize the variables of interest.

The limitations of this study must also be acknowledged. First, the factor analyses were conducted on questionable sample sizes. Larger sample sizes are preferable; a general rule of thumb is to have at least five subjects for each item in a given questionnaire (Fassinger, 1987; Gorsuch, 1983; Tabachnik & Fidell, 1983). This rule was more seriously violated with the 50-item PVS than it was with the 36-item RHS. Second, efforts to analyze a

structural model containing measurement error were not successful. This was likely the result of having only one or two indicators of each latent variable. Loehlin (1987) recommends that at least three indicators of each variable be used. Accounting for measurement error can vastly improve the validity of the research findings (Fassinger, 1987; Hughes, Price, & Marrs, 1986) and may have had a significant impact on the results identified in this study.

Implications for Future Research and Practice

Research on hardiness should continue only after two core issues have been addressed. First, hardiness measures are in need of refinement. The results of this study, as well as others, do not consistently identify the three hypothesized components. Even more alarming is the number of items that do not load on the hypothesized components. Researchers should not continue to study the hardiness construct while ignoring these serious measurement issues. Only once the hardiness measures have been improved substantially should the possible independent contributions of hardiness and each of its components be explored.

Second, the relationship between hardiness and neuroticism should be investigated further. This study found a high degree of overlap between these two variables. It is important to clarify the similarities and differences between hardiness and neuroticism and to understand their role in the hardiness research paradigm.

In addition to these core issues, further improvements

and validation of objective measures of illness would be useful. The lack of relationship between illness behaviors and the other variables found in this study may have occurred because illness behaviors was truly independent (i.e., not confounded) from them. This is the desirable reason. However, it is also possible that the measure was not adequately assessing actual illness. Future research can address this question by validating this measure with other objective measures of illness such as physicians' diagnoses.

Practical applications of hardiness can be implemented once these methodological and conceptual issues have been adequately addressed and resolved. For men, the structural model based on frequency scores indicated that hardiness plays an important role in decreasing the number of illnesses reported in men who experience a greater number of life stressors. There was a tendency for more neurotic men to report a greater number of stressors, and for the degree of neuroticism to influence the frequency of illnesses reported. Treatment interventions should focus on enhancing the cognitive appraisal processes associated with hardiness. This may be particularly important for men who are experiencing greater levels of life stress.

The results from the model based on women's frequency scores indicated that hardiness plays a different role in decreasing the frequency of illness than it does in men. Although, hardy women reported fewer illnesses, hardiness

did not play an influential role in decreasing the number of illnesses reported by women who were experiencing more life stressors. Women who are more neurotic perceive a greater number of life events as stressful. With this in mind, interventions for women will have a greater impact if they have a dual emphasis on enhancing hardiness and confronting neurotic perceptions. Focusing on neurotic attitudes and affect may be particularly important for those women who report a greater number of life stressors.

Hardiness plays an important role in decreasing the severity of illnesses in men who are experiencing greater levels of life stress. Men experiencing a greater degree of neuroticism are more likely to report more severe illnesses regardless of the severity of life stress. There is a tendency for these illnesses to exacerbate the degree of life stress if they are serious enough to warrant visits to a physician, absenteeism from work, and hospitalization.

Among less neurotic men, efforts to promote hardiness-related beliefs and behaviors may help to reduce the perceived severity of life stress and thus may help deter the development of illness. Among more neurotic men, other interventions may be necessary to address the role that their negative attitudes and affect play in increasing their illness reports. This appears to be important regardless of the degree of life stress they experience. In addition, because there is a tendency for illness behaviors to exacerbate the severity of the life stress experienced by

men, it may also be important to help them understand the underlying meaning of their behaviors and why they are perceived as stressful.

For women, the results of this study suggest that the hardiness characteristic plays an important role in decreasing the severity of illness reported regardless of the degree of life stress women experience. The severity of life stress is more likely to impact the severity of illness in women who are more neurotic. Similar to men, having to miss work or greater contact with the medical community increases the severity of life stress experienced.

Treatment interventions designed to enhance hardiness and modify neurotic personality styles are important for women. Efforts to enhance hardy cognitive appraisal processes is likely to have a greater impact on the severity of illness reported by women. Interventions which confront women's negative attitudes and affect may help them to view life events as being less stressful. Similar to men, women having greater contact with the medical profession and absenteeism from work are likely to perceive these outcomes as stressful. Treatment interventions should assist them in understanding how these behaviors influence the degree of stress they perceive as existing in their lives.

APPENDICES

APPENDIX A

Initial Contact Letter

No longer is it possible to avoid the work-related pressures associated with increased job demands, time pressures, and technological advances. In addition to work-related pressures, many people also experience stress associated with balancing numerous family, social, and community activities. Facing these numerous stressful life situations is often associated with greater physical illness.

You are one of a small number of people employed at Michigan State University who is being asked to provide information on the relationship between life stress and physical illness. Your name was drawn randomly from a list of MSU employees. In order for the results to truly represent the experience of people employed at MSU, it is important that each questionnaire be completed and returned. It also is important that about the same number of men and women participate in this study. It is for these reasons that I am interested in your responses to the questionnaires and not to those of a fellow coworker or a family member. Participation in this study is voluntary and is not a condition of MSU employment. There are no penalties for declining to participate.

You may be assured of complete confidentiality. The questionnaire has an identification number for mailing purposes only; thus, I can check your name off of the mailing list when your questionnaire is returned. Your name will never be placed on the questionnaire.

The results of this study are important to people concerned about the effect that life stress has on physical health. This may include employees, employers, medical doctors, government officials, and interested citizens. You may receive a summary of the results by writing "copy of results requested" on the back of the return envelope and printing your name and address below it. Please do not put this information on the questionnaire itself.

I would be most happy to answer any questions you might have. You can write me at the address provided above or call me collect at (801) 531-1823. Please note that this is my own personal research project. It is not associated with an interest of MSU.

Thank you in advance for your assistance.

Sincerely,

Lois A. Benishek, M.A.
Doctoral Student
Counseling Psychology Program

P.S. As an added incentive for completing this survey, your identification number will be entered into a drawing for a $50.00 prize.

APPENDIX B

Informed Consent Form

I, _____, agree to participate in this study and understand the following conditions:

1. I have freely consented to participate in this study and understand that this means that I agree to complete the enclosed survey packet.

2. The purpose of the study has been explained to me, and I both understand the explanation and what my participation involves.

3. I understand that there will be no risks to me and that I will not be, in any way, uncomfortable by participating in this study.

4. I understand that my responses are confidential and that I will not be identified by name as a participant in this study.

5. I understand that the survey packet will take approximately 30 to 45 minutes to complete.

6. I understand that I may be randomly selected to receive $50 as an added incentive for participating in this study. If I am the person randomly selected, this payment will be made to me on or before December 15, 1991.

_____
Your name (printed)

_____
Your signature

_____
Date signed

APPENDIX C

Postcard Follow-Up Contact

Last week a survey was sent to you seeking information about the degree of life stress, attitudes and personality characteristics, and physical illness you are experiencing. Your name was drawn from a random sample of MSU employees.

If you have already completed and returned the survey, please accept my sincere thanks. If not, please do so today. Because the survey has been sent out to only a small, but representative sample of MSU employees, it is extremely important that yours also be included in the study if the results are to accurately represent the opinions of MSU employees.

If by some chance you did not receive the survey or it got misplaced, please call me collect tonight at (801) 531-1823, and I will get another one in the mail to you tomorrow.

Sincerely,

Lois A. Benishek, M.A.

APPENDIX D

Second Follow-Up Contact

Approximately three weeks ago I wrote you seeking information about your degree of life stress, your attitudes and personality style, and the number of illnesses you have experienced in the past six months. As of today, I have not received your completed survey.

This study is being conducted because of the belief that life stress is related to physical illness. It is important that this relationship be more clearly understood.

I am writing to you again because of the significance each survey has to the usefulness of this study. Your name was drawn through a scientific sampling process in which every MSU employee had an equal chance of being selected. This means that only about 3 in every 100 MSU employees are being asked to complete this survey. In order for the results of this study to be truly representative of the experience of all MSU employees, it is essential that each person in the sample return his or her survey. As mentioned in my last letter, your survey should only be completed by you.

In the event that your survey has been misplaced, a replacement is enclosed.

Your cooperation is greatly appreciated.

Cordially,

Lois A. Benishek, M.A.
Doctoral Student
Counseling Psychology Program

P.S. Several people have written to ask when the results will be available. I hope to have them available sometime next summer.

P.S.S. Please recall that you could receive $50.00 for completing this survey if your identification number is randomly selected.

APPENDIX E

Third Follow-Up Contact

I am writing you about my study on the relationship between life stress and physical illness. I have not received your completed survey.

The large number of surveys returned is very encouraging. However, whether I will be able to accurately describe the experience of MSU employees depends upon you and others who have not yet responded. This is because past experiences suggest that those of you who have not returned your survey may hold quite different experiences of life stress and physical illness than those who have already responded.

This is the first study of this relationship among MSU employees that has ever been completed. Therefore, the results are of particular importance to other university and college employees, employers, medical doctors, government officials, and interested citizens. The usefulness of my results depends upon how accurately I am able to describe the experiences of MSU employees.

It is for this reason that I am writing to you again. In case my other correspondence did not reach you, a replacement survey is enclosed. May I urge you to complete and return it as soon as possible.

I'll be happy to send you a copy of the results if you want one. Simply put your name, address, and "copy of results requested" on the back of the return envelope. I expect to have them ready to send by next summer.

Your contribution to the success of this study will be greatly appreciated.

Most sincerely,

Lois A. Benishek, M.A.
Doctoral Student
Counseling Psychology Program

P.S. Please recall that you could receive $50.00 for completing this survey if your identification number is randomly selected.

APPENDIX F

Personal Views Survey

Below are some items that you may agree or disagree with. Please indicate how you feel about each one by circling a number from 0 to 3 in the space provided.

As you will see, many of the items are worded very strongly. This is to help you decide the extent to which you agree or disagree. Please read all the items carefully. Be sure to answer all items on the basis of the way you feel now. Don't spend too much time on any one item.

0 = NOT AT ALL TRUE
1 = A LITTLE TRUE
2 = QUITE A BIT TRUE
3 = COMPLETELY TRUE

1. I often wake up eager to take up my life where it left off the day before 0 1 2 3
2. I like a lot of variety in my work 0 1 2 3
3. Most of the time, my bosses or superiors will listen to what I have to say 0 1 2 3
4. Planning ahead can help avoid most future problems 0 1 2 3
5. I usually feel that I can change what might happen tomorrow by what I do today 0 1 2 3
6. I feel uncomfortable if I have to make any changes in my everyday schedule 0 1 2 3
7. No matter how hard I try, my efforts will accomplish nothing 0 1 2 3
8. I find it difficult to imagine getting excited about working 0 1 2 3
9. No matter what you do, the "tried and true" ways are always the best 0 1 2 3
10. I feel that it's almost impossible to change my spouse's or partner's mind about something 0 1 2 3
11. Most people who work for a living are just manipulated by their bosses 0 1 2 3
12. New laws shouldn't be made if they hurt a person's income 0 1 2 3
13. When you marry and have children you have lost your freedom of choice 0 1 2 3
14. No matter how hard you work, you never really seem to reach your goals 0 1 2 3
15. A person whose mind seldom changes can usually be depended on to have reliable judgment 0 1 2 3
16. I believe most of what happens in life is just meant to happen 0 1 2 3

17. It doesn't matter if you work hard at your job, since only the bosses profit 0 1 2 3

18. I don't like conversations when others are confused about what they mean to say 0 1 2 3

19. Most of the time it just doesn't pay to try hard, since things never turn out right anyway 0 1 2 3

20. The most exciting thing for me is my own fantasies 0 1 2 3

21. I won't answer people's questions until I am very clear as to what they are asking 0 1 2 3

22. When I make plans, I'm certain I can make them work 0 1 2 3

23. I really look forward to my work 0 1 2 3

24. It doesn't bother me to step aside for a while from something I'm involved in, if I'm asked to do something else 0 1 2 3

25. When I am at work performing a difficult task, I know when I need to ask for help 0 1 2 3

26. It's exciting for me to learn something about myself 0 1 2 3

27. I enjoy being with people who are predictable 0 1 2 3

28. I find it's usually very hard to change a friend's thinking about something 0 1 2 3

29. Thinking of yourself as a free person just makes you feel frustrated and unhappy 0 1 2 3

30. It bothers me when something unexpected interrupts my daily routine 0 1 2 3

31. When I make a mistake, there's very little I can do to make things right again 0 1 2 3

32. I feel no need to try my best at work, since it makes no difference anyway 0 1 2 3

33. I respect rules because they guide me 0 1 2 3

34. One of the best ways to handle most problems is just not to think about them 0 1 2 3

35. I believe that most athletes are just born good at sports 0 1 2 3

36. I don't like things to be uncertain or unpredictable 0 1 2 3

37. People who do their best should get full financial support from society 0 1 2 3

38. Most of my life gets wasted doing things that don't mean anything 0 1 2 3

39. Lots of times I don't really know my own mind 0 1 2 3

40. I have no use for theories that are not closely tied to facts 0 1 2 3

41. Ordinary work is just too boring to be worth doing 0 1 2 3

42. When other people get angry at me, it's usually for no good reason 0 1 2 3

43. Changes in routine bother me 0 1 2 3

44. I find it hard to believe people who tell me that the work they do is of value to society 0 1 2 3

45. I feel that if people try to hurt me, there's usually not much I can do to stop them 0 1 2 3

46. Most days, life just isn't very exciting for me 0 1 2 3

47. I think people believe in individuality only to impress others 0 1 2 3

48. When I'm reprimanded at work, it usually seems to be unjustified 0 1 2 3

49. I want to be sure someone will take care of me when I get old 0 1 2 3

50. Politicians run our lives 0 1 2 3

APPENDIX G

Revised Hardiness Scale

Below are some items that you may agree or disagree with. Please indicate how you feel about each one by circling a number from 0 to 3 in the space provided.

As you will see, many of the items are worded very strongly. This is to help you decide the extent to which you agree or disagree. Please read all the items carefully. Be sure to answer all items on the basis of the way you feel now. Don't spend too much time on any one item.

0 = NOT AT ALL TRUE
1 = A LITTLE TRUE
2 = QUITE A BIT TRUE
3 = COMPLETELY TRUE

1. There are no conditions that justify endangering the health, food, and shelter of one's family or of one's self 0 1 2 3
2. Pensions large enough to provide for dignified living are the right of all when age or illness prevents one from working 0 1 2 3
3. Politicians control our lives 0 1 2 3
4. Life is empty and has no meaning in it for me 0 1 2 3
5. Most of life is wasted in meaningless activity 0 1 2 3
6. I very seldom make detailed plans 0 1 2 3
7. Most of my activities are determined by what society demands 0 1 2 3
8. I tend to start working on a new task without spending much time thinking about the best way to proceed 0 1 2 3
9. I find it hard to believe people who actually feel that the work they perform is of value to society 0 1 2 3
10. Before I ask a question, I figure out exactly what I know already and what it is I need to find out 0 1 2 3
11. No matter how hard you work, you never really seem to reach your goals 0 1 2 3
12. No matter how hard I try, my efforts will accomplish nothing 0 1 2 3
13. I find it difficult to imagine enthusiasm concerning work 0 1 2 3
14. The human's fabled ability to think is not really such an advantage 0 1 2 3
15. I am really interested in the possibility of expanding my consciousness through drugs 0 1 2 3
16. It upsets me to go into a situation without knowing what I can expect from it 0 1 2 3

17. The more able person has a greater responsibility for the welfare of the less able 0 1 2 3

18. The most exciting thing for me is my own fantasies 0 1 2 3

19. My work is carefully planned and organized before it is begun 0 1 2 3

20. I like to be with people who are unpredictable 0 1 2 3

21. Those who work for a living are manipulated by their bosses 0 1 2 3

22. I wonder why I work at all 0 1 2 3

23. The attempt to know yourself is a waste of effort 0 1 2 3

24. I long for a simple life in which bodily needs are the most important things and decisions don't have to be made 0 1 2 3

25. If you have to work, you might as well choose a career where you deal with matters of life and death 0 1 2 3

Please CIRCLE one of the two paired statements in each item listed below that BETTER represents your attitude.

26. a. In the long run, people get the respect they deserve in this world.
    b. Unfortunately, people's work often passes unrecognized no matter how hard they try.

27. a. The idea that most teachers are unfair to students is nonsense.
    b. Most students don't realize the extent to which their grades are influenced by accidental happenings.

28. a. Without the right breaks one cannot be an effective leader.
    b. Capable people who fail to become leaders have not taken advantage of their opportunities.

29. a. Becoming a success is a matter of hard work; luck has little or nothing to do with it.
    b. Getting a good job depends mainly on being in the right place at the right time.

30. a. In my case, getting what I want has little or nothing to do with luck.
    b. Many times we might just as well decide what to do by flipping a coin.

31. a. Who gets to be the boss often depends on who was lucky enough to be in the right place first.
    b. Getting people to do the right thing depends upon ability; luck has little to do with it.

32. a. Most people don't realize the extent to which their lives are controlled by accidental happenings.
    b. There is really no such thing as "luck."

33. a. With enough effort we can wipe out political corruption.
    b. It is difficult for people to have control over things politicians do in office.

34. a. **Many times I feel that I have little influence over the things that happen to me.**
    b. **It is impossible for me to believe that chance and luck play an important role in my life.**

35. a. **What happens to me is my own doing.**
    b. **Sometimes I feel that I don't have enough control over the direction my life is taking.**

36. a. **Most of the time I can't understand why politicians behave the way they do.**
    b. **In the long run, the people are responsible for bad government on a national as well as on a local basis.**

APPENDIX H

Combined Hassles & Uplifts Scale

Directions: HASSLES are irritants -- things that annoy or bother you; they can make you upset or angry. UPLIFTS are events that make you feel good; they can make you joyful, glad, or satisfied. Some hassles and uplifts occur on a fairly regular basis and others are relatively rare. Some have only a slight effect; others have a strong effect.

This questionnaire lists things that can be hassles and uplifts in day-to-day life. During a given time period, some of these things will have been a hassle; some will have been an uplift. Others will have been both a hassle and an uplift.

Please think about how much of a hassle or how much of an uplift each item was for you in the PAST 6 MONTHS. Please indicate on the left-hand side of the page (under "HASSLES") how much of a hassle the item was by circling the appropriate number. Then indicate on the right-hand side of the page (under "UPLIFTS") how much of an uplift it was for you by circling the appropriate number.

Remember, circle one number on the left-hand side of the page and one number on the right-hand side of the page for each item.

0 = NONE OR NOT APPLICABLE
1 = SOMEWHAT
2 = QUITE A BIT
3 = A GREAT DEAL

HOW MUCH OF A HASSLE WAS THIS FOR YOU?			HOW MUCH OF AN UPLIFT WAS THIS FOR YOU?
0 1 2 3	1.	Your children	0 1 2 3
0 1 2 3	2.	Your parents or parents-in-law	0 1 2 3
0 1 2 3	3.	Other relatives	0 1 2 3
0 1 2 3	4.	Your spouse	0 1 2 3
0 1 2 3	5.	Time spent with family	0 1 2 3
0 1 2 3	6.	Health or well-being of a family member	0 1 2 3
0 1 2 3	7.	Sex	0 1 2 3
0 1 2 3	8.	Intimacy	0 1 2 3
0 1 2 3	9.	Family-related obligations	0 1 2 3
0 1 2 3	10.	Your friends	0 1 2 3
0 1 2 3	11.	Fellow workers	0 1 2 3
0 1 2 3	12.	Clients, customers, patients, etc.	0 1 2 3
0 1 2 3	13.	Your supervisor or employer	0 1 2 3
0 1 2 3	14.	The nature of your work	0 1 2 3

0	1	2	3	15.	Your work load	0	1	2	3
0	1	2	3	16.	Your job security	0	1	2	3
0	1	2	3	17.	Meeting deadlines or goals on the job	0	1	2	3
0	1	2	3	18.	Enough money for necessities (food, clothing, housing, health care, taxes, insurance, etc.)	0	1	2	3
0	1	2	3	19.	Enough money for education	0	1	2	3
0	1	2	3	20.	Enough money for emergencies	0	1	2	3
0	1	2	3	21.	Enough money for extras (entertainment, recreation, vacations, etc.)	0	1	2	3
0	1	2	3	22.	Financial care for someone who doesn't live with you	0	1	2	3
0	1	2	3	23.	Investments	0	1	2	3
0	1	2	3	24.	Your smoking	0	1	2	3
0	1	2	3	25.	Your drinking	0	1	2	3
0	1	2	3	26.	Effects of drugs and medications	0	1	2	3
0	1	2	3	27.	Your physical appearance	0	1	2	3
0	1	2	3	28.	Time alone	0	1	2	3
0	1	2	3	29.	Exercise(s)	0	1	2	3
0	1	2	3	30.	Your medical care	0	1	2	3
0	1	2	3	31.	Your health	0	1	2	3
0	1	2	3	32.	Your physical abilities	0	1	2	3
0	1	2	3	33.	Weather	0	1	2	3
0	1	2	3	34.	News events	0	1	2	3
0	1	2	3	35.	Your environment (quality of air, noise level, greenery, etc.)	0	1	2	3
0	1	2	3	36.	Political and social issues	0	1	2	3
0	1	2	3	37.	Your neighborhood (neighbors, setting)	0	1	2	3
0	1	2	3	38.	Conserving (gas, electricity, water, gasoline, etc.)	0	1	2	3
0	1	2	3	39.	Pets	0	1	2	3
0	1	2	3	40.	Cooking	0	1	2	3
0	1	2	3	41.	Housework	0	1	2	3
0	1	2	3	42.	Home repairs	0	1	2	3
0	1	2	3	43.	Yardwork	0	1	2	3
0	1	2	3	44.	Car maintenance	0	1	2	3
0	1	2	3	45.	Taking care of paperwork (paying bills, filling out forms, etc.)	0	1	2	3
0	1	2	3	46.	Home entertainment (TV, music, reading, etc.)	0	1	2	3
0	1	2	3	47.	Amount of free time	0	1	2	3
0	1	2	3	48.	Recreation and entertainment outside the home (movies, sports, eating out, walking, etc.)	0	1	2	3
0	1	2	3	49.	Eating (at home)	0	1	2	3
0	1	2	3	50.	Church or community organizations	0	1	2	3

0	1	2	3	51.	Legal matters	0	1	2	3
0	1	2	3	52.	Being organized	0	1	2	3
0	1	2	3	53.	Social commitments	0	1	2	3

APPENDIX I

PERI Life Events Scale

Directions: Below is a list of events that may or may not have occurred in your life during the PAST 6 MONTHS. Read each event carefully.

I. To the left of the event, circle YES or NO to indicate whether or not you experienced the event during the past 6 months.

II. To the right of those events for which you circled YES, circle a number indicating the severity of the event's impact on you. Use the following scale to select the number:

0 = NOT AT ALL SEVERE
1 = SOMEWHAT SEVERE
2 = MODERATELY SEVERE
3 = EXTREMELY SEVERE

EXAMPLE:

YES	NO	Started school or a training program .	0	1	2	3
YES	NO	Changed schools or training programs	0	1	2	3
YES	NO	Graduated from school or training program	0	1	2	3

Remember to respond to these items with regard to your life in the PAST 6 MONTHS.

School							
1.	YES	NO	Started school or a training program after not going to school for a long time	0	1	2	3
2.	YES	NO	Changed schools or training programs	0	1	2	3
3.	YES	NO	Graduated from school or training program	0	1	2	3
4.	YES	NO	Had problems in school or in training program	0	1	2	3
5.	YES	NO	Failed school or training program	0	1	2	3
6.	YES	NO	Did not graduate from school or training program	0	1	2	3
Work							
7.	YES	NO	Started work for the first time	0	1	2	3
8.	YES	NO	Returned to work after not working for a long time	0	1	2	3
9.	YES	NO	Changed jobs for a better one	0	1	2	3
10.	YES	NO	Changed jobs for a worse one	0	1	2	3
11.	YES	NO	Changed jobs for one that was not better and not worse than the last one	0	1	2	3
12.	YES	NO	Had trouble with a boss or coworker	0	1	2	3
13.	YES	NO	Demoted at work	0	1	2	3
14.	YES	NO	Found out that was not going to be promoted at work	0	1	2	3
15.	YES	NO	Conditions at work got worse, other than demotion or trouble at work	0	1	2	3
16.	YES	NO	Promoted	0	1	2	3

17.	YES	NO	Had significant success at work	0	1	2	3
18.	YES	NO	Conditions at work improved, not counting promotion or other personal successes	0	1	2	3
19.	YES	NO	Laid off	0	1	2	3
20.	YES	NO	Fired	0	1	2	3
21.	YES	NO	Started a business or profession	0	1	2	3
22.	YES	NO	Expanded business or professional practice	0	1	2	3
23.	YES	NO	Took on a greatly increased work load	0	1	2	3
24.	YES	NO	Suffered a business loss or failure	0	1	2	3
25.	YES	NO	Sharply reduced work load	0	1	2	3
26.	YES	NO	Stopped working, not retirement, for an extended period	0	1	2	3

Love and Marriage or Committed Relationships

27.	YES	NO	Became engaged	0	1	2	3
28.	YES	NO	Engagement was broken	0	1	2	3
29.	YES	NO	Married or became seriously committed in a relationship	0	1	2	3
30.	YES	NO	Started a love affair	0	1	2	3
31.	YES	NO	Relations with partner changed for the worse, without separation or divorce	0	1	2	3
32.	YES	NO	Separated	0	1	2	3
33.	YES	NO	Divorced	0	1	2	3
34.	YES	NO	Relation with partner changed for the better	0	1	2	3
35.	YES	NO	Got together again after separation	0	1	2	3
36.	YES	NO	Infidelity	0	1	2	3
37.	YES	NO	Trouble with in-laws or partner's parents	0	1	2	3
38.	YES	NO	Partner died	0	1	2	3

Having Children

39.	YES	NO	You or your partner became pregnant	0	1	2	3
40.	YES	NO	Birth of first child	0	1	2	3
41.	YES	NO	Birth of second or later child	0	1	2	3
42.	YES	NO	You or your partner had an abortion	0	1	2	3
43.	YES	NO	You or your partner had a miscarriage or stillbirth	0	1	2	3
44.	YES	NO	Found out that you cannot have children	0	1	2	3
45.	YES	NO	Child died	0	1	2	3
46.	YES	NO	Adopted a child	0	1	2	3
47.	YES	NO	Started menopause	0	1	2	3

Family

48.	YES	NO	New person moved into the household	0	1	2	3
49.	YES	NO	Person moved out of the household	0	1	2	3
50.	YES	NO	Someone stayed on in the household after he or she was expected to leave	0	1	2	3
51.	YES	NO	Serious family argument other than with partner	0	1	2	3
52.	YES	NO	A change in the frequency of family get-togethers	0	1	2	3
53.	YES	NO	Family member other than spouse or child dies	0	1	2	3

Residence

54.	YES	NO	Moved to a better residence or neighborhood	0	1	2	3

55.	YES	NO	Moved to a worse residence or neighborhood	0	1	2	3
56.	YES	NO	Moved to a residence or neighborhood no better or no worse than the last one	0	1	2	3
57.	YES	NO	Unable to move after expecting to be able to move	0	1	2	3
58.	YES	NO	Built a home or had one built	0	1	2	3
59.	YES	NO	Remodeled a home	0	1	2	3
60.	YES	NO	Lost a home through fire, flood, or other disaster	0	1	2	3

Crime and Legal Matters

61.	YES	NO	Assaulted	0	1	2	3
62.	YES	NO	Robbed	0	1	2	3
63.	YES	NO	Accident in which there were no injuries	0	1	2	3
64.	YES	NO	Involved in a law suit	0	1	2	3
65.	YES	NO	Accused or something for which a person could be sent to jail	0	1	2	3
66.	YES	NO	Lost driver's license	0	1	2	3
67.	YES	NO	Arrested	0	1	2	3
68.	YES	NO	Went to jail	0	1	2	3
69.	YES	NO	Got involved in a court case	0	1	2	3
70.	YES	NO	Convicted of a crime	0	1	2	3
71.	YES	NO	Acquitted of a crime	0	1	2	3
72.	YES	NO	Released from jail	0	1	2	3
73.	YES	NO	Didn't get out of jail when expected	0	1	2	3

Finances

74.	YES	NO	Took out a mortgage	0	1	2	3
75.	YES	NO	Started buying a car, furniture, or other large purchase on the installment plan	0	1	2	3
76.	YES	NO	Foreclosure of a mortgage or loan	0	1	2	3
77.	YES	NO	Repossession of a car, furniture, or other items bought on the installment plan	0	1	2	3
78.	YES	NO	Took a cut in wage or salary without a demotion	0	1	2	3
79.	YES	NO	Suffered a financial loss or loss of property not related to work	0	1	2	3
80.	YES	NO	Went on welfare or some type of public assistance	0	1	2	3
81.	YES	NO	Went off welfare or some type of public assistance	0	1	2	3
82.	YES	NO	Got a substantial increase in wage or salary without a promotion	0	1	2	3
83.	YES	NO	Did not get an <u>expected</u> wage or salary increase	0	1	2	3
84.	YES	NO	Had financial improvement not related to work	0	1	2	3

Social Activities

85.	YES	NO	Increased church or synagogue, club, neighborhood, or other organizational activities	0	1	2	3
86.	YES	NO	Took a vacation	0	1	2	3

87.	YES	NO	Was not able to take a planned vacation	0	1	2	3
88.	YES	NO	Took up a new hobby, sport, craft, or recreational activity	0	1	2	3
89.	YES	NO	Dropped a hobby, sport, craft, or recreational activity	0	1	2	3
90.	YES	NO	Acquired a pet	0	1	2	3
91.	YES	NO	Pet died	0	1	2	3
92.	YES	NO	Made new friends	0	1	2	3
93.	YES	NO	Broke up with a friend	0	1	2	3
94.	YES	NO	Close friend died	0	1	2	3
Miscellaneous							
95.	YES	NO	Entered the Armed Services	0	1	2	3
96.	YES	NO	Left the Armed Services	0	1	2	3
97.	YES	NO	Took a trip other than a vacation	0	1	2	3
Health							
98.	YES	NO	Physical health improved	0	1	2	3
99.	YES	NO	Physical illness	0	1	2	3
100.	YES	NO	Injury	0	1	2	3
101.	YES	NO	Unable to get treatment for an illness or injury	0	1	2	3

APPENDIX J

Neuroticism Scale of the NEO Personality Inventory

Directions: Read each statement carefully and select a number that best represents your opinion. There are no "right" or "wrong" answers, and you need not be an "expert" to complete this questionnaire.

-2	=	STRONGLY DISAGREE
-1	=	DISAGREE
0	=	NEUTRAL
+1	=	AGREE
+2	=	STRONGLY AGREE

1.	I often feel tense and jittery	-2	-1	0	+1	+2
2.	I'm an even-tempered person	-2	-1	0	+1	+2
3.	Sometimes I feel completely worthless	-2	-1	0	+1	+2
4.	I rarely feel fearful or anxious	-2	-1	0	+1	+2
5.	I often get angry at the way people treat me	-2	-1	0	+1	+2
6.	I have sometimes experienced a deep sense of guilt or sinfulness	-2	-1	0	+1	+2
7.	I am easily frightened	-2	-1	0	+1	+2
8.	I am not considered a touchy or temperamental person	-2	-1	0	+1	+2
9.	I tend to blame myself when anything goes wrong	-2	-1	0	+1	+2
10.	I am not a worrier	-2	-1	0	+1	+2
11.	I am known as hot-blooded and quick-tempered	-2	-1	0	+1	+2
12.	I have a low opinion of myself	-2	-1	0	+1	+2
13.	I often worry about things that might go wrong	-2	-1	0	+1	+2
14.	It takes a lot to get me mad	-2	-1	0	+1	+2
15.	Sometimes things look bleak and pretty hopeless to me	-2	-1	0	+1	+2
16.	Frightening thoughts sometimes come into my head	-2	-1	0	+1	+2
17.	I often get disgusted with people I have to deal with	-2	-1	0	+1	+2
18.	I rarely feel lonely and blue	-2	-1	0	+1	+2
19.	I'm seldom apprehensive about the future	-2	-1	0	+1	+2
20.	People I work or associate with find me easy to get along with	-2	-1	0	+1	+2
21.	Too often, when things go wrong, I get discouraged and feel like giving up	-2	-1	0	+1	+2
22.	I have fewer fears than most people	-2	-1	0	+1	+2

23.	There are some people I really hate	-2	-1	0	+1	+2
24.	I am seldom sad or depressed	-2	-1	0	+1	+2
25.	I seldom feel self-conscious when I'm around people	-2	-1	0	+1	+2
26.	I have trouble resisting my cravings	-2	-1	0	+1	+2
27.	I feel I am capable of coping with most of my problems	-2	-1	0	+1	+2
28.	In dealing with other people, I always dread making a social blunder	-2	-1	0	+1	+2
29.	I rarely overindulge in anything	-2	-1	0	+1	+2
30.	I often feel helpless and want someone else to solve my problems	-2	-1	0	+1	+2
31.	It doesn't embarrass me too much if people ridicule and tease me	-2	-1	0	+1	+2
32.	When I am having my favorite foods, I tend to eat too much	-2	-1	0	+1	+2
33.	I keep cool in emergencies	-2	-1	0	+1	+2
34.	At times I have been so ashamed I just wanted to hide	-2	-1	0	+1	+2
35.	I have little difficulty resisting temptation	-2	-1	0	+1	+2
36.	When I'm under a great deal of stress, sometimes I feel like I'm going to pieces	-2	-1	0	+1	+2
37.	I often feel inferior to others	-2	-1	0	+1	+2
38.	I sometimes eat myself sick	-2	-1	0	+1	+2
39.	I can handle myself pretty well in a crisis	-2	-1	0	+1	+2
40.	I feel comfortable in the presence of my bosses or other authorities	-2	-1	0	+1	+2
41.	I am always able to keep my feelings under control	-2	-1	0	+1	+2
42.	It's often hard for me to make up my mind	-2	-1	0	+1	+2
43.	If I have said or done the wrong thing to someone, I can hardly bear to face him or her again	-2	-1	0	+1	+2
44.	Sometimes I do things on impulse that I later regret	-2	-1	0	+1	+2
45.	When everything seems to be going wrong, I can still make good decisions	-2	-1	0	+1	+2
46.	When people I know do foolish things, I get embarrassed for them	-2	-1	0	+1	+2
47.	Seldom do I give in to my impulses	-2	-1	0	+1	+2
48.	I'm pretty stable emotionally	-2	-1	0	+1	+2

APPENDIX K

Seriousness of Illness Rating Scale

Directions: Below is a list of illnesses, injuries, and maladies that people sometimes experience. Read each item carefully.

I. Place an "X" beside each of the items that you have experienced IN THE PAST 6 MONTHS.

II. If the item does not apply to you, skip it and go on to the next item.

____ 1. HEADACHE
____ 2. MUSCULAR DYSTROPHY
____ 3. MUMPS
____ 4. HICCUPS
____ 5. HARDENING OF THE ARTERIES
____ 6. FAINTING
____ 7. HEMORRHOIDS
____ 8. HYPERVENTILATION
____ 9. DRUG ALLERGY
____ 10. OVERWEIGHT
____ 11. LOW BLOOD PRESSURE
____ 12. BOILS
____ 13. MONONUCLEOSIS
____ 14. ECZEMA
____ 15. CIRRHOSIS OF THE LIVER
____ 16. STARVATION
____ 17. HERPES
____ 18. KIDNEY INFECTION
____ 19. DIABETES
____ 20. DANDRUFF
____ 21. INFLAMMATION OF THE PANCREAS
____ 22. COLORBLINDNESS
____ 23. NEARSIGHTEDNESS
____ 24. BURSITIS
____ 25. ACCIDENTAL POISONING
____ 26. TUBERCULOSIS
____ 27. ALZHEIMER'S DISEASE
____ 28. CHICKEN POX
____ 29. ARTHRITIS
____ 30. HAY FEVER
____ 31. BED SORES
____ 32. DIARRHEA
____ 33. SYPHILIS
____ 34. HERNIA
____ 35. SHINGLES (chest rash usually related to chicken pox)
____ 36. CARBUNCLE (inflammation of tissue that is more painful than a boil)
____ 37. EPILEPSY
____ 38. COMA
____ 39. SCABIES (a contagious skin disease caused by a parasite or mite)
____ 40. LARYNGITIS
____ 41. ASTIGMATISM
____ 42. COLLAPSED LUNG
____ 43. GOUT (painful swelling of the joints of feet and hands)
____ 44. APPENDICITIS
____ 45. FARSIGHTEDNESS
____ 46. DIZZINESS
____ 47. PSORIASIS
____ 48. CORNS
____ 49. BLOOD CLOT IN THE LUNG
____ 50. HIGH BLOOD PRESSURE
____ 51. SORE THROAT
____ 52. CHEST PAIN
____ 53. BAD BREATH
____ 54. DEAFNESS
____ 55. WHOOPING COUGH
____ 56. TONSILLITIS
____ 57. BLINDNESS
____ 58. MEASLES
____ 59. CONSTIPATION
____ 60. GALLSTONES
____ 61. RINGWORM
____ 62. HIV INFECTION
____ 63. INFECTED EYE
____ 64. IRREGULAR HEART BEAT
____ 65. HEPATITIS
____ 66. HEARTBURN
____ 67. HEATSTROKE
____ 68. BURNS

____ 69. FROSTBITE
____ 70. HEART ATTACK
____ 71. BRONCHITIS
____ 72. STROKE
____ 73. SLIPPED DISK
____ 74. PNEUMONIA
____ 75. SUNBURN
____ 76. VARICOSE VEINS
____ 77. INABILITY TO HAVE SEXUAL INTERCOURSE
____ 78. STY
____ 79. BRAIN INFECTION
____ 80. GOITER (enlarged thyroid gland)
____ 81. GONORRHEA
____ 82. PEPTIC ULCER
____ 83. TUMOR IN THE SPINAL CORD
____ 84. SINUS INFECTION
____ 85. BLEEDING IN THE BRAIN
____ 86. ANEMIA
____ 87. BLOOD CLOT IN BLOOD VESSELS
____ 88. ACNE
____ 89. MIGRAINE
____ 90. ABSENCE OF SEXUAL PLEASURE
____ 91. CUMULATIVE TRAUMA DISORDER (carpal tunnel syndrome, tendinitis, etc.)
____ 92. EMPHYSEMA
____ 93. KIDNEY STONES
____ 94. UREMIA (toxins in the blood resulting from kidney problems)
____ 95. GLAUCOMA
____ 96. ASTHMA
____ 97. THYROID PROBLEMS
____ 98. CONGENITAL HEART DEFECT
____ 99. TOOTHACHE
____ 100. NOSEBLEED
____ 101. BACK PAIN
____ 102. COMMON COLD
____ 103. CEREBRAL PALSY
____ 104. MULTIPLE SCLEROSIS
____ 105. INFECTION OF THE MIDDLE EAR
____ 106. CANCER
____ 107. WARTS
____ 108. LEUKEMIA
____ 109. COLD SORE, CANKER SORE
____ 110. PARKINSON'S DISEASE
____ 111. HEART FAILURE

Women Only:
____ 112. PAINFUL MENSTRUATION
____ 113. MENOPAUSE
____ 114. ENDOMETRIOSIS
____ 115. INCREASED MENSTRUAL FLOW
____ 116. OVARIAN CYST
____ 117. FIBROIDS OF THE UTERUS
____ 118. ABORTION
____ 119. NO MENSTRUAL PERIOD

APPENDIX L

Demographic and Background Information Form

Please fill in or circle the response that best describes you.

A. Age: _____ years

B. Sex:
1. MALE
2. FEMALE

C. Ethnicity:
1. CAUCASIAN
2. AFRICAN AMERICAN
3. NATIVE AMERICAN
4. ASIAN AMERICAN
5. HISPANIC/MEXICAN AMERICAN
6. OTHER (specify):
_____

D. Marital status:
1. MARRIED
2. REMARRIED
3. WIDOWED
4. SEPARATED
5. DIVORCED
6. NEVER MARRIED

E. Religious preference:
1. PROTESTANT
2. CATHOLIC
3. JEWISH
4. ISLAMIC
5. LATTER-DAY SAINTS
6. OTHER (specify):
_____
7. NONE

F. Highest level of education completed:
1. SOME HIGH SCHOOL
2. HIGH SCHOOL
3. SOME COLLEGE OR SPECIALIZED TRAINING
4. ASSOCIATE'S DEGREE
5. BACHELOR'S DEGREE
6. MASTER'S DEGREE
7. DOCTORATE
8. OTHER (specify):
_____

G. Present occupation:
_____

H. Length of time at present occupation:
_____
(years and/or months)

I. Annual Income:
1. $ 0,000 - $ 9,999
2. $10,000 - $19,999
3. $20,000 - $29,999
4. $30,000 - $39,999
5. $40,000 - $49,999
6. $50,000 - $59,999
7. $60,000 - $69,999
8. MORE THAN $70,000

J. How many appointments have you made with a health care professional for your own physical health problems in the past 6 months?

_____ times

K. **How many days have you been absent from work in the past 6 months due to your own physical health problems?**

_____ **days**

L. **How many times have you been hospitalized for physical health problems in the past 6 months?**

_____ **times**

M. **Do you have any permanent physical handicaps or disabilities?**

1. **NO**
2. **YES (Please explain in the space provided below.)**

LIST OF REFERENCES

LIST OF REFERENCES

Aldwin, C. M., Levenson, M. R., Spiro, A., & Bosse, R. (1989). Does emotionality predict stress? Findings from the Normative Aging Study. Journal of Personality and Social Psychology, 56(4), 618-624.

Allred, K. D., & Smith, T. W. (1989). The hardy personality: Cognitive and physiological responses to evaluative threat. Journal of Personality and Social Psychology, 56(2), 257-266.

Baron, R. M., & Kenny, D. A. (1986). The moderator-mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. Journal of Personality and Social Psychology, 51(6), 1173-1182.

Barry, B. A. (1988). Hardiness as a mediator between stressors and life satisfaction in the elderly: A path analytic study. Unpublished doctoral dissertation, Hofstra University, Hempstead, New York.

Baum, A., & Grunberg, N. E. (1991). Gender, stress, and health. Health Psychology, 10(2), 80-85.

Blazer, D. G., & Houpt, J. L. (1979). Perception of poor health in the healthy older adult. Journal of the American Geriatrics Society, 27, 330-334.

Bollen, K. A. (1989). Structural equations with latent variables. New York: John Wiley & Sons.

Brett, J. F., Brief, A. P., Burke, M. J., George, J. M., & Webster, J. (1990). Negative affectivity and the reporting of stressful life events. Health Psychology, 9(1), 57-68.

Byrne, B. M. (1989). A primer for LISREL: Basic applications and programming for confirmatory factor analytic models. New York: Springer-Verlag.

Carver, C. S. (1989). How should multifaceted constructs be tested? Issues illustrated by self-monitoring, attributional style, and hardiness. Journal of Personality and Social Psychology, 56(4), 577-585.

Carver, C., & Ganellen, R. (1983). Depression and components of punitiveness: High standards, self-criticism, and overgeneralization. Journal of Abnormal Psychology, 92, 330-337.

Cohen, J. (1988). Statistical power analysis for the behavioral sciences (2nd ed.). Hillsdale, NJ: Lawrence Erlbaum Associates, Publishers.

Cohen, S., & Edwards, J. R. (1989). Personality characteristics as moderators of the relationship between stress and disorder. In R. W. J. Neufeld (Ed.), Advances in the investigation of psychological stress (pp. 235-283). NY: John Wiley & Sons.

Cohen, S., & Williamson, G. M. (1991) Stress and infectious disease in humans. Psychological Bulletin, 109(1), 5-24.

Contrada, R. J. (1989). Type A behavior, personality hardiness, and cardiovascular responses to stress. Journal of Personality and Social Psychology, 57(5), 895-903.

Contrada, R. J., Leventhal, H., & O'Leary, A. (1991). Personality and health. In L.A. Pervin (Ed.), Handbook of personality: Theory and research (pp. 638-669). New York: The Guilford Press.

Costa, P. T., Jr., & McCrae, R. R. (1980). Somatic complaints in males as a function of age and neuroticism: A longitudinal analysis. Journal of Behavioral Medicine, 3, 245-257.

Costa, P. T., Jr., & McCrae, R. R. (1985a). Hypochondriasis, neuroticism, and aging: When are somatic complaints unconfounded? American Psychologist, 40, 19-28.

Costa, P. T., Jr., & McCrae, R. R. (1985b). The NEO-Personality Inventory manual. Odessa, FL: Psychological Assessment Resources.

Costa, P. T., Jr., & McCrae, R. R. (1987). Neuroticism, somatic complaints, and disease: Is the bark worse than the bite? Journal of Personality, 55(2), 299-316.

Costa, P. T., Jr., & McCrae, R. R. (1989). NEO-PI/FFI manual supplement. Odessa, FL: Psychological Assessment Resources.

Delongis, A., Coyne, J. C., Dakof, G., Folkman, S., & Lazarus, R. S. (1982). Relationship of daily hassles, uplifts, and major life events to health status. Health Psychology, 1(2), 119-136.

Diamond, E. L. (1982). The role of anger and hostility in essential hypertension and coronary heart disease. Psychological Bulletin, 92, 410-433.

Dienstbier, R. A. (1989). Arousal and physiological toughness: Implications for mental and physical health. Psychological Review, 96(1), 84-100.

Dillman, D. A. (1978). Mail and telephone surveys: The total design method. New York: John Wiley & Sons.

Dohrenwend, B. S., & Dohrenwend, B. P. (1981). Formulation of the issues. In B.S. Dohrenwend & B.P. Dohrenwend, B.P. (Eds.), Stressful life events and their contexts (pp. 1-27). NY: Prodist. (Reprinted 1983, New Brunswick, NJ: Rutgers University Press).

Dohrenwend, B. S., Dohrenwend, B. P., Dodson, M., & Shrout, P. E. (1984). Symptoms, hassles, social supports, and life events: Problem of confounded measures. Journal of Abnormal Psychology, 93(2), 222-230.

Dohrenwend, B. S., Krasnoff, L., Askenasy, A. R., & Dohrenwend, B. P. (1978). Exemplification of a method for scaling life events: The PERI Life Events Scale. Journal of Health and Social Behavior, 19, 205-229.

Dohrenwend, B. P., Link, B. G., Kern, R., Shrout, P., & Markowitz, J. (1990). Measuring life events: The problem of variability within life categories. Stress Medicine, 6, 179-187.

Dohrenwend, B. P., & Shrout, P. E. (1985). "Hassles" in the conceptualization and measurement of life stress variables. American Psychologist, 40(7), 780-785.

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

Fassinger, R. E. (1987). Use of structural equation modeling in counseling psychology research. Journal of Counseling Psychology, 34(6), 425-436.

Francis, D. J. (1988). An introduction to structural equation models. Journal of Clinical and Experimental Neuropsychology, 10(5), 623-639.

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

Friedman, M., & Rosenman, R. H. (1974). Type A behavior and your pattern. New York: Knopf.

Funk, S. C., & Houston, B. K. (1987). A critical analysis of hardiness scales validity and utility. Journal of Personality and Social Psychology, 53(3), 572-578.

Ganellan, R. J., & Blaney, P. H. (1984). Hardiness and social support as moderators of the effects of life stress. Journal of Personality and Social Psychology, 47(1), 156-163.

Gill, M. J., & Harris, S. L. (1991). Hardiness and social support as predictors of psychological discomfort in mothers of children with autism. Journal of Autism and Developmental Disorders, 21(4), 407-416.

Gorsuch, R. L. (1983). Factor analysis (2nd ed.). Hillsdale, NJ: Lawrence Erlbaum Associates, Publishers.

Gray, J. A. (1981). A critique of Eysenck's theory of personality. In. H.J. Eysenck (Ed.), A model for personality (pp. 246-276). New York: Springer Press.

Hannah, T. E., & Morrissey, C. (1987). Correlates of psychological hardiness in Canadian adolescents. The Journal of Social Psychology, 127(4), 339-344.

Hardiness Institute. (1985). Personal Views Survey. Chicago, IL: Hardiness Institute.

Harrell, J. P. (1980). Psychological factors and hypertension: A status report. Psychological Bulletin, 87, 482-501.

Hinkle, L. E., Jr. (1974). The effect of exposure to culture change, social change, and changes in interpersonal relationships on health. In B.S. Dohrenwend & B.P. Dohrenwend (Eds.), Stressful life events: Their nature and effects (pp. 9-44). New York: Wiley.

Holahan, C. J., & Moos, R. H. (1985). Life stress and health: Personality, coping, and family support in stress resistance. Journal of Personality and Social Psychology, 49(3), 739-747.

Holmes, T. H., & Rahe, R. H. (1967). The Social Readjustment Rating Scale. Journal of Psychosomatic Research, 11, 213-218.

Holroyd, K. A., & Coyne, J. (1987). Personality and health in the 1980's: Psychosomatic medicine revisited. Journal of Personality, 55(2), 359-375.

Holt, P., Fine, M. J., & Tollefson, N. (1987). Mediating stress: Survival of the hardy. Psychology in the Schools, 24, 51-58.

Hudgens, R. (1974). Personal catastrophe and depression: A consideration of the subject with respect to medically ill adolescents, and a requiem for retrospective life event studies. In B. S. Dohrenwend & B. P. Dohrenwend (Eds.), Stressful life events: Their nature and effects (pp. 110-134). New York: Wiley.

Hughes, M., Price, R., & Marrs, D. (1986). Linking theory construction and theory testing: Models with multiple indicators of latent variables. Academy of Management Review, 11, 128-144.

Hull, J. G., VanTreuren, R. R., & Propsom, P.M. (1988). Attributional style and the components of hardiness. Personality and Social Psychology Bulletin, 14(3), 505-513.

Hull, J. G., VanTreuren, R. R., & Virnelli, S. (1987). Hardiness and health: A critique and alternative approach. Journal of Personality and Social Psychology, 53(3), 518-530.

James, L. R., & Brett, J. M. (1984). Mediators, moderators, and tests for mediation. Journal of Applied Psychology, 69(2), 307-321.

Joreskog and Sorbom/SPSS Inc. (1989). LISREL 7: A guide to the program and applications (2nd ed.). Chicago, IL: SPSS Inc.

Jorgensen, R. S., & Richards, C. S. (1989). Negative affect and the reporting of physical symptoms among college students. Journal of Counseling Psychology, 36(4), 501-504.

Kanner, A. D., Coyne, J. C., Schaeffer, C., & Lazarus, R. (1981). Comparison of two modes of stress measurement: Daily hassles and uplifts versus major life events. Journal of Behavioral Medicine, 4(1), 1-39.

Keane, A., DuCette, J., & Adler, D. C. (1985). Stress in ICU and non-ICU nurses. Nursing Research, 34(4), 231-236.

Keehn, R. J., Goldberg, I. D., & Beebe, G. W. (1974). Twenty-four year mortality follow-up of army veterans with disability separations of psychoneurosis in 1944. Psychosomatic Medicine, 36, 27-46.

Kerwin, M. L., Howard, G. S., Maxwell, S. E., & Borkowski, J. G. (1987). Implications of covariance structure analysis (LISREL) versus regression models for counseling research. The Counseling Psychologist, 15, 287-310.

Kessler, R., Brown, R., & Broman, C. (1981). Sex differences in psychiatric help seeking: Evidence from four large surveys. Journal of Health and Social Behavior, 22, 49-64.

Kobasa, S. C. (1979a). Personality and resistance to illness. American Journal of Community Psychology, 7(4), 413-423.

Kobasa, S. C. (1979b). Stressful life events, personality, and health: An inquiry into hardiness. Journal of Personality and Social Psychology, 37(1), 1-11.

Kobasa, S. C. (1982a). Commitment and coping in stress resistance among lawyers. Journal of Personality and Social Psychology, 42(4), 707-717.

Kobasa, S. C. (1982b). 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: Lawrence Erlbaum Associates, Publishers.

Kobasa, S. C., Hilker, R. R. J., & Maddi, S. R. (1979). Who stays healthy under stress? Journal of Occupational Medicine, 21(9), 595-598.

Kobasa, S. C., Maddi, S. R., & Courington, S. (1981). Personality and constitution as mediators in the stress-illness relationship. Journal of Health and Social Behavior, 22, 368-378.

Kobasa, S. C., Maddi, S. R., & Kahn, S. (1982a). Hardiness and health: A prospective study. Journal of Personality and Social Psychology, 42(1), 168-177.

Kobasa, S. C., Maddi, S. R., & Puccetti, M. C. (1982b). Personality and exercise as buffers in the stress-illness relationship. Journal of Behavioral Medicine, 5(4), 391-404.

Kobasa, S. C., Maddi, S. R., Puccetti, M. C., & Zola, M. A. (1985). Effectiveness of hardiness, exercise and social support as resources against illness. Journal of Psychosomatic Research, 29(5), 525-533.

Kobasa, S. C., Maddi, S. R., & Zola, M. A. (1983). Type A and hardiness. Journal of Behavioral Medicine, 6(1), 41-51.

Kobasa, S. C., & Puccetti, M. C. (1983). Personality and social resources in stress resistance. Journal of Personality and Social Psychology, 45(4), 839-850.

Kohn, P. M., Lafreniere, K., & Gurevich, M. (1991). Hassles, health, and personality. Journal of Personality and Social Psychology, 61(3), 478-482.

Larsen, R. J., & Ketelaar, T. (1991). Personality and susceptibility to positive and negative emotional states. Journal of Personality and Social Psychology, 61(1), 132-140.

LaRue, A., Bank, L., Jarvik, L., & Hetland, M. (1979). Health in old age: How do physicians' ratings and self-ratings compare? Journal of Gerontology, 34, 687-691.

Lazarus, R. S., DeLongis, A., Folkman, S., & Gruen, R. (1985). Stress and adaptational outcomes: The problem of confounded measures. American Psychologist, 40(7), 770-779.

Lazarus, R. S., & Folkman, S. (1984). Stress, appraisal, and coping. New York: Springer.

Lazarus, R. S., & Folkman, S. (1989). Manual for the Hassles and Uplifts Scales (Research Edition). Palo Alto, CA: Consulting Psychologists Press.

Leak, G. K., & Williams, D. E. (1989). Relationship between social interest, alienation, and psychological hardiness. Individual Psychology, 45(3), 369-375.

Lee, H. J. (1991). Relationship of hardiness and current life events to perceived health in rural adults. Research in Nursing and Health, 14, 351-359.

Loehlin, J. (1987). Latent variable models: In introduction to factor, path, and structural analyses. Hillsdale, NJ: Lawrence Erlbaum Associates, Publishers.

Long, J. S. (1983). Confirmatory factor analysis. Beverly Hills, CA: Sage Publications.

Maddi, S. R., Bartone, P. T., & Puccetti, M. C. (1987). Stressful events are indeed a factor in physical illness: Reply to Schroeder and Costa (1984). Journal of Personality and Social Psychology, 32, 833-843.

Maddi, S. R., & Kobasa, S. C. (1981). Intrinsic motivation and health. In H.I. Day (Ed.) Advances in intrinsic motivation and aesthetics (pp. 299-321). New York: Plenum Press.

Maddi, S. R., & Kobasa, S. C. (1984). The hardy executive: Health under stress. Homewood, IL: Dow Jones-Irwin.

Maddi, S. R., Kobasa, S. C., & Hoover, M. (1979). An alienation test. Journal of Humanistic Psychology, 19(4), 73-76.

Manning, M. R., Williams, R. F., & Wolfe, D. M. (1988). Hardiness and the relationship between stressors and outcomes. Work and Stress, 2(3), 205-216.

Marija J. Norusis/SPSS Inc. (1990). SPSS base system user's guide. Chicago, IL: SPSS Inc.

Marsh, H. W., Balla, J. R., & McDonald, R. P. (1988). Goodness-of-fit indexes in confirmatory factor analysis: The effect of sample size. Psychological Bulletin, 103(3), 391-410.

Massey, V. M. (1989). Relationship between powerlessness, hardiness, diagnosis, and hopelessness in persons hospitalized for cholecystectomy or metastic carcinoma. Unpublished doctoral dissertation, University of Texas, Austin, Texas.

McCrae, R. R., Bartone, P. T., & Costa, P. T., Jr. (1976). Age, anxiety, and self-reported health. Aging and Human Development, 7, 49-58.

McCrae, R. R., & Costa, P. T., Jr. (1985). Comparison of EPI and psychoticism scales with measures of the five-factor model of personality. Personality and Individual Differences, 6, 587-597.

McCrae, R. R., & Costa, P. T., Jr. (1986). Personality, coping, and coping effectiveness in an adult sample. Journal of Personality, 54, 385-405.

McCrae, R. R., & Costa, P. T., Jr. (1987). Validation of the five-factor model of personality across instruments and observers. Journal of Personality and Social Psychology, 52(1), 81-90.

McCrae, R. R., & Costa, P. T. (1991). Adding Liebe und Arbeit: The full five-factor model and well-being. Bulletin of Personality and Social Psychology, 17, 227-232.

McNeil, K., Kozma, A., Stones, M. J., & Hannah, E. (1986). Measurement of psychological hardiness in older adults. Canadian Journal on Aging, 5(1), 43-48.

Monroe, S. M. (1983). Major and minor life events as predictors of psychological distress: Further issues and findings. Journal of Behavioral Medicine, 6(2), 189-205.

Morrissey, C., & Hannah, T. E. (1986). Measurement of psychological hardiness in adolescents. Journal of Genetic Psychology, 148(3), 393-397.

Nowack, K. M. (1986). Type A, hardiness, and psychological distress. Journal of Behavioral Medicine, 9(6), 537-548.

Nunnally, J. C. (1978). Psychometric theory. New York: McGraw-Hill.

O'Leary, A. (1990). Stress, emotion, and human immune functioning. Psychological Bulletin, 108(3), 363-382.

Ormel, J., & Wohlfarth, T. (1991). How neuroticism, long-term difficulties, and life situation changes influence psychological distress: A longitudinal model. Journal of Personality and Social Psychology, 60(5), 744-755.

Pennebaker, J. W. (1982). The psychology of physical symptoms. New York: Springer-Verlag.

Peterson, C., & Seligman, M. E. P. (1987). Explanatory style and illness. Journal of Personality, 55(2), 237-265.

Pollock, S. E. (1989). The hardiness characteristic: A motivating factor in adaptation. Advances in Nursing Sciences, 11(2), 53-62.

Pollock, S. E., & Duffy, M. E. (1990). The Health-related Hardiness Scale: Development and psychometric analysis. Nursing Research, 39(4), 218-222.

Rabkin, J. G., & Struening, E. L. (1976a). Life events, stress, and illness. Science, 194, 1013-1020.

Rabkin, J. G., & Struening, E. L. (1976b). Social change, stress, and illness: A selective literature review. Psychoanalysis and Contemporary Science, 5, 573-624.

Raphael, K. G., Cloitre, M., & Dohrenwend, B. P. (1991). Problems with recall and misclassification with checklist methods of measuring stressful life events. Health Psychology, 10(1), 62-74.

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: John Wiley & Sons.

Rhodewalt, F., & Agustsdottir, S. (1984). On the relationship of hardiness to the Type A behavior pattern: Perception of life events versus coping with life events. Journal of Research on Personality, 18, 212-223.

Rhodewalt, F., & Zone, J. B. (1989). Appraisal of life change, depression, and illness in hardy and nonhardy women. Journal of Personality and Social Psychology, 56(1), 81-88.

Roth D. L., Wiebe, D. J., Fillingham, R. B., & Shay, K. A. (1989). Life events, fitness, hardiness, and health: A simultaneous analysis of proposed stress-resistance effects. Journal of Personality and Social Psychology, 57(1), 136-142.

Rowlison, T., & Felner, R. D. (1988). Major life events, hassles, and adaptation in adolescence: Confounding the conceptualization and measurement of life stress and adjustment revisited. Journal of Personality and Social Psychology, 55, 432-444.

Schmied, L. A., & Lawler, K. A. (1986). Hardiness, Type A behavior, and the stress-illness relation in working women. Journal of Personality and Social Psychology, 51(6), 1218-1223.

Schroeder, D. H., & Costa, P. T., Jr. (1984). Influence of life event stress on physical illness: Substantive effects or methodological flaws? Journal of Personality and Social Psychology, 46(4), 853-863.

Selye, H. (1956). The stress of life. New York: McGraw-Hill.

Shekelle, R. B., Raynor, W. J., Ostfeld, A. M. Garron, D. C., Bieliauskas, L. A., Liu, S. C., Maliza, C., & Paul, O. (1981). Psychological depression and 17-year risk of death from cancer. Psychosomatic Medicine, 43, 117-125.

Shepperd, J. A., & Kashani, J. H. (1991). The relationship of hardiness, gender, and stress to health outcomes in adolescents. Journal of Personality, 59(4), 747-768.

SPSS Inc. (1990). SPSS LISREL 7 and PRELIS user's guide and reference. Chicago, IL: SPSS Inc.

Stone, S. V., & Costa, P. T., Jr. (1990). Disease-prone personality or distress-prone personality? The role of neuroticism in coronary heart disease. In H.S. Friedman (Ed.), Personality and disease, (pp. 178-200). New York: John Wiley & Sons.

Stone, A., & Neale, J. (1984). New measure of daily coping: Development and preliminary results. Journal of Personality and Social Psychology, 46, 892-906.

Strelau, J. (1987). Emotion as a key concept in temperament research. Journal of Research in Personality, 21, 510-528.

Suls, J., & Rittenhouse, J. D. (1990). Models of linkages between personality and disease. In H.S. Friedman (Ed.), Personality and disease, (pp. 38-64). New York: John Wiley & Sons.

Suls, J., & Rittenhouse, J. D. (1987). Personality and physical health: An introduction. Journal of Personality, 55(2), 157-167.

Tabachnik, B. G., & Fidell, L. S. (1983). Using multivariate statistics. New York: Harper & Row, Publishers.

Tellegan, A. (1985). Structures of mood and personality and their relevance to assessing anxiety, with an emphasis on self-report. In A.J. Tuma & J. Mason (Eds.), Anxiety and the anxiety disorders (pp. 681-706). Hillsdale, NJ: Erlbaum.

Tessler, R., & Mechanic, D. (1978). Psychological distress and perceived health status. Journal of Health and Social Behavior, 19, 254-262.

Thompson, S. C. (1981). Will it hurt less if I can control it? A complex answer to a simple question. Psychological Bulletin, 90(1), 89-101.

Tucker, L. R., & Lewis, C. (1973). The reliability coefficient for maximum likelihood factor analysis. Psychometrika, 38, 1-10.

Wampold, B. E., & Freund, R. D. (1987). Use of multiple regression in counseling psychology research: A flexible data-analytic strategy. Journal of Counseling Psychology, 34(4), 372-382.

Watson, D. (1988). Intraindividual and interindividual analyses of positive and negative affect: Their relation to health complaints, perceived stress, and daily activities. Journal of Personality and Social Psychology, 54(6), 1020-1030.

Watson, D., & Clark, L. A. (1984). Negative affectivity: The disposition to experience aversive emotional states. Psychological Bulletin, 96, 465-490.

Watson, D., & Pennebaker, J. W. (1989). Health complaints, stress, and distress: Exploring the central role of Negative Affectivity. Psychological Review, 96(2), 234-254.

Watson, D., & Pennebaker, J. W. (in press). Situational, dispositional, and genetic basis of symptom reporting. In J.A. Skelton & R.T. Croyle (Eds.), Mental representations in health and illness. New York: Springer-Verlag.

Westman, M. (1990). The relationship between stress and performance: The moderating effect of hardiness. Human Performance, 3(3), 141-155.

Wiebe, D. J. (1991). Hardiness and stress moderation. A test of proposed mechanisms. Journal of Personality and Social Psychology, 60(1), 89-99.

Wiebe, D. J., & McCallum, D. M. (1986). Health practices and hardiness as mediators in the stress-illness relationship. Health Psychology, 5(5), 425-0438.

Wiebe, D. J., Williams, P. G., & Smith, T. W. (1991). Convergent and discriminant validity of the hardiness scales: Another look at the potential neuroticism confound. Unpublished manuscript. University of Utah, Department of Psychology, Salt Lake City.

Wiedenfeld, S. A., O'Leary, A., Bandura, A., Brown, S., Levine, S., & Raska, K. (1990). Impact of perceived self-efficacy in coping with stressors on components of the immune system. Journal of Personality and Social Psychology, 59(5), 1082-1094.

Wyler, A. R., Masuda, M., & Holmes, T. H. (1968). Seriousness of Illness Rating Scale. Journal of Psychosomatic Research, 11, 363-374.

Young, V. C. (1987). Hassles, uplifts, and life events as predictors of health. Unpublished doctoral dissertation, University of California, Berkeley, California.

Zika, S., & Chamberlain, K. (1987). Relation of hassles and personality to subjective well-being. Journal of Personality and Social Psychology, 53(1), 155-162.