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A longitudinal investigation of the factor structure of subjective well-being as measured by the Philadelphia Geriatric Center Morale Scale

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A LONGITUDINAL INVESTIGATION OF THE FACTOR STRUCTURE OF SUBJECTIVE WELL-BEING AS MEASURED BY THE PHILADELPHIA GERIATRIC CENTER MORALE SCALE

by

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This research examined the longitudinal stability of subjective well-being as measured by the Philadelphia Geriatric Center Morale Scale. Subjective well-being was hypothesized to have a hierarchical factor structure with a second order factor, subjective well-being, explaining variance in first order dimensions labeled agitation, lonely dissatisfaction, and attitude toward one's own aging. The latent constructs were measured by items composing the PGC scale. Maximum likelihood confirmatory factor analysis techniques were used to test the fit of the model.

Subjective well-being was investigated using a panel of older rural adults (N=195) surviving a ten-year, two-wave investigation. The first wave of data was collected in 1976 with 418 older rural adults ranging in age from 65-99 years. Survivors at the second wave, in 1986, ranged in age from 75-97 years.

Three hypotheses were addressed in this study. Results of the study provided limited support for the first hypothesis, examining the stability of subjective well-being over time. The correlation of subjective well-being over time was statistically significant but moderate.

The second hypothesis, testing the replication of subjective well-being factor structure at Time 1 and Time

2, also was supported by the data. The hierarchical factor structure of subjective well-being was replicated for Time 1 and Time 2. Variance in observable indicators of the PGC scale was accounted for by the first order factors at both Time 1 and Time 2. Variance in these first order factors, in turn, was explained by subjective well-being.

The third hypothesis, examining the fit of the model to the rural data, was supported. The longitudinal model provided a moderate fit of the model to the rural sample. These results provided support for the conceptualization of a hierarchical factor structure of subjective well-being.

The hypothesized hierarchical factor structure was found at Time 1 and Time 2 separately but the relationship of subjective well-being across time was moderate indicating that, while limited supported for stability was found, changes did occur over time.

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INTRODUCTION

Statement of the Problem

Subjective well-being has been a focus of interest among social gerontologists for the past four decades (Larson, 1978). Of the many instruments designed to measure this construct, the Philadelphia Geriatric Center Morale Scale (PGC scale) (Lawton, 1975) has remained one of the most popular. The scale (Lawton, 1972), originally consisting of 22 items, was revised and reduced to 17 items by Lawton in 1975. The revised version of the scale is composed of three subscales labeled agitation, lonely dissatisfaction, and attitude toward one's own aging (Lawton, 1975). The PGC scale has remained a frequently used instrument for the measurement of subjective well-being since its revision. In general and particularly with regard to the PGC scale, questions concerning the interrelationships of the dimensions to subjective well-being have only recently begun to be studied and no studies have reported results concerning subjective well-being factor structure over time.

Liang and associates (1983, 1985, 1987a, 1987b) used structural equation modeling techniques to test the goodness of fit of subjective well-being factor structure as measured by the PGC scale. The resulting model

supported the hypothesis that subjective well-being is a hierarchical construct composed of both unidimensional and multidimensional elements. A unidimensional construct, subjective well-being, is placed at the highest level of the model and is labeled a second order latent construct. "The hierarchical model specifies dependency relationships among attributes of the construct; consequently, the anticipated second order solution is a dominant factor (a) that accounts for a substantial proportion of the total variance, and (b) on which all scales representing global and sub-global variables load highly" (Stones & Kozma, 1985, p. 22). This unidimensional construct of subjective well-being acts as an independent variable explaining significant amounts of variance in the multidimensional first order latent constructs of agitation, lonely dissatisfaction, and attitudes toward one's own aging. The individual items composing the Philadelphia Geriatric Center Morale Scale serve as observable or measured indicators of these hierarchical latent variables. A relatively good fit for this hierarchical conceptualization of subjective well-being was obtained in all four Liang and associate studies using the PGC scale as a measure of subjective well-being.

The first study by Liang and Bollen (1983) examined the hierarchical factor structure of subjective well-being using data from the 1968 National Senior Citizens Survey.

Subjective well-being was posited to be an overall construct responsible for variance among three subscales (agitation, lonely dissatisfaction, and attitude toward one's own aging). Liang and Bollen (1983), using 15 of the 17 items composing the PGC scale to test their hypothesized hierarchical model, reported that subjective well-being was responsible for substantial amounts of variance in the multidimensional components: agitation, 61%; lonely dissatisfaction, 90%; and attitude toward one's own aging, 74%. They stated that the multidimensional first order constructs of lonely dissatisfaction, attitude toward one's own aging, and agitation were responsible for covariance among the 15 items or observed indicators of the PGC scale. In turn, the covariance of the three components was explained by the second order construct, subjective well-being, thereby, supporting a hierarchical or nested factor structure.

More recently, other studies using different measures of subjective well-being, have supported a hierarchical conceptualization of well-being (Andrews & McKennell, 1980; Andrews & Withey, 1976; Kammann, Farry, & Herbison, 1984; Lawton, 1983; McKennell, 1978; Stones & Kozma, 1985). In specific support of Liang and his associates, Stones and Kozma (1985) stated that "the studies to address most satisfactorily the issues posed (in conceptualization of the subjective well-being construct) are those of Liang and

Bollen (1983) and Liang (1984) whose findings support a hierarchical model" (p. 24).

Liang and associates have conducted three subsequent studies using the PGC scale which investigated the replicability of the hierarchical factor structure of subjective well-being (1985, 1987a, 1987b). In the first of these studies, sex differences in the factor structure of well-being were examined (Liang & Bollen, 1985). They reported that although some statistically significant differences were found in the fit of the model according to sex, these were not of substantive importance in light of the large sample size and the ability to interpret several goodness of fit measures (Jöreskog & Sörbom, 1984), such as chi-square, the chi-square/df Ratio, the Goodness of Fit Index, the Adjusted Goodness of Fit Index, the Root Mean Square Residual, and the Total Coefficient of Determination, a measure somewhat analogous to R^2 in regression analyses.

The second of these studies examined the replicability of the hierarchical model cross culturally with Japanese and American subjects (Liang, Asano, Bollen, Kahana, & Maeda, 1987a). As with the earlier replication, they found a good fit for the hierarchical model to the data. Although this analysis was trimmed to 11 of Lawton's 17 items to achieve adequate fit, no major differences were

found in the factor structure of the model among Japanese and Americans.

Liang et al.'s third replication investigated the factor structure of well-being using black/white comparisons (Liang, Lawrence, & Bollen, 1987b). Unlike earlier replications, results from this analysis did show some significant differences in the fit of the hierarchical factor structure of subjective well-being according to race. These differences, however, were not so great as to produce a totally unacceptable fit of the hierarchical model of subjective well-being to the data.

Three conclusions can be drawn from this series of investigations. First, the hierarchical factor structure of subjective well-being as measured by the PGC scale replicated relatively well in specific older population subgroup comparisons. Second, the goodness of fit of the measurement model to the data indicated that in each case subjective well-being was responsible for significant amounts of variance in agitation, lonely dissatisfaction, and attitude toward one's own aging. And third, the first order constructs of lonely dissatisfaction, attitude toward one's own aging, and agitation are responsible for covariance among items of the PGC scale, with the exception of the two items found to have measurement error in the black/white comparisons.

Additional research is needed, however, to further demonstrate the replicability of subjective well-being hierarchical factor structure among other subgroups of the elderly population. Liang recommended that additional studies be conducted among subgroups using the PGC scale (Liang & Bollen, 1983, 1985; Liang et al., 1987b). One such group is the rural elderly. Available data suggest that life perspectives may vary among older rural and urban adults (Fengler & Jensen, 1981; Kozma & Stones, 1983; Krout, 1986; Lee & Lassey, 1980; Michalos, Fuller, Mage, Matthews, & Wood, 1980). The life experiences of elderly rural adults differ from those of urban ones. Older rural adults report higher well-being than their urban counterparts even though they have fewer services and medical facilities (Bastida, 1984), poorer physical health (Dahlsten & Shank, 1979; Greene, Salber, & Feldman, 1978; McCoy & Brown, 1978; Nelson, 1980; Preston & Mansfield, 1984), greater economic hardships (Bastida, 1984; Lee & Lassey, 1980; National Rural Center, 1981; Nelson, 1980), more substandard housing (Mikesell, 1977), and less public transportation (Bastida, 1984; Cutler, 1975). This unique subgroup of the population will help to provide additional information concerning the factor structure of subjective well-being.

Also important is information on the replicability of the hierarchical factor structure of subjective well-being

over time. Although levels of well-being have been found to remain relatively stable throughout adulthood (Costa, Zonderman, McCrae, Cornoni-Huntley, Locke, & Barbano, 1987), no information is currently available concerning the longitudinal replicability of well-being factor structure. It is possible that the amounts of variance explained in agitation, lonely dissatisfaction, and attitude toward one's own aging by subjective well-being do not remain constant over time.

The research questions of this study were designed to address the replicability of the hierarchical factor structure of subjective well-being over time using a rural sample of older adults. The following questions addressed the purposes of the study:

1. Does the hierarchical factor structure of subjective well-being as measured by the Philadelphia Geriatric Center Morale Scale replicate with a rural sample?
2. Does the hierarchical factor structure of subjective well-being as measured by the Philadelphia Geriatric Center Morale Scale replicate over a ten-year period of time?

Hypotheses

The following hypotheses were used to examine the research questions of this study:

H_1: Subjective well-being, the second order factor in the hierarchical factor structure model, will be significantly related at Time 1 and Time 2.

H_2: The hierarchical factor structure of subjective well-being will be significant at Time 1 and Time 2.

H_3: The hierarchical factor structure of subjective well-being will be a good fit for a rural sample of older adults.

Assumptions

This study was based upon the following assumptions:

1. The Philadelphia Geriatric Center Morale is an appropriate measure of subjective well-being among older adults.
2. The interrelationships among agitation, lonely dissatisfaction, and attitude toward one's own aging result because of the existence of a second order construct, subjective well-being.

3. The items composing the Philadelphia Geriatric Center Morale Scale represent measured variables of the latent constructs subjective well-being, agitation, lonely dissatisfaction, and attitude toward one's own aging.

Definition of Terms

For the purposes of this study, the following definitions were used:

Subjective Well-Being: an individual's perception of his/her overall sense "of satisfaction and positive mental health that is commonly thought to be the best indicator of unobservable constructs such as self-esteem or ego strength" (Lawton, 1983, p. 66).

Agitation: a dimension of subjective well-being; an individual's subjective evaluation of his/her present worry, anger, or frustration (Beckman, 1981); negative affect (Lawton, Kleban, & di Carlo, 1984); psychiatric symptoms (George, 1981; Lawton, 1977).

Lonely Dissatisfaction: a dimension of subjective well-being; an individual's assessment of general quality of life (George, 1981; Lawton, 1977).

Attitude toward One's Own Aging: a dimension of subjective well-being; age-related morale (Beckman, 1981; George, 1981; Lawton et al., 1984; Liang & Bollen, 1985).

First Order Construct: an unobserved or latent variable explaining the association between observed or measured indicators (Jöreskog & Sörbom, 1984; Liang & Bollen, 1983, 1985).

Second Order Construct: an unobserved or latent variable explaining the association among a lower ordered set of latent variables (Jöreskog & Sörbom, 1984; Liang & Bollen, 1983, 1985).

Limitations of the Study

This research examined the interrelationships among dimensions of subjective well-being at two points in time, the relationship of subjective well-being to the dimensions of agitation, lonely dissatisfaction, and attitude toward one's own aging at these two points in time, and the relationship of subjective well-being at Time 1 to subjective well-being at Time 2. Limitations of the study should be acknowledged.

First, the measures of subjective well-being at Time 1 and Time 2 were ten years apart. The time frame of these measurements made it impossible to detect any changes in the measured variables which may have occurred during the intervening years.

Second, the older adults who did not survive the ten-year period were not included in the substantive analysis. In order to examine the relationship over time, measurements at both 1976 and 1986 were needed. The fact that they were omitted from the analysis means that some cases were excluded on a nonrandom basis. Anytime a portion of the sample becomes nonrandom, there is the potential for sample selection bias and "one risks confounding the substantive phenomenon of interest with the selection process" (Beck, 1983, p. 391). Maximum likelihood confirmatory factor analysis is a powerful analytic tool used to investigate latent/observable construct relationships but it does not allow for control of sample selection bias with a "hazard" or survival variable.

CHAPTER 2

REVIEW OF LITERATURE

Development and Use of the Philadelphia Geriatric Center Morale Scale

The original version of the PGC scale consisted of 22 items and was constructed specifically for use with older populations (Lawton, 1972). The scale is based upon a multidimensional conceptualization of subjective well-being. When describing the scale's development, Lawton described his scale as:

> "a really useful scale requir(ing) far easier response formats and wording than many previously used scales. The resulting Philadelphia Geriatric Center (PCG) Morale Scale consisted of 22 items, most of them in dichotomous response format, validated against adjustment ratings given by staff to several hundred residents of two homes for aged and an apartment building for the elderly" (1975, p. 85)."

The 1972 version of the scale was composed of six subscales--attitude toward one's own aging, agitation, lonely dissatisfaction, acceptance of status quo, optimism, and surgency (Lawton, 1972).

The six-factor scale, however, was difficult to replicate. A revision, reported by Lawton in 1975, trimmed the scale to 17 items. The revised scale retained three of the original factors--agitation, lonely dissatisfaction, and attitude toward one's own aging. These three dimensions of well-being were replicated with

some consistency by others (Morris & Sherwood, 1975; Schooler, 1970) and have remained the components of the scale to date. Lawton (1977) recommended that the scale be used "for normally responsive and marginally comprehending subjects, especially when there is interest in the separate dimensions of morale" (p. 4). Few researchers, however, have heeded Lawton's remarks concerning the multidimensionality of the scale.

The PGC scale has been used frequently since the 1975 revision (e.g., Atkinson, Kivett, & Campbell, 1986; Beckman, 1981; Kivett, 1988; Mancini & McKeel, 1986; Mancini & Orthner, 1980; Seelbach & Sauer, 1977; Scott & Kivett, 1985; Ward, Sherman, & LaGory, 1984). The popularity of this subjective well-being measure among social gerontologists is likely due to five characteristics. First, the multi-item format of the PGC scale has several advantages over single-item measures: a) reliability coefficients can be calculated when multiple items are available (McNeil, Stones, & Kozma, 1986); b) inherent measurement error can be partialed out; c) results are often skewed in single-item assessments because a single item is always scored in only one direction; d) it is possible to examine different aspects of well-being with the use of subsets or individual items; and e) information gained is not based on a single response (Diener, 1984).

Secondly, the summated score for the PGC scale has shown consistent reliability across a number of populations, i.e., alpha coefficients ranging from .75 to .85 (e.g., Mancini & McKeel, 1986; Ward et al., 1984). Third, the three subscales also have been reproduced consistently (George & Bearon, 1980; Liang & Bollen, 1983, 1985; Liang et al., 1987a, 1987b; Morris & Sherwood, 1975; Schooler, 1970). In addition, the reliabilities of the subscales--agitation, .85; lonely dissatisfaction, .85; and attitude toward one's own aging, .81--are reported to be among the highest for multi-item psychological well-being scales (McNeil et al., 1986). Correlations between the factors or subscales of subjective well-being are moderate: .39 between agitation and attitude toward one's own aging, .21 between attitude toward one's own aging and lonely dissatisfaction, and .34 between lonely dissatisfaction and agitation (Lawton, 1972), and .52 between lonely dissatisfaction and attitude toward one's own aging (Beckman & Houser, 1982). Such evidence supports the fact that the three subscales are interrelated but not identical, thereby measuring different dimensions of subjective well-being.

Fourth, in studies conducted by Lohmann (1977), the convergent validity of the Philadelphia Geriatric Center Morale Scale with nine other measures of well-being averaged .73. And fifth, as Lawton (1977) stated, the

response format of the scale is easy to use and the relatively short number of items makes it a convenient instrument to incorporate within investigations.

As this evidence suggests, there appears to be a "general consensus both within gerontology and its closest relatives, that well-being is a multidimensional concept" (Knapp, 1976, p. 575). The majority of studies investigating subjective well-being, however, have not addressed this multidimensionality. As a general rule, results concerning subjective well-being have been reported only on the more global measure with little attention being given to the subscales or dimensions of subjective well-being. In the specific case of the Philadelphia Geriatric Center Morale Scale, no studies could be located that examined the individual components of subjective well-being. Several researchers have voiced concern about the lack of attention social gerontologists have paid to this multidimensional nature of subjective well-being (Baldassare, Rosenfield, & Rook, 1984; Carp & Carp, 1983; Cherlin & Reeder, 1975; George, 1981; George & Bearon, 1980; Hoyt & Creech, 1983; Hoyt, Kaiser, Peters, & Babchuk, 1980; Lawton, 1983; Liang & Bollen, 1983; Liang et al., 1987a, 1987b; McNeil et al., 1986).

As these gerontologists have stated, ignoring the multidimensional characteristics of subjective well-being results in methodological as well as theoretical

weaknesses. First, estimates based on an incorrectly specified unidimensional construct may be severely biased (Liang & Bollen, 1983). Second, leaping to the broader construct, subjective well-being, ignores the importance of well-being to each dimension just as it ignores the interrelationships among these dimensions themselves (Huston & Robins, 1982). Third, it is possible that in predicting older adult subjective well-being the patterns of relative magnitude for predictors may vary across dimensions with some variables more important to one construct than to another. For example, frequency of social interaction may be more important to one component of subjective well-being than to another. In the specific case of the PGC scale, frequency of social interaction may be more important to lonely dissatisfaction than to agitation or attitude toward one's own aging.

Dimensionality of Subjective Well-Being

The only researchers to examine the Philadelphia Geriatric Center Morale Scale with the intent of investigating its dimensional factor structure have been Liang and associates (Liang & Bollen, 1983, 1985; Liang et al., 1987a, 1987b). In light of the popularity of this well-being scale, it is important that the reliability of its structure across and within populations be studied. The factor structure hypothesized by Liang and associates (1983, 1985, 1987a, 1987b) is a nested structure with one

global construct, subjective well-being, identified as the higher ordered latent variable. A second set of latent variables--agitation, lonely dissatisfaction, and attitude toward one's own aging--are labeled first order constructs. These unobserved variables are measured by the items, or observed indicators, of the PGC scale.

Subjective well-being is the second order, or higher level, construct responsible for correlations among the three dimensions or first-order constructs (agitation, lonely dissatisfaction, and attitude toward one's own aging). Liang and Bollen (1983, 1985) developed their conceptual model of subjective well-being with 15 of the 17 items of the PGC. They justified the omission of two items ("How much do you feel lonely?" and "I see enough of my friends and relatives") by concurring with Morris and Sherwood (1975) that these indicators measure a construct other than subjective well-being (Liang & Bollen, 1983). Using the 15-item scale, Liang and Bollen (1983) found support for a hierarchical conceptualization; well-being explained between 61% and 93% of the variance in the three dimensions. Each of the latent first order constructs was subsequently measured by a number of observed scale items: agitation, 6 items; lonely dissatisfaction, 4 items; and attitude toward one's own aging, 5 items. Results from this analysis of the factor structure of the Philadelphia Geriatric Center Morale Scale showed that:

1. subjective well-being explained substantial amounts of variance in the three dimensions: agitation, 61%; lonely dissatisfaction, 90%; and attitude toward one's own aging, 74%.
2. the hierarchical factor structure model for subjective well-being replicated across four randomly divided subgroups of a national sample.

Subsequent analyses investigating the factor structure of the Philadelphia Geriatric Center Morale Scale showed that the scale was relatively stable across subgroups of the elderly population. Although Liang and Bollen reported in the first of their replications (1985) that some statistically significant differences were found according to sex, these were of no substantive importance. Male/female differences were found in measurement error variance and first order factor loadings. In view of their large sample size and the interpretation of a number of goodness of fit measures, Liang and Bollen (1985) concluded that these small differences "would not have a significant impact" (p. 476).

Liang and associates continued to examine the factor structure of the PGC scale in two recent 1987 studies. In the first of these studies, the factor structure of the PGC scale was compared cross-culturally with Japanese and

American subjects. Liang et al. (1987a) found that the 15-item PGC scale used in their earlier work did not provide a good fit to the Japanese data. Analyses indicated that four of the 15 items were problematic. Two items, "I am afraid of a lot of things" and "Life is hard for me most of the time" had factor complexities (or standardized loadings) greater than 1.0 while two additional items, "I get mad more than I used to" and "Things are better than I thought" had relatively low standardized factor loadings (less than .4). Liang and associates modified their former model in two ways: (a) they eliminated the four items that were problematic within the Japanese sample, and (b) they incorporated five pairs of correlated measurement error. This modified model, using 11 of the 17 original items in the PGC scale, provided an adequate fit of the hypothesized model to the Japanese as well as the American data. Although the final model for this cross-cultural study used only 11 items from the PGC scale, the revised model indicated stability of factor structure among the Japanese as well as American data. The model used for this investigation, while short four items, resembled that reported in the two earlier studies by Liang and Bollen (1983, 1985).

The second 1987 study (Liang et al., 1987b), unlike the cross-cultural study, did show significant subgroup differences. Liang et al. investigated racial differences

in the factor structure of the PGC scale as well as the Life Satisfaction Index-A (Neugarten, Havighurst, & Tobin, 1961). Results from this analysis showed that the Philadelphia Geriatric Center Morale Scale had consistent black/white differences in the measurement error variance of two items ("I am afraid of a lot of things" and "Life is hard for me"). The race differences found in these measurement errors mean that these two items may have different reliabilities for blacks and whites. According to Liang et al. (1987b), "the reliabilities of these two items in the black samples are only one-half of the magnitude of their white counterparts. . . . the meaning of race comparison would be ambiguous because the observed race difference is confounded by the difference in measurement structure" (p. 427).

The four studies conducted by Liang and associates (1983, 1985, 1987a, 1987b) underscore the importance of rigorous investigation of measurement models. The significant racial differences found in the Liang et al. (1987b) indicate the problems that can occur when measurement error confounds substantive results. Advanced statistical packages such as LISREL (Jöreskog & Sörbom, 1984) give researchers the ability to examine the fit of their proposed models with provisions made for measurement error variance. These techniques also allow investigators

to examine the relationship of measured variables to unobserved constructs.

As this review suggests, several attempts have been made to clarify the conceptualization of well-being. Some investigators have attempted to achieve a better understanding of subjective well-being by combining many items from several scales (Carp & Carp, 1983; Lawton et al., 1984; Lohmann, 1980). These attempts have resulted in multi-faceted components that fail to explain the amount of variance explained by one reliably replicated scale. In light of the popularity of such instruments as the Philadelphia Geriatric Center Morale Scale, it becomes most important to investigate the replicability of this measurement model among different subgroups of the elderly population.

Subjective Well-Being over Time

Relatively few studies examining subjective well-being have examined its stability over time. Results from available studies, however, suggest that subjective well-being does not decline with age (Larson, 1978). Costa et al. (1987) investigated the stability of well-being among adult men and women 25-74 years of age using a multistage, stratified national sample (NHANES1 Follow-up; Cornoni-Huntley, Barbano, Brody, Cohen, Feldman, Kleinman, & Madans, 1983). Costa et al. reported that well-being remained equally stable during adulthood for men and women.

Their division of age categories into under 35 years, 35-44, 45-54, 55-64, and older than 64 years, however, made it impossible to examine any possible changes in subjective well-being among adults 65 years and older.

Stability in subjective well-being has been indirectly observed through several studies. Investigations have shown, for example, that among middle aged and/or older adults, subjective well-being is a powerful predictor of itself at a later time (Bauer & Okun, 1983; George & Maddox, 1977; Kozma & Stones, 1983; Mussen, Honzik, & Eichorn, 1982; Palmore & Kivett, 1977; Recker & Wong, 1984). In their overview of subjective well-being predictors, McNeil et al. (1986) state:

> "The prediction of subjective well-being variance by separate predictors is small. Health, the most powerful of all predictors, is capable of predicting, at most, only 16% of the subjective well-being variance. Most other objective predictors account for 1 to 10% of the subjective well-being variance. George (1978) found that the total variance of subjective well-being predictors was 21.8%. This estimate is small compared to the variance contribution of subjective well-being itself (i.e., up to 63%)" (p. 60).

These studies indicate subjective well-being is somewhat stable over time. No studies could be located, however, that have investigated the longitudinal stability of subjective well-being as measured by the PGC scale.

Components of Subjective Well-Being

Reflecting upon the multidimensional conceptualization of the PGC scale, Stones and Kozma (1980) state that "the PGC . . . assume(s) quantitative differentiation to be possible both within and between components" (p. 276). No studies other than those investigating the hierarchical factor structure of subjective well-being could be located, however, that have examined relationships concerning components of the PGC scale (agitation, lonely dissatisfaction, and attitude toward one's own aging).

Agitation

Little information could be located concerning the agitation component of subjective well-being. In Lawton's first article explaining the development of the PGC scale (1972), he states:

> "Almost all of the symptoms of anxiety which were included in the scale load on this component, as well as dysphoric mood elements. However, there is a driving, restless, agitated quality to the dysphoric mood, as suggested by the short temper item and insomnia in the content of the items" (p. 155).

The dysphoric mood elements (Lawton, 1972), psychiatric symptoms (George, 1981; Lawton, 1977), and negative affect (Lawton et al., 1984) associated with this component suggest that older adults in depressive states will demonstrate agitation more than normally functioning older adults. Therefore, it might be expected that this

component would be the most likely of the three components of subjective well-being as measured by the PGC scale to demonstrate some measure of stability over time, particularly among normally functioning adults. Certain older adults, however, could be expected to show changes in agitation over time. Breckenridge, Gallagher, Thompson, and Peterson (1986) reported that adults experiencing the first stages of grief demonstrated depressive symptoms such as weight loss, poor appetites, and insomnia. The older bereaved adults of their study, however, appeared to experience less severe distress at the time of spousal loss than bereaved middle-aged adults. Socioeconomic status has also been shown to increase the prevalence of grief reaction; individuals of lower socioeconomic status have shown a greater prevalence of grief reactions than middle-class adults (Weissman & Meyers, 1978). The results of studies examining older adults with regard to depression suggest that normally functioning older adults may exhibit some depressive or dysphoric symptoms during times of loss but that these symptoms are less likely to be severe in nature. Older adults who have histories of depression are more likely to demonstrate higher amounts of agitation (Foster & Gallagher, 1986) during their later years. It is possible that this way of dealing with problems will show stability over time.

No studies could be located that have investigated the agitation component of the PGC scale.

Lonely Dissatisfaction

Loneliness is the dimension of subjective well-being as measured by the PGC scale that has received the most investigation. No studies are available that use the lonely dissatisfaction subscale of the PGC as the measure of loneliness, however. Results of studies examining loneliness with other instruments suggest that this component of well-being may differ over time (Creecy, Berg, & Wright, 1985). The increase in dependency, decrease in physical health, and decrease of social networks accompanying aging may increase loneliness. Butler (1975) stated that major crises such as widowhood, sensory loss, aging, and institutionalization may result in loneliness. Research conducted by Kivett (1978, 1979) supports this hypothesis. She found that adequacy of transportation, widowed vs. married status, health, adequacy of vision, organizational activity, frequency of telephoning, and single vs. married status were significant discriminators among categories of loneliness (quite often lonely, sometimes lonely, and never lonely).

Others reported that loneliness was associated with internal factors [feelings of hopelessness, emptiness, and defeat (Russell, Peplau, & Ferguson, 1978); anxiety, depression, low self-esteem, and hostility (Russell,

Peplau, & Cutrona, 1980)] and with external factors [relational loss, inadequacy within one's social network, and structural barriers (i.e., low income or inadequate transportation) (Klemmack & Roff, 1984; Perlman, 1988)]. The results of these studies suggest that the PGC scale lonely dissatisfaction component of subjective well-being may not remain stable over time.

Attitude Toward One's Own Aging

Several studies are available that investigate the attitudes of others regarding aging or stereotypes of aging. Studies are rare that examine older adults' attitudes toward their own aging, particularly those using the PGC subscale. The closely related issues of age identity and subjective evaluation of age have received attention, however. Results of two of these studies (Bultena & Powers, 1978; Milligan, Powell, Harley, & Furchtghott, 1985) indicate that older adults often deny their own aging. Using a sample of elderly men (65 to 85 years of age), Milligan et al. reported that older men in poorer health tended to see themselves as a stereotypic old person more often than older men in better physical health. The subjects of this study were asked to rate three social objects [a young man (20-30), an old man (70-80), and themselves] concerning 32 pairs of polar adjectives. The subjects who were in poorer health saw themselves more closely resembling the older man while subjects in good

physical health were more likely to see themselves the young man.

Bultena and Powers (1978) found that many older adults in the first wave of their ten-year longitudinal study rejected an old self image. By the second wave, however, there was an increase in acceptance of an older self image. Similar to conclusions by Milligan et al. (1984), the older adults in this longitudinal study stated that their changed perceptions were due to "their altered life situations, particularly declines in their physical independence and health. These losses, in their minds, made retention of a middle-aged identity problematic" (p. 753).

Based upon the results of these studies, it seems likely that as older adults age their attitudes toward their own aging may become more negative, particularly if they have lowered evaluations of physical health and increased dependency needs due to physical or mental impairment. Subsequently, older adults may project a negative self image. If this is indeed the case, this component of subjective well-being may not remain stable over time particularly in instances of deteriorating health.

Atkinson et al. (1986) used the attitude toward one's own aging component of the PGC Scale as an independent variable in their investigation of the theoretical

conceptualization of intergenerational solidarity. The five-item subscale was used as an independent variable entitled "acceptance of changed norms for the elderly" (p. 411). Although the variable did not have significant effects upon the dependent variables of interest (consensus, affection, and association), this study provides one of the few examples in which a dimension of the PGC scale has been examined. The attitude toward one's own aging component of the PGC scale performed moderately well in this study with a reported Cronbach's alpha of .70.

In conclusion, the investigations by Liang and associates (1983, 1985, 1987a, 1987b) support a hierarchical factor structure of subjective well-being in that subjective well-being, the second order factor, accounts for significant amounts of variance in the first order factors of lonely dissatisfaction, attitude toward one's own aging, and agitation. These first order factors in turn account for covariance among observed indicators or individual items in the PGC scale. This nested structure replicated relatively well in black/white, male/female, and Japanese/American comparisons. As of this writing, however, the hierarchical factor structure of the Philadelphia Geriatric Center Morale Scale has not be examined with a longitudinal research design or with a rural sample. Although some evidence exists showing

subjective well-being to be relatively stable throughout older adulthood (Baur & Okun, 1983; Mussen et al., 1982; Recker & Wong, 1984), the thirty to forty year span of old age does not represent a static period for adults. Decreases in physical health (Rosenwaike, 1985), decreases in available social supports (Wan & Odell, 1983), and role changes due to widowhood and retirement (Arens, 1982-83; Atchley, 1975; Blau, 1961; Hutchison, 1975; Petrowsky, 1976; Pihlblad & Adams, 1972; Videback & Knox, 1965) indicate that the lives of older adults continue to evolve even during advanced age. In addition, the limited information available concerning components of subjective well-being indicates that more investigation is needed concerning their performance over time. An examination of well-being with the same persons over a ten-year period will provide needed information concerning the hierarchical factor structure of subjective well-being over time.

Liang has also recommended that this invariance of subjective well-being factor structure be replicated with specific subgroups of the older population. The rural elderly are such a group. The life experiences of rural adults differ from those of urban ones. Older rural adults report higher subjective well-being than their urban counterparts even though they have fewer resources and greater distances to travel for services. Examination of subjective well-being among this subgroup of the population

will provide additional replication of the hierarchical factor structure model.

CHAPTER 3

RESEARCH METHODS

Research Design and Sample Selection

This study was a secondary analysis of existing longitudinal data. The data were collected in two waves: Time 1, 1976 and Time 2, 1986. The first wave (Time 1) consisted of 418 older adults residing in a "rural by-passed" county in the southeastern United States (Kivett & Scott, 1979). Caswell County, in the Piedmont region of North Carolina, was selected as the focus of study because criteria established it as a "'high' impact area for Title III funding under the Older Americans Act" (Kivett & Suggs, 1986, p. 2). These criteria were: a) the increase in elderly population between 1960-1970; b) the relatively large percentage of older adults receiving Assistance to the Aged and Medical Assistance (now known as Supplemental Security Income, SSI) (U.S. Bureau of Census, 1973; and c) the relatively low percentage of elderly persons receiving Social Security benefits.

Data at Time 1 were obtained using an area compact clustering sample strategy (sampling ratio=.19) (Appendix A). Using census tract data and aerial photographs, the county was divided into zones; zones were divided into area segments and these segments were randomly selected for sampling. Every adult 65 years or older within selected

sampling areas was interviewed. Individuals living in group housing were sampled separately. The response rate for Time 1 data was 82%.

In 1986, Kivett and Suggs conducted a ten-year follow-up of the 418 individuals originally interviewed in 1976. Known survivors totaled 195; known nonsurvivors, n=207; 16 persons, or approximately 4%, of the 418 individuals were not located. The response rate for known survivors was 98%.

For the substantive issues or the hypotheses of this study, only those data on known survivors were used. Due to the longitudinal nature of the research questions, measurements of subjective well-being at Time 1 and Time 2 were necessary.

Instrumentation

A 99-item questionnaire was administered by trained interviewers in the homes of respondents at Time 1. Two call backs were required to assure maximum older adult participation. Information was obtained in the following areas of interest: general demography; housing status and information; health status; visiting patterns with children, siblings, and friends and neighbors; income; medical costs; leisure time activities; problems and worries; life satisfaction; and morale.

The Time 2 questionnaire (Appendix B) was a modified version of the original instrument administered in 1976; a

minimum number of changes were made to enable replication of earlier data. Seven areas of research interest were represented in the 1986 instrument: employment, income, housing, health, activity, subjective well-being, and program needs and use. The questionnaires were administered by trained interviewers in the homes of respondents following procedures similar to Time 1. Surrogate respondents provided objective information on 25 subjects because of older adult's physical and/or mental incapacity. These 25 survivors were omitted from the analyses of the present study because questions of a subjective nature, such as subjective well-being, were not answered by surrogates.

The general demography section of the Time 1 questionnaire provided information on sex, race, education, age, marital status, residential mobility, home ownership, and household composition and preferences. The work and retirement sections of the two questionnaires provided information about current and past work status and information on retirement such as reasons for retirement, satisfaction with retirement, and length of retirement. The family and friends sections provided information on number and distance of, and interaction patterns with children and siblings plus information about friendship activity. The health sections of the questionnaires provided subjective assessments of overall health and

physical activity as well as information about specific diseases, hospitalization, health care, and health care expenses. The activities sections provided information concerning organized group activity and past times and hobbies. Information from the income sections provided data on total income as well as a more detailed listing of twelve possible financial resources. Individuals also answered questions concerning perceptions of income adequacy. The services and assistance sections provided data on the frequency of use of several services and information on requested, but unavailable, services. The final sections of the questionnaires, subjective well-being, provided information on subjective well-being, perceptions of problems, and mutual aid with family and friends. The Revised Philadelphia Geriatric Center Morale Scale (Lawton, 1975) was used to measure subjective well-being. This scale was specifically designed for use with older populations.

The Time 2 questionnaire obtained additional information on degrees of dependency. This information included items about who gives help and the type of help given. In addition, information was collected concerning surrogate respondents in those cases where information was unobtainable from the surviving older adult.

The 17 items of the Philadelphia Geriatric Center Morale Scale were the measured variables of interest for

this study. With the exception of one item, "As you get older, are things (better, worse, same) than you thought they would be?", all variables had dichotomous responses. A high summated score was interpreted as positive or high subjective well-being. To accommodate the statistical model for this study, the 17 items of the scale were conceptualized as the observed indicators of three multiple latent first order dimensions--a) agitation, b) lonely dissatisfaction, and c) attitude toward one's own aging--and the global, second order latent construct, subjective well-being.

Data Analysis

The data analyses for this study were divided into three major sets of procedures.

Descriptive Analyses

First, descriptive statistics provided demographic information. Means and frequencies were used to examine demographic differences between survivors, nonsurvivors, and the total sample. These descriptive statistics were one way of investigating the sample selection bias inherent in this study because of the nonrandom exclusion of nonlocated subjects (n=16), nonsurvivors (n=207), and survivors who had surrogates provide Time 2 questionnaire information (n=25). In addition, means and frequencies were used to examine differences in the physical, social, and emotional status of survivors at Time 1 and at Time 2.

Preliminary Analyses

The second major set of analyses were composed of four preliminary procedures that were helpful in formulating the substantive model, which hypothesized a hierarchical factor structure for subjective well-being.

Polychoric Correlation Coefficients. The first of these preliminary procedures involved the calculation of polychoric correlation coefficients. Polychoric correlation coefficients are derived from the correlation of bivariate ordinal variables (Jöreskog & Sörbom, 1984). These coefficients are preferred for use with dichotomous variables such as those found in the Philadelphia Geriatric Center Morale Scale (Babakus, Ferguson, & Jöreskog, 1987; Liang & Bollen, 1983; Muthén, 1983). Polychoric coefficients result from the calculation of bivariate relationships ignoring all other variables within the multivariate model (K. A. Bollen, personal communication, June 14, 1988).

Polychoric correlation coefficients have advantages when the variables of interest are categorical. They give "the most accurate pairwise correlations" (Babakus et al., 1987) while Pearson correlation coefficients underestimate true pairwise relationships. In other words, the factor loadings for both first and second order factors are closer to their true value with polychoric coefficients. The use of Pearson correlation coefficients results in loadings

that are, therefore, biased downward. In addition, polychoric coefficients give estimated standard errors that are closer to the values obtained when continuous variables are used (Babakus et al., 1987).

There are disadvantages to the use of polychoric coefficients, however. The use of a correlation matrix composed of polychoric coefficients inflates chi-square and often results in the rejection of the resulting fit of the model (Babakus et al., 1987). It also is likely to produce poor goodness-of-fit indices. Babakus et al. (1987) reported that the Goodness-of-Fit Index (GFI), the Adjusted Goodness-of-Fit Index (AGFI), and the Root Mean Square Residual (RMSR) were poorer when polychoric coefficients were used. The choice of whether to use polychoric or Pearson correlation coefficients in the input data matrix is determined by the primary focus of the study (Babakus et al., 1987). If the primary issue is concerned with the structure of constructs, the truer estimates provided with polychoric coefficients are preferable. On the other hand, if the fit of the model to data is the most important issue, Pearson correlation coefficients are preferable.

In the particular case of this study, the first and second order factor loadings were of primary interest. The first hypothesis dealt with the correlation of subjective well-being at Time 1 and Time 2, and the second hypothesis dealt with the loadings of first and second factors at Time

1 and Time 2. Therefore, the preferred coefficients were polychoric correlations. For the purposes of this study, polychoric coefficients were calculated for the following matrices: Time 1 models for survivors and nonsurvivors; Time 2 models for survivors and the substantive model.

Polychoric coefficients were calculated in a two-step procedure. First, phi coefficients were generated using crosstabs procedures (SPSSX, 1988). These phi coefficients were then translated to polychoric coefficients using a conversion table (Roscoe, 1975). The resulting polychoric correlation coefficients then became the coefficients of the input data matrix.

Confirmatory Factor Analyses. The second preliminary procedure dealt with the number of items of the PGC scale. Confirmatory factor analyses (Jöreskog & Sörbom, 1984) were performed with the full 17-variable model (Lawton, 1975) and the 15-variable model (Liang & Bollen, 1983, 1985). These analyses tested basic models, ones without correlated measurement error variances.

The third preliminary procedure used in this study compared confirmatory factor analysis models at Time 1 for survivors, nonsurvivors, and the total sample. As with the previous analyses, basic models were tested without the addition of correlated measurement error. The comparison of Time 1 models provided an additional way of investigating the sample selection bias inherent in this

study. That is, if the three Time 1 factor structure models for survivors, nonsurvivors, and the total sample were similar, the hypothesized Time 1 model of subjective well-being could be considered similar across groups regardless of whether they were nonrandomly removed from the sample.

The fourth preliminary procedure examined the test of the Time 1 and Time 2 models separately for survivors. Confirmatory factor analysis procedures were used. The models were basic in nature with no correlated measurement error variances added to improve the fit of the models.

Tests of Hypotheses

The final set of analyses examined the substantive issues of this study. The first hypothesis, examining the relationship of subjective well-being over time, was tested by examining the Time 1, Time 2 correlation of the second order factor, subjective well-being.

The second hypothesis, investigating the significance of the hierarchical factor structure of subjective well-being at Time 1 and Time 2, was tested by examination of first and second order factor loadings at both times.

The third hypothesis, investigating the fit of the longitudinal hierarchical factor structure model of subjective well-being to a rural sample of older adults, was tested by examining measures of fit, such as chi-

square, chi-square/df ratio, Goodness of Fit Index, and Root Mean Square Residual (Jöreskog & Sörbom, 1984).

In addition, comparisons were made between the structural coefficients (gammas) or direct causal links between second and first order constructs and the factor loadings (lambdas) of observed indicators to first order constructs at Time 1 and Time 2 with the purpose of indicating any change among lower ordered variables over the ten-year period of time.

Confirmatory factor analysis procedures were used to investigate the longitudinal factor structure of subjective well-being. This statistical procedure made it possible to examine the goodness of fit of an hypothesized measurement model--in this case, the hierarchical factor structure of subjective well-being (Figure 1). Maximum likelihood confirmatory factor analysis procedures require the investigator to specify a priori the relationships of measured variables to unobserved or latent variables. The technique also enables the researcher to separate measurement error from the latent variables (Pedhazur, 1982).

Confirmatory factor analysis provided the techniques necessary for examination of goodness of fit of the longitudinal subjective well-being measurement model and the correlation (or stability) of subjective well-being over time. The use of this confirmatory factor analysis

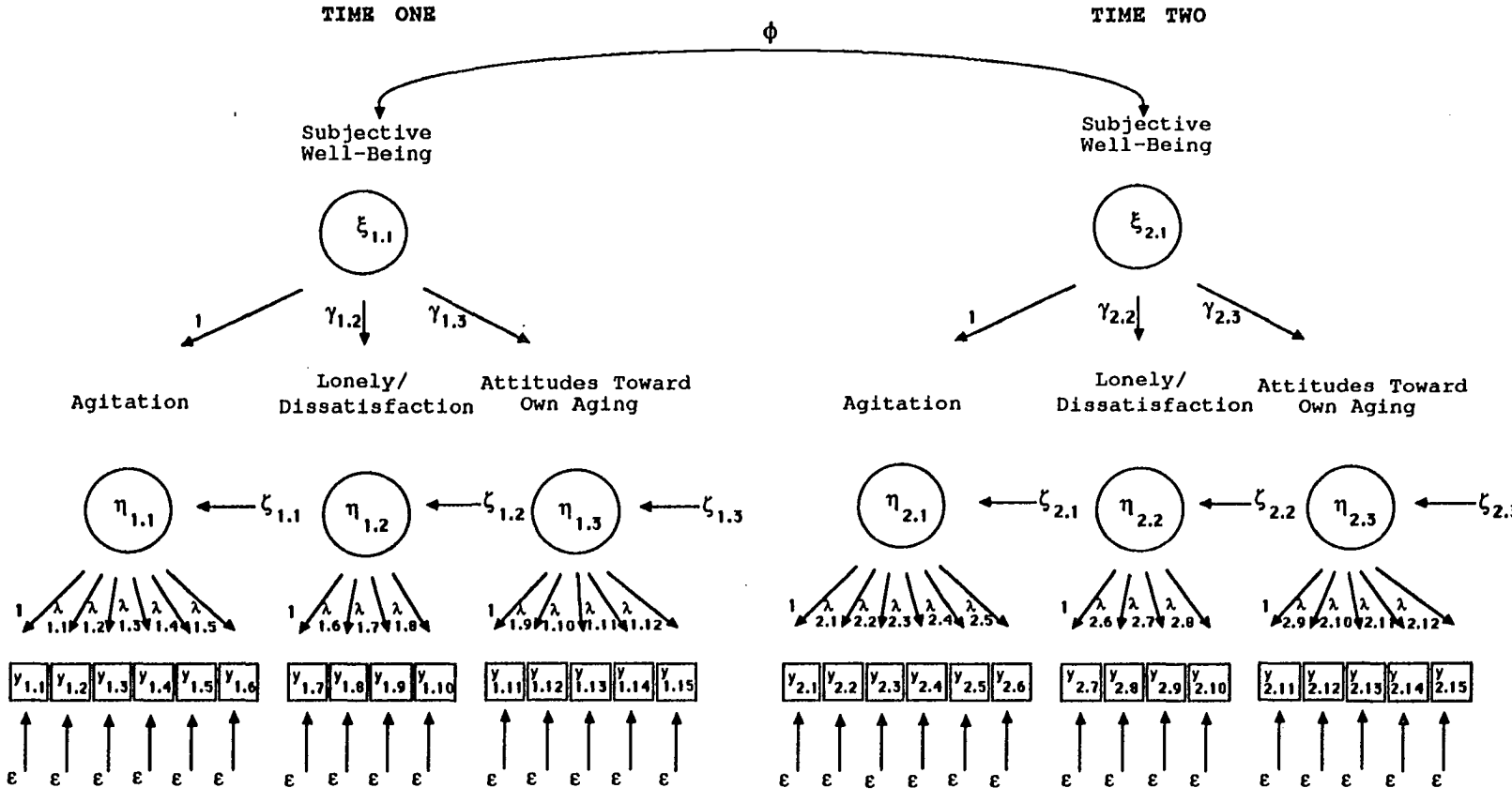

Figure 1. **Longitudinal Factor Structure of Subjective Well-Being as Measured by the Philadelphia Geriatric Center Morale Scale, *PGC Scale*.**

assumed the following: a) the observed indicators contain measurement error; b) the three first-order factors of agitation, lonely dissatisfaction, and attitude toward one's own aging are not independent or there could be no second order subjective well-being construct; and c) observed indicators are assumed to be distributed normally.

Confirmatory factor analysis procedures also provide the researcher with the ability to partial out measurement error and thereby improve the fit of the hypothesized model to the data. Correlated measurement error variances were selected in additive fashion until all resulting normalized residuals were below an absolute value of 2.0. The reported estimates for the substantive model were chosen from the last correlated measurement error model thereby reporting those estimates achieved from the most successful fit of the model to the data.

In accordance with the LISREL program (Jöreskog & Sörbom, 1984), the following symbols represent components of this longitudinal conceptualization:

ϕ (phi)	= Correlation between Time 1 subjective well-being and Time 2 subjective well-being
$\xi_{1.1}$ (xi)	= Time 1 subjective well-

being, second order construct

$\gamma_{1.1}$ to $\gamma_{1.3}$ (gammas) = Time 1 structural coefficients, direct causal links between latent constructs

$\eta_{1.1}$ to $\eta_{1.3}$ (etas) = Time 1 dimensions of subjective well-being or first order latent constructs (lonely dissatisfaction, attitude toward one's own aging, and agitation)

$\zeta_{1.1}$ to $\zeta_{1.3}$ (zetas) = Time 1 errors in first order equations

$\lambda_{1.1}$ to $\lambda_{1.14}$ (lambdas) = Time 1 factor loadings or coefficients of indicators regressed on unobserved or latent dimensions

$y_{1.1}$ to $y_{1.6}$ = Time 1 observed indicators of agitation

$y_{1.7}$ to $y_{1.10}$ = Time 1 observed indicators of lonely dissatisfaction

$y_{1.11}$ to $y_{1.15}$ = Time 1 observed indicators of attitude toward one's own aging

$\xi_{2.1}$ (xi) = Time 2 subjective well-being, second order construct

$\gamma_{2.1}$ to $\gamma_{2.3}$ (gammas) = Time 2 structural coefficients, direct causal links between latent constructs

$\eta_{2.1}$ to $\eta_{2.3}$ (etas) = Time 2 dimensions of subjective well-being or first order latent constructs (lonely dissatisfaction, attitude toward one's own aging, and agitation)

$\zeta_{2.1}$ to $\zeta_{2.3}$ (zetas) = Time 2 errors in first order equations

$\lambda_{2.1}$ to $\lambda_{2.15}$ (lambdas) = Time 2 factor loadings or coefficients of indicators regressed on unobserved or latent dimensions

$y_{2.1}$ to $y_{2.6}$ = Time 2 observed indicators of agitation

$y_{2.7}$ to $y_{2.10}$ = Time 2 observed indicators of lonely dissatisfaction

$y_{2.11}$ to $y_{2.15}$ = Time 2 observed indicators of attitude toward one's own aging

$\varepsilon_{1.1}$ to $\varepsilon_{2.15}$ = measurement error variance observable indicators

Figure 1 showed that subjective well-being at both measurement times was hypothesized to consist of three dimensions: agitation ($\eta_{1.1}$ and $\eta_{2.1}$); lonely dissatisfaction ($\eta_{1.2}$ and $\eta_{2.2}$); and attitude toward one's own aging ($\eta_{1.3}$ and $\eta_{2.3}$). The agitation dimensions at Time 1 and Time 2 were measured by six indicators ($y_{1.1}$ to $y_{1.6}$ and $y_{2.1}$ to $y_{2.6}$). Lonely dissatisfaction dimensions at Time 1 and Time 2 were measured by four indicators ($y_{1.7}$ to $y_{1.10}$ and $y_{2.7}$ to $y_{2.10}$). Time 1 and Time 2 attitude toward one's own aging were measured by five observable indicators ($y_{1.11}$ to $y_{1.15}$ and $y_{2.11}$ to $y_{2.15}$).

CHAPTER 4

RESULTS

The results of this study are discussed in three major sections. First, descriptive information is provided which compares survivors to the total sample and nonsurvivors at Time 1. These results are presented to identify demographic differences in the three groups. In addition, this first section also provides results that compare the physical, social, and emotional status of survivors at Time 1 and Time 2.

The second section of this chapter provides the results of several preliminary analyses that were conducted prior to the testing of the substantive model, which deals with the longitudinal factor structure of subjective well-being. These analyses include the results of tests of the models using polychoric and Pearson correlation coefficients in the input data matrix, data input concerns that relate to the dichotomous nature of the variables in the Philadelphia Geriatric Center Morale Scale (Lawton, 1975). In addition, this section provides the results of 17-item versus 15-item scale comparisons. Comparisons of 15-item Time 1 models for survivors, nonsurvivors, and the total sample are made to address sample selection bias, an inherent problem in this study. This section concludes with results from analyses comparing the factor structure

of subjective well-being for survivors separately at Time 1 and Time 2.

The final section of this chapter presents results concerning the substantive model. The substantive model consists of 15 of the original 17 items in Lawton's PGC Scale (1975). Pearson correlation coefficients were the input data.

Descriptive Results

Characteristics of Survivors, Nonsurvivors, and Total Sample at Time 1

The nonrandom exclusion of non-located subjects (n=16) and nonsurvivors (n=207) from the substantive Time 2 preliminary and substantive analyses introduces the possibility of sample selection bias. As a result, descriptive information is used to compare survivors with the total sample and nonsurvivors at Time 1 (Table 1). Survivors were more likely to be female, white, and married than either the total sample or nonsurvivors. In addition, survivors were younger and had higher education levels than the other comparison groups.

In summary, these demographic results suggest that some sample selection bias is present because of the inability to include nonsurvivors in the preliminary and substantive maximum likelihood confirmatory factor analyses. Therefore, the generalizability of results for

Table 1

Selected Demographic Characteristics of Total Sample, Nonsurvivors, and Survivors at Time 1

	Total Sample n=418			Nonsurvivors n=207			Survivors n=195		
Characteristic	n	%	$\bar{X}$	n	%	$\bar{X}$	n	%	$\bar{X}$
Sex									
Male	182	43.5		110	53.1		67	34.4	
Female	236	56.5		97	46.9		128	65.6	
Race									
White	263	62.9		138	66.7		117	60.0	
Black	155	37.1		69	33.3		78	40.0	
Marital Status									
Married	214	51.2		85	43.6		74	61.6	
Widowed	163	38.9		85	43.6		97	31.3	
Div/Sep	11	2.7		6	3.1		8	2.0	
Single	30	7.2		19	9.7		9	5.1	
Age			73.4			75.6			71.0
Education			6.8			6.3			7.5

the subsequent analyses should be made with caution. These demographic differences could possibly contribute to differences in the fit of the hypothesized model to the data among survivors, nonsurvivors, and the total sample (results of which are discussed later in Chapter 4).

Differences in Survivor Status

Some differences occurred among survivors, on average, during the ten-year period between Time 1 and Time 2 (Table 2). Examination of variables related to physical health and ability show some decline in physical status. Survivors at Time 2 show increases in the percentages who report their health as poor. In addition, survivors are less likely to be able to go anyplace at Time 2 than at Time 1 (67 vs. 90%). Fifty percent of survivors at Time 2 evaluate their health as worse than five years ago, an increase of 14 percentage points since Time 1.

Those variables that provide information on the social status of survivors also show changes over the ten-year period. Survivors at Time 2 are more likely to live alone than at Time 1. In addition, the reduction of group social participation suggests that survivors at Time 2 reduced their involvement in such social activities. Approximately two-thirds of the survivors report that they saw their friends and relatives as often as they wanted at both Time 1 and Time 2.

Table 2

Changes in Status for Survivors: Time 1 and Time 2

Status	Time 1	Time 2
	$\bar{X}$	$\bar{X}$
Age	71.0	80.9
	%	%
Health		
Excellent	20.9	22.1
Good	42.9	39.2
Fair	32.5	30.7
Poor	3.7	8.0
Ability to Get Around		
Go practically anyplace	89.7	67.1
Get around house, seldom out	6.2	20.7
Get around house, with difficulty	3.1	4.8
Confined to a chair	1.0	4.8
Stay in bed at all times	....	2.1
Other	....	.5
Health Compared to 5 Years Ago		
Better	7.2	8.5
Same	56.9	41.5
Worse	35.9	50.0
Numbers Living Alone	17.4	28.2
Living with Spouse	46.7	27.7
Living with Others	35.9	44.1
Presence of a Confidant		
Yes	86.9	84.7
No	13.1	15.3
Participation in Organized Social Groups		
None	9.3	22.1
Once a month	16.8	14.1
2-3 times a month	23.6	27.6
> 3 times a month	50.3	36.2

(table continues)

Status	Time 1	Time 2
	%	%
See Enough of Friends and Relatives		
As often as I want	69.1	65.4
Somewhat unhappy about it	30.9	34.6
Transportation		
Drive own car	49.2	38.7
Ride with spouse, child	....*	23.9
Ride with neighbor, friend, relative	49.2	31.3
Drive someone else's car	.5	....
Ride bus	....	1.8
No transportation	1.0	.6
Other	....	3.7
Enough Money		
Not enough	26.3	24.2
Enough if careful	56.9	53.8
Enough for everything	16.8	22.0
Feelings of Loneliness		
Quite often	11.5	11.7
Sometimes	38.2	46.6
Almost never	50.3	41.7
Amount of Unhappiness		
A good deal	19.9	9.3
Some, not much	36.6	51.8
Almost none	43.5	38.9

* Category not available in Time 1 Questionnaire.

Differences in the methods of transportation indicate that while fewer survivors drove their own cars at Time 2 (with a larger percentage now riding with their spouse or child), they continue to have means of transportation. Few at Time 1 (1%) or at Time 2 (.6%) report being without some type of transportation. With regard to income, survivors report similar perceptions of income adequacy at Time 1 and Time 2.

Few survivors at Time 1 or at Time 2 report frequent feelings of loneliness or unhappiness. Fifty percent of survivors at Time 1 report almost never feeling lonely while at Time 2 approximately 42% report that they rarely experience loneliness. With regard to unhappiness, fewer than 20% at Time 1 express a good deal of unhappiness. This percentage decreases to approximately 9% at Time 2.

In summary, these results show that survivors experienced change in the ten-year period between Time 1 and Time 2. On average, they show some degree of decline in health and social participation, but these changes do not appear to be accompanied by greater feelings of loneliness or unhappiness.

Results of Preliminary Model Analyses

Several preliminary analyses were conducted prior to the confirmatory factor analysis of the longitudinal factor structure of subjective well-being. These analyses were used to determine appropriate matrices for the input data,

to determine composition of the PGC scale, to compare the Time 1 factor structure of subjective well-being among survivors, nonsurvivors, and the total sample, and to compare the Time 1 and Time 2 factor structure models of subjective well-being separately for survivors. The information obtained from these preliminary analyses was helpful in formulating the substantive model.

Polychoric Correlation Coefficients vs. Pearson Correlation Coefficients in the Input Data Matrix

The use of dichotomous variables in the items of the PGC Scale indicates that the preferred input data correlations for preliminary and substantive subjective well-being models should be polychoric coefficients. Difficulties were encountered, however, with the use of these bivariate correlations. The input data matrix for the substantive model would not invert and no maximum likelihood estimates could be calculated when polychoric coefficients were used in the initial matrix. Although it is difficult to be precise as to the cause, it is possible that this mathematical problem results from the singularity of this particular polychoric correlation matrix because, with the exception of one variable, all of the variables are dichotomous (K. A. Bollen, personal communication, June 14, 1988; Olsson, 1979a, 1979b). In addition, polychoric coefficients do not perform well with extremely skewed data (Babakus et al, 1987). The distribution of the variables

for this study can be described as extremely skewed with the majority of variables having high percentages of responses in one category (Table 3). It is also possible that the relatively small number of survivors (n=150) contributed to the matrix inversion problem. In addition, the between time correlations for the PGC scale items were low, with many at or below .10 (Appendix C). Because of the inability to obtain estimates, the recommended use of polychoric coefficients was abandoned for data input, for the less optimal use of Pearson correlation coefficient matrices.

Results are presented, however, that compare 17-variable models developed with polychoric correlation and Pearson correlation coefficients for the Time 1 confirmatory factor analysis (Table 4). The two models presented here are basic in nature and do not contain any correlated measurement error variances. These comparisons demonstrate the advantages and disadvantages of the polychoric coefficients. In all instances, the standardized first and second order factor loadings are higher with the polychoric correlations. For example, the standardized gammas (loadings of first order factors on the second order factor) for agitation, lonely dissatisfaction, and attitude toward own aging with Pearson correlation coefficients in the input matrix were .931, .797, and .710, respectively. These gammas were .937,

Table 3

Distribution of Observable Indicators

Observable Indicator	% of Positive Response Time 1	Time 2
Agitation		
y_1 : Little things bother me more this year	66.5	65.6
y_2 : I sometimes worry so much that I can't sleep	62.6	73.5
y_3 : I am afraid of a lot of things	80.6	79.1
y_4 : I get mad more than I used to	86.8	92.0
y_5 : I take things hard	73.3	80.1
y_6 : I get upset easily	69.8	69.1
Lonely Dissatisfaction		
y_7 : How much do you feel lonely	84.8	85.3*
y_8 : I see enough of my friends and neighbors	69.1	72.4*
y_9 : I sometimes feel life isn't worth living	87.9	89.5
y_{10}: I have a lot to be sad about	84.2	83.3
y_{11}: How satisfied are you with your life today	94.8	91.4
y_{12}: Life is hard for me much of the time	85.3	89.5
Attitude Toward One's Own Aging		
y_{13}: Things keep getting worse as I get older	58.6	47.2
y_{14}: I have as much pep as I had last year	61.3	68.1
y_{15}: As you get older you are less useful	74.9	61.3
y_{16}: As I get older, things are better/worse/same than I thought they would be	65.8	66.9
y_{17}: I am as happy as when I was younger	50.8	54.4

* Items not included in 15-item models of PGC scale.

Table 4

Comparison of LISREL Estimates for Survivors at Time 1 using Pearson and Polychoric Correlation Coefficients

Parameters	Pearson Est.	Pearson St. Est.	Polychoric Est.	Polychoric St. Est.
Variance of the Second Order Factor				
Subjective Well-Being	.316	1.000	.466	1.000
Second Order Factor Loadings				
γ_1: Agitation	1.000	.931	1.000	.937
γ_2: Dissatisfaction	.933	.797	.921	.812
γ_3: Attitude Toward Own Aging	.956	.710	.981	.748
First Order Factor Loadings				
Agitation				
λ_1 : Little things bother me	1.000	.604	1.000	.729
λ_2 : I worry so much	1.020	.616	1.007	.734
λ_3 : I am afraid	.750	.453	.741	.540
λ_4 : I get mad more	.666	.402	.724	.527
λ_5 : I take things hard	1.228	.741	1.151	.839
λ_6 : I get upset easily	1.131	.683	1.131	.824
Lonely Dissatisfaction				
λ_7 : How much I feel lonely	1.000	.658	1.000	.774
λ_8 : I see enough friends,relatives	.670	.441	.682	.528
λ_9 : Life isn't worth living	.835	.549	.834	.646
λ_{10}: I have a lot to be sad about	.962	.633	.981	.760
λ_{11}: How satisfied with life	.814	.536	.841	.651
λ_{12}: Life is hard for me	.996	.655	1.029	.797
Attitude Toward Own Aging				
λ_{13}: Things get worse as you age	1.000	.757	1.000	.896
λ_{14}: I have as much pep	.766	.580	.799	.716
λ_{15}: As one ages, less useful	.663	.502	.718	.643
λ_{16}: Things better/worse	.699	.529	.717	.642
λ_{17}: I am as happy as younger	.497	.376	.504	.451

(Table continues)

Parameters	Pearson Est.	Pearson St. Est.	Polychoric Est.	Polychoric St. Est.
Error Variances in First Order Factors				
ζ_1: Agitation	.048+	.133	.065+	.122
ζ_2: Dissatisfaction	.158*	.365	.205	.341
ζ_3: Attitude Toward Own Aging	.284	.496	.354	.441
Measurement Error Variances in Indicators				
Agitation				
ε_1: Little things bother me	.636		.469	
ε_2: I worry so much	.621		.461	
ε_3: I am afraid	.795		.708	
ε_4: I get mad more	.838		.722	
ε_5: I take things hard	.451		.297	
ε_6: I get upset easily	.533		.321	
Lonely Dissatisfaction				
ε_7: How much I feel lonely	.567		.400	
ε_8: I see enough friends,relatives	.805		.721	
ε_9: Life isn't worth living	.698		.583	
ε_{10}:I have a lot to be sad about	.600		.422	
ε_{11}:How satisfied with life	.713		.576	
ε_{12}:Life is hard for me	.571		.365	
Attitude Toward Own Aging				
ε_{13}:Things get worse as you age	.427		.198	
ε_{14}:I have as much pep	.664		.488	
ε_{15}:As one ages, less useful	.748		.587	
ε_{16}:Things better/worse	.721		.588	
ε_{17}:I am as happy as younger	.859		.796	

Note: To conserve space, PGC scale items are shown in abbreviated form.

All estimates are statistically significant at the .001 level except for those constrained to an initial value of 1.000 or those marked with +, indicating nonsignificance, or *, indicating statistical significance at the .01 level.

.812., and .748 when polychoric the input matrix. Although the magnitude of factor loadings is consistently higher with polychoric coefficients, the ordering of observable and latent variables on subsequent factors remains the same.

To summarize, the polychoric coefficients do provide better estimates of the parameters within the model but the ordering of each indicator upon a factor remains the same regardless of whether polychoric or Pearson correlation coefficients are used in the input data matrix. In addition, the error variances of first order factors and the measurement error variances of indicators are consistently lower when polychoric coefficients are used.

As others have indicated (Babakus et al., 1987; Bollen, personal communication, June 14, 1988) and as demonstrated in this study, goodness of fit measures are inflated with polychoric coefficients [χ^2(df=116)=899.04 for polychoric vs. χ^2(df=116)=207.55 for Pearson correlation coefficients] (Table 5). In addition, the inflated chi-square means that the chi-square/df ratio is above the desired cut-off point of 2.0 (7.75 for the polychoric vs. 1.79 for the Pearson). As a result, all measures of goodness of fit, as expected, are poorer with polychoric as compared with Pearson correlation coefficients.

Table 5

Comparison of Goodness of Fit Measures for Pearson and Polychoric Correlation Coefficients

Measures of Fit	Pearson	Polychoric
Chi-square (df = 116)	207.55	899.04
Probability	.00	.00
Chi-square/df	1.79	7.75
GFI	.88	.72
AGFI	.50	-.16
RMSR	.07	.10
Tot. Coef. of Det. (R^2)	.90	.91

It is regrettable that the polychoric correlation coefficients did not perform for the substantive model. Because the substantive issues of this study are concerned with the invariance of subjective well-being factor structure over time, the less biased estimates generated from a polychoric correlation coefficient input matrix would have given higher first and second order factor loadings as well as higher correlations among first and second order factors across time. Pearson correlation coefficients, as evidenced in this comparison, provide estimates that are somewhat lower than the more unbiased estimates produced by the polychoric coefficients. Each factor loading computed from the Pearson correlation analysis is biased downward and provides a less true estimate of the parameters of the substantive model. All subsequent preliminary models as well as the final substantive model are tested using Pearson correlation coefficients in the input data matrix. When subsequent analyses are examined, it should be remembered that the true relationships are stronger than could be estimated with Pearson correlation coefficients.

Composition of the PGC Scale

One of the recurring problems with interpreting results concerning the factor structure of the Philadelphia Geriatric Center Morale Scale has been the inconsistency in the number of items used with each analysis: 17 items when

the scale has been used by researchers to examine contextual issues concerning subjective well-being (e.g., Kivett, 1988; Mancini & McKeel, 1986; Ward et al., 1984), 15 items in the early work of Liang and Bollen (1983, 1985) concerning the factor structure of well-being, and 11 items in their cross-cultural Japanese American study of subjective well-being (Liang et al., 1987a). For the purposes of this study, analyses began using the full 17-variable model developed and reported by Lawton (1975) as the Revised Philadelphia Geriatric Center Morale Scale (Table 6).

Problems developed in preliminary analyses, however, when the 17-item scale was used to examine the factor structure of subjective well-being separately for Time 1 and Time 2. In some instances when using all 17 items the input data matrix would not invert, making it impossible to get maximum likelihood estimates. In other analyses, the matrix would invert but the psi matrix (matrix of first order factor errors) was not positive definite; i.e, the eta matrix had maximum likelihood estimates less than zero. These mathematical/computational problems are most likely due to the similar problems experienced with polychoric correlation coefficients; i.e., extreme skewness in the data (Table 2), the relatively small number of survivors (n=150), and the use of dichotomous rather than continuous data (Babakus et al., 1987; K. A. Bollen, personal

Table 6

PGC Scale Items by First Order Factors

Agitation	Response*
Little things bother me more this year	(yes, no)
I sometimes worry so much that I can't sleep	(yes, no)
I am afraid of a lot of things	(yes, no)
I get mad more than I used to	(yes, no)
I take things hard	(yes, no)
I get upset easily	(yes, no)
Lonely Dissatisfaction	**Responses**
How much do you feel lonely	(not much, a lot)[a]
I see enough of my friends and neighbors	(yes, no)[a]
I sometimes feel that life isn't worth living	(yes, no)
Life is hard for me much of the time	(yes, no)
How satisfied are you with your life today	(satisfied, not satisfied)
I have a lot to be sad about	(yes, no)
Attitude Toward One's Own Aging	**Responses**
Things keep getting worse as I get older	(yes, no)
I have as much pep as I had last year	(yes, no)
As you get older you are less useful	(yes, no)
As I get older, things are better/worse/ same than I thought they would be	(better, worse, same)
I am as happy as when I was younger	(yes, no)

* Underlined response indicates positive subjective well-being.

[a] Items not included in 15-variable models of the PGC scale.

communitcation, June 14, 1988; Olsson, 1979a, 1979b). In addition, the input data matrix for the substantive model using Pearson correlation coefficients would not invert with the full 17-item PGC Scale model.

Adjustments were made to correct this problem. Based upon the results of Morris and Sherwood (1975) and Liang and Bollen (1983, 1985), two items were deleted from the scale. These were "How much do you feel lonely?" and "I see enough of my friends and relatives." These researchers concluded that the two items measure something other than subjective well-being. The deletion of these items did correct the mathematical convergence problems encountered with the 17-item scale. Subsequent analyses, including the substantive model, use the 15-variable modification of Lawton's original revision reported by Liang and Bollen (1983, 1985) and Morris and Sherwood (1975).

Comparison of Survivor, Nonsurvivor, and Total Sample Models at Time 1

Separate factor analysis models were developed for survivors, nonsurvivors, and the total sample for the purpose of comparing differences in factor loadings and fit of the model to the data among these three groups (Table 7). If the results using only survivors differ from those for nonsurvivors and for the total sample, it would indicate that the meaning of or pattern of responses on the subjective well-being measures for survivors is different

Table 7

Comparison of LISREL Estimates for Survivors, Nonsurvivors, and the Total Sample at Time 1

Parameters	Survivors n=182 Est.	Survivors n=182 St. Est.	Nonsurvivors n=185 Est.	Nonsurvivors n=185 St. Est.	Total Sample n=381 Est.	Total Sample n=381 St. Est.
Variance of the Second Order Factor						
Subjective Well-Being	.295	1.000	.317	1.000	.298	1.000
Second Order Factor Loadings						
γ_1: Agitation	1.000	.891	1.000	.781	1.000	.816
γ_2: Lonely Dissatisfaction	.839	.801	.610	.740	.646	.767
γ_3: Attitude Toward Own Aging	1.032	.742	.967	.717	1.024	.757
First Order Factor Loadings						
Agitation						
λ_1 : Little things bother	1.000	.610	1.000	.721	1.000	.669
λ_2 : I worry so much	.997	.608	.845	.610	.918	.614
λ_3 : I am afraid	.711	.434	.599	.432	.647	.433
λ_4 : I get mad more	.667	.407	.553	.339	.600	.402
λ_5 : I take things hard	1.218	.743	.897	.647	1.020	.682
λ_6 : I get upset easily	1.139	.694	.861	.621	.967	.647
Lonely Dissatisfaction						
λ_7 : Life isn't worth living	1.000	.569	1.000	.464	1.000	.495
λ_8 : I have a lot to be sad	1.164	.662	1.152	.534	1.123	.601
λ_9 : How satisfied with life	.892	.508	1.594	.740	1.324	.656
λ_{10}: Life is hard for me	1.170	.666	1.683	.781	1.494	.740
Attitude Toward Own Aging						
λ_{11}: Things get worse	1.000	.755	1.000	.759	1.000	.738
λ_{12}: I have as much pep	.764	.577	.972	.738	.867	.640
λ_{13}: As one ages, less useful	.663	.501	.691	.525	.698	.516
λ_{14}: Things better/worse	.701	.530	.693	.526	.743	.548
λ_{15}: I am as happy as younger	.506	.382	.527	.400	.539	.398

(Table continues)

Parameters	Survivors n=182 Est.	St. Est.	Nonsurvivors n=185 Est.	St. Est.	Total Sample n=381 Est.	St. Est.
Error Variances in First Order Factors						
ζ_1: Agitation	.077*		.203**		.150	
ζ_2: Lonely Dissatisfaction	.116**		.098**		.101	
ζ_3: Attitude Toward Own Aging	.257		.280		.233	
Measurement Error Variances in Indicators						
Agitation						
ε_1: Little things bother me	.628		.480		.553	
ε_2: I worry so much	.630		.628		.623	
ε_3: I am afraid	.812		.813		.813	
ε_4: I get mad more	.834		.841		.839	
ε_5: I take things hard	.449		.581		.534	
ε_6: I get upset easily	.518		.614		.582	
Lonely Dissatisfaction						
ε_7: Life isn't worth living	.676		.785		.755	
ε_8: I have a lot to be sad	.562		.714		.639	
ε_9: How satisfied with life	.742		.453		.430	
ε_{10}:Life is hard for me	.557		.390		.452	
Attitude Toward Own Aging						
ε_{11}:Things get worse as you age	.430		.424		.455	
ε_{12}:I have as much pep	.667		.455		.590	
ε_{13}:As one ages, less useful	.749		.724		.734	
ε_{14}:Things better/worse	.719		.723		.699	
ε_{15}:I am as happy as younger	.854		.840		.842	

Note: To conserve space, PGC scale items are shown in abbreviated form.

All estimates are statistically significant at the .001 level except for those with asterisks:

* $p < .05$ ** $p < .01$

from those of rural older adults who did not survive the ten year period and from the sample as a whole at Time 1. The results of this comparison are summarized.

Using the 15-item PGC scale with Pearson correlation coefficients in the input matrix, the three models were relatively similar with regard to first and second order factor loadings as well as to measures of goodness of fit in Table 7. First, the amount of variance in subjective well-being, the second-order factor, is similar across the three samples: survivors, .295; nonsurvivors, .317; and the total sample, .298. The three models are also similar with regard to the relative magnitude of second order factor loadings (gammas), particularly when standardized indicators are examined. These coefficients are interpreted similarly to factor loadings in an exploratory factor analysis; i.e., they indicate the unique amount of variance in the first order factors of agitation, lonely dissatisfaction, and attitude toward one's own aging accounted for by the second order factor, subjective well-being (Tabachnick & Fidell, 1983). Agitation has the highest second order factor loading across the three models followed by lonely dissatisfaction and attitude toward one's own aging. In each model, the gammas are moderately high, ranging consistently from .70 to .90 across the three groups. The error variances in these first order factors for the three groups also are similar. Error

variance range from .077 to .280 which means that subjective well-being explains between 72% and 92% of the variance in agitation, lonely dissatisfaction, and attitude toward one's own aging.

The first order factor loadings (lambdas) indicate the unique amount of variance in observed indicators accounted for by the first order factors of agitation, lonely dissatisfaction, and attitude toward one's own aging (Tabachnick & Fidell, 1983). The size of these loadings varies across the three Time 1 models, but the pattern of loadings is relatively consistent regardless of whether unstandardized or standardized indicators are examined. In cases where there are differences, the relative magnitude of lambdas (λ) in the survivor model differ from those in the nonsurvivor and the total sample models. For example, the loadings of observable indicators on the first order factor of lonely dissatisfaction differ across the three samples. In all the models, y_{10} (Life is hard for me much of the time) has the highest factor loading (survivors, .666; nonsurvivors, .781; and total sample, .740). Results of the survivor model differ from those of the other two, however, in the relative magnitude of factor loadings for the three remaining indicators (y_7, y_8, and y_9).

The range of estimates of measurement error variances among indicators is generally the same across groups.

Error variances range from .39 to .84 across all samples. These error variances show that the first order factors of agitation, lonely dissatisfaction, and attitude toward one's own aging explain between 61% and 14% of the variances in observed indicators.

The goodness of fit measures are fairly consistent across samples with the exceptions of chi-square and the chi-square/df ratio (Table 8). The various measures of fit assess "the probability that the observed correlation matrix could have been generated by the hypothesized model" (Liang & Bollen, 1983, p. 186). A small, nonsignificant chi-square indicates acceptance of the null hypothesis of no differences between the observed correlations among the measured variables and those generated if the model estimates are true, which is the generally desirable outcome.

Chi-square is sensitive to sample size, resulting in poorer fits with larger samples (Bentler & Bonett, 1980; Bohrnstedt & Borgotta, 1981). The larger chi-square for the total sample, therefore, should be expected in light of the larger number of older rural adults represented in the test of this model. The ratio of chi-square to degrees of freedom is another method of assessing the fit of the model to the data (Wheaton, Muthén, Alwin, & Summers, 1977). This measure of fit provides a less inflated index than

Table 8

Comparison of Goodness of Fit Measures for Survivors, Nonsurvivors, and the Total Sample at Time 1

Measures of Fit	Survivors n=182	Nonsurvivors n=185	Total Sample n=381
Chi-Square (DF = 87)	155.43	122.76	214.66
Probability	.00	.01	.00
Chi-Square/DF	1.79	1.41	2.47
GFI	.89	.92	.93
AGFI	.62	.71	.75
RMSR	.07	.06	.06
Total Coef. of Det. (R^2)	.87	.79	.83

chi-square because the calculated chi-square is divided by the correlations minus the number of estimated parameters which somewhat mitigates the effect of sample size. Ratios at or below 2.0 are considered acceptable as indices of goodness of fit (Wheaton et al., 1977). This index of fit indicates that the survivor and the nonsurvivor models fit the data better than the total sample model, although the chi-square/df ratio of 2.47 for the total sample is not far from the criterion ratio of 2.0.

The remaining goodness of fit measures (Goodness of Fit Index, Adjusted Goodness of Fit Index, Root Mean Square Residuals, and Total Coefficient of Determination) are fairly consistent across all Time 1 models. Some specific differences do exist, however. The survivor model, for example, is somewhat lower for the Goodness of Fit Index as well as the Adjusted Goodness of Fit Index. These differences should be expected, however, because the GFI and the AGFI indices are affected by sample size (Babakus et al., 1987). In addition, the Root Mean Square Residual (RMSR) for the survivor model is higher than for nonsurvivors or the total sample models. As with other goodness of fit measures, this index also is affected by sample size. Contrary to other measures of fit, the RMSR has an inverse relationship to sample size. As sample size increases, RMSR decreases. The less than optimal RMSR

(.07) would possibly be lower if the sample size had been 200 or above.

In summary, comparison of survivor, nonsurvivor, and total sample results demonstrate that the factor structure and fit of the model are fairly consistent across the three different groups of the Time 1 sample. When differences do exist, they are of relatively small magnitude. In addition, measures of fit also are relatively consistent across the three samples with all three providing moderate fits of the models to the data. These similarities do not concur with earlier demographic differences among survivors, nonsurvivors, and the total sample. These comparisons do demonstrate, however, that similarities exist in the factor structure and fit of the Time 1 model among survivors who are included in the substantive model and nonsurvivors and the total sample. In addition, consistent Cronbach alphas for the total scale and each subscale are consistent across samples (subjective well-being, .85, .84, .85; agitation, .75 for all groups; lonely dissatisfaction, .73, .72, .70; and attitude toward one's own aging, .68, .71, .69). This does not provide an ideal solution to the sample selection bias believed to be inherent in this study, but the similarity of fit does provide some evidence that the factor structure of subjective well-being is consistent across the subgroups of this rural sample.

Comparison of Time 1 and Time 2 Survivor Models

Preliminary analyses of the factor structure of subjective well-being calculated for survivors separately at Time 1 and at Time 2 were attempted with the 15-variable Pearson correlation coefficient input data matrix. The Time 2 model would not invert using these correlation coefficients. As with other preliminary analyses, it is possible that this mathematical problem is due to the extreme skewness of the dichotomous data and to the relatively small sample size.

Matrices computed with polychoric correlation coefficients did invert, however. A brief comparison of the Time 1 and Time 2 polychoric correlation coefficient models is provided here to demonstrate the similarities of the factor structure model for survivors separately at Time 1 and Time 2 (no tables provided).

The two separate factor structure models for survivors at Time 1 and Time 2 show that the variance of subjective well-being is moderate to low. This should be expected given the dichotomous nature of variables composing the PGC Scale. The ordering of variance explained in the first order factors of agitation, lonely dissatisfaction, and attitude toward one's own aging by the second order factor changes over time but the strength of these factor loadings at Time 1 and Time 2 remains stable with all standardized gammas above .77.

A similar pattern results for the loadings of observed indicators on the first order factors. As with the second order factor loadings, the ordering of variance explained in the individual items changes over time but all standardized loadings are above .50 with the exception of two, both of which loaded above .40.

The goodness of fit measures are higher when polychoric coefficients are used in the input data matrix but they remain consistent across time. For example, the ratio of chi-square to degrees of freedom (Time 1, 7.87; Time 2, 6.83), the Total Coefficient of Determination (Time 1, .89; Time 2, .88), the Goodness of Fit index (Time 1, .74; Time 2, .77), and the Root Mean Square Residual (Time 1, .09; time 2; .08) are similar at both times. The comparison of these polychoric correlation coefficient results suggest that the factor structure of subjective well-being is similar for survivors at Time 1 and Time 2. The reliabilities of subjective well-being and the subscales are fairly consistent at Time 1 and Time 2 (subjective well-being, .85, .84; agitation, .75, .76; lonely dissatisfaction, .73, .76) with the exception of attitude toward one's own aging (.68, .59).

Results of the Substantive Model

The substantive issues of this study can be divided into three major areas, each addressed by an hypothesis.

Substantive Model: Survivors at Time 1 and Time 2

Stability of Subjective Well-Being over Time. The first hypothesis, that the correlation of subjective well-being at Time 1 and Time 2 will be statistically significant, addresses the issue of stability of subjective well-being across time. This hypothesis is supported by the data (Table 9 and Figure 2). The standardized estimate of the relationship between subjective well-being at Time 1 and Time 2 is .412 [$t(388)=3.06$, $p<.001$]. Although statistically significant, the correlation should be considered moderate with approximately 83% ($R^2=.17$) of the variance in the Time 1 and Time 2 subjective well-being relationship left unexplained by the longitudinal model (mean morale scores: Time 1, 28.83; Time 2, 29.12). Examination of the eta correlation matrix further emphasizes the fact that the correlation among etas or first-order factors across time is low (Table 10). The correlation of the agitation factor with itself over the 10-year period is .315, a moderately low level, while the across-time correlations of lonely dissatisfaction and attitudes toward one's own aging are even lower, .277 and .281, respectively. Such results should be expected in light of the low over-time correlations within the Pearson correlation coefficient input data matrix (Appendix C).

Table 9

LISREL Estimates for the Substantive Model: Survivors at Time 1 and Time 2

Parameters	Time 1 Est.	Time 1 St. Est.	Time 2 Est.	Time 2 St. Est.
Correlation of Subjective Well-Being Over Time			.120**	.412
Variance of the Second Order Factor				
Subjective Well-Being	.404	1.000	.210	1.000
Second Order Factor Loadings				
γ_1: Agitation	1.000	.955	1.000	.801
γ_2: Lonely Dissatisfaction	.713	.820	1.030	.821
γ_3: Attitude Toward Own Aging	.813	.741	1.065	.921
First Order Factor Loadings				
Agitation				
λ_1: Little things bother me	1.000	.665	1.000	.572
λ_2: I worry so much	.955	.635	1.020	.688
λ_3: I am afraid	.604	.402	.916	.524
λ_4: I get mad more	.550	.366	.533	.305
λ_5: I take things hard	1.131	.752	.963	.551
λ_6: I get upset easily	1.038	.690	1.228	.702
Dissatisfaction				
λ_7: Life isn't worth living	1.000	.553	1.000	.575
λ_8: I have a lot to be sad about	1.104	.610	1.006	.578
λ_9: How satisfied with life	.656	.362	1.029	.592
λ_{10}:Life is hard for me	1.099	.607	1.027	.590
Attitude Toward Own Aging				
λ_{11}:Things get worse as you age	1.000	.697	1.000	.529
λ_{12}:I have as much pep	.830	.579	.985	.521
λ_{13}:As one ages, less useful	.689	.481	.894	.473
λ_{14}:Things better/worse	.726	.506	.782	.414
λ_{15}:I am as happy as younger	.510	.355	.754	.399

(Table continues)

Parameters	Time 1 Est.	Time 1 St. Est.	Time 2 Est.	Time 2 St. Est.
Error Variances in First Order Factors				
ζ_1: Agitation	.039+	.087	.117**	.359
ζ_2: Dissatisfaction	.100*	.328	.108*	.326
ζ_3: Attitude Toward Own Aging	.219**	.451	.042+	.151
Measurement Error Variances in Indicators				
Agitation				
ε_1: Little things bother me	.558		.673	
ε_2: I worry so much	.582		.527	
ε_3: I am afraid	.828		.698	
ε_4: I get mad more	.866		.907	
ε_5: I take things hard	.433		.683	
ε_6: I get upset easily	.523		.489	
Lonely Dissatisfaction				
ε_7: Life isn't worth living	.695		.658	
ε_8: I have a lot to be sad about	.627		.648	
ε_9: How satisfied with life	.843		.650	
ε_{10}:Life is hard for me	.631		.658	
Attitude Toward Own Aging				
ε_{11}:Things get worse as you age	.514		.720	
ε_{12}:I have as much pep	.642		.730	
ε_{13}:As one ages, less useful	.769		.774	
ε_{14}:Things better/worse	.722		.829	
ε_{15}:I am as happy as younger	.874		.841	

(table continues)

Measurement Error Covariances[a]	
18,3	.212
12,5	-.194
23,9	.171**
22,20	.179**
23,20	.165**
27,8	.092+
28,8	-.167
21,2	.069+
14,5	-.206
18,2	.059+

[a] Error covariances listed in order of entry

Note: To conserve space, PGC scale items are shown in abbreviated form.

All estimates are statistically significant at the .001 level except for those marked with +, indicating nonsignificance, or asterisks level.

* $p < .05$ ** $p < .01$

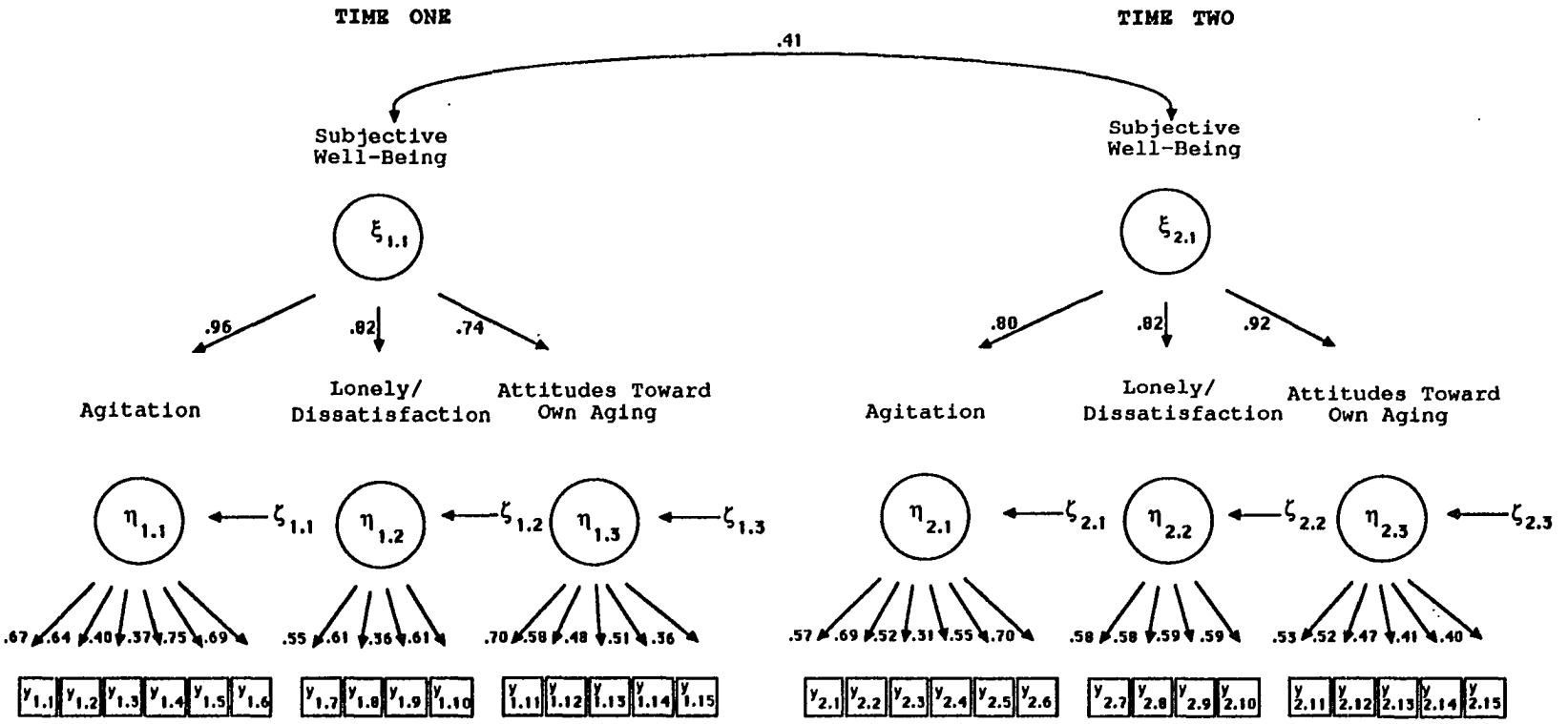

Figure 2. Factor Loadings for Longitudinal Hierarchical Factor Structure of Subjective Well-Being as Measured by the Philadelphia Geriatric Center Morale Scale.*

*Factor loadings expressed as standardized estimates.

Table 10

Correlations of First Order Factors Within and Across Time

Factors	Agit1	Lon/Dis1	Att1	Agit2	Lon/Dis2	Att2
Agit1	1.000					
Lon/Dis1	.783	1.000				
Att1	.708	.607	1.000			
Agit2	**.315**	.270	.244	1.000		
Lon/Dis2	.323	**.277**	.250	.675	1.000	
Att2	.363	.311	**.281**	.738	.756	1.000

Note: Across time factor correlations underlined and printed in bold.

Hierarchical Factor Structure of Subjective Well-Being. The second substantive issue of this study deals with the hierarchical factor structure of subjective well-being. The second hypothesis, which states that the three-factor structure of subjective well-being posited and found by previous analysts would be supported in this study of the rural elderly, is supported by the data (Table 9 and Figure 2). Without exception, all loadings are significant at or below .001, with t-values (df=388) ranging from 3.15 to 7.60. This evidence, in conjunction with preliminary polychoric comparisons of separate models for survivors at Time 1 and Time 2, shows that the observed indicators of the Philadelphia Geriatric Center Morale scale do load reliably on three first order factors and that these first order factors (agitation, lonely dissatisfaction, and attitude toward one's own aging) are not independent of one another but are related by a second order factor, subjective well-being. The error variances show that subjective well-being explains high percentages of variance in first order factors at both times: agitation, 96.7%, 88.3%; lonely dissatisfaction, 90.0%, 89.2%; and attitude toward one's own aging, 78.1%, 95.8%.

A separate maximum likelihood confirmatory factor analysis was conducted in which equality constraints were placed on the substantive model. The purpose of these constraints is to make first and second order factors and

observable indicators load equally for similar items and constructs at Time 1 and Time 2. For example, the loading of agitation on subjective well-being is constrained to be equal at Time 1 and Time 2. The model with equality constraints is then compared to the substantive model, a model that allows factor loadings to be freely estimated at each time via a chi-square difference test. If the chi-square difference test is significant, the two models are different, i.e., the variance explained in observable indicators by the first order factors of agitation, lonely dissatisfaction, and attitude toward one's own aging and the variance explained in these first order factors by subjective well-being is not the same at Time 1 as it is at Time 2. Table 11 shows the goodness of fit statistics for the two models. The chi-square difference test [$\chi^2_{diff}(14)=.0288$, n.s.] shows that the substantive model without constraints and the model with equality constraints are not statistically different. Thus, any observed differences in the estimated factor loadings in the unrestricted model results at Time 1 and Time 2 are due to chance.

Goodness of Fit of the Hierarchical Model to the Rural Sample. The third substantive issue deals with the fit of the hypothesized hierarchical factor structure of

Table 11

Comparison of Goodness of Fit Measures for the Substantive and the Equality Constraint Models

Measures of Fit	Substantive Model	Equality Model
Chi-square	454.37 (df=388)	467.85 (df=402)
Probability	.01	.01
Chi-square/df Ratio	1.17	1.16
GFI	.84	.83
AGFI	.02	-.22
RMSR	.07	.07
Tot. Coef. of Det. (R^2)	.99	.99

Chi-Square Difference (DF=14) = .03, $p > .05$

subjective well-being to a rural sample of older adults. This issue is addressed in the third hypothesis, which states the hierarchical factor structure of subjective well-being will provide a good fit to a rural sample of older adults. Several measures of goodness of fit are examined. These measures, when considered collectively, indicate that the hypothesized model provides a moderate fit to the rural sample data with some measures indicating poor fit and others indicating adequate fit (Table 12).

Confirmatory factor analysis procedures provide a means of improving the fit of the model by freely estimating the correlation of measurement error variances. In the development of the substantive model for this study, ten correlated measurement error terms were entered in additive fashion to improve the fit (Table 13 and Figure 3). Following Liang and Bollen (1983), in each test, the normalized residuals of the theta epsilon matrix or error variance matrix (TE) were examined. Then the correlation between the measurement error of the variables having the highest residual was freely estimated in the subsequent analysis. The procedure continued until 10 correlated measurement error variances had been included and no normalized residuals were above an absolute value of 2.00. These adjustments improve the model somewhat but the

Table 12

Goodness of Fit Measures for the Substantive Model: Survivors at Time 1 and Time 2

Measures of Fit	
Chi-square (df = 388)	454.37
Probability	.01
Chi-Square/df Ratio	1.17
GFI	.84
AGFI	.02
RMSR	.07
Tot. Coef. of Det. (R^2)	.99

Table 13

Improvement of Fit with Ten Nested Correlated Measurement Error Variance Models

	df	Chi-square	p	^{2}/df	GFI	AGFI	RMSR	Tot. R^2
Basic Model	398	522.41	.000	1.31	.82	-.25	.07	.986
18,3	397	512.29	.000	1.29	.82	-.22	.07	.986
12,5	396	502.25	.000	1.27	.82	-.19	.07	.988
23,9	395	494.19	.000	1.25	.83	-.15	.07	.989
22,20	394	487.96	.000	1.24	.83	-.12	.07	.989
23,20	393	480.04	.001	1.22	.83	-.10	.07	.990
27,8	392	478.17	.002	1.22	.83	-.08	.07	.990
28,8	391	471.37	.003	1.21	.83	-.06	.07	.990
21,2	390	469.90	.003	1.20	.83	-.04	.07	.991
14,5	389	455.47	.011	1.17	.84	.00	.07	.992
FINAL MODEL								
18,2	388	454.37	.011	1.17	.84	.02	.07	.992

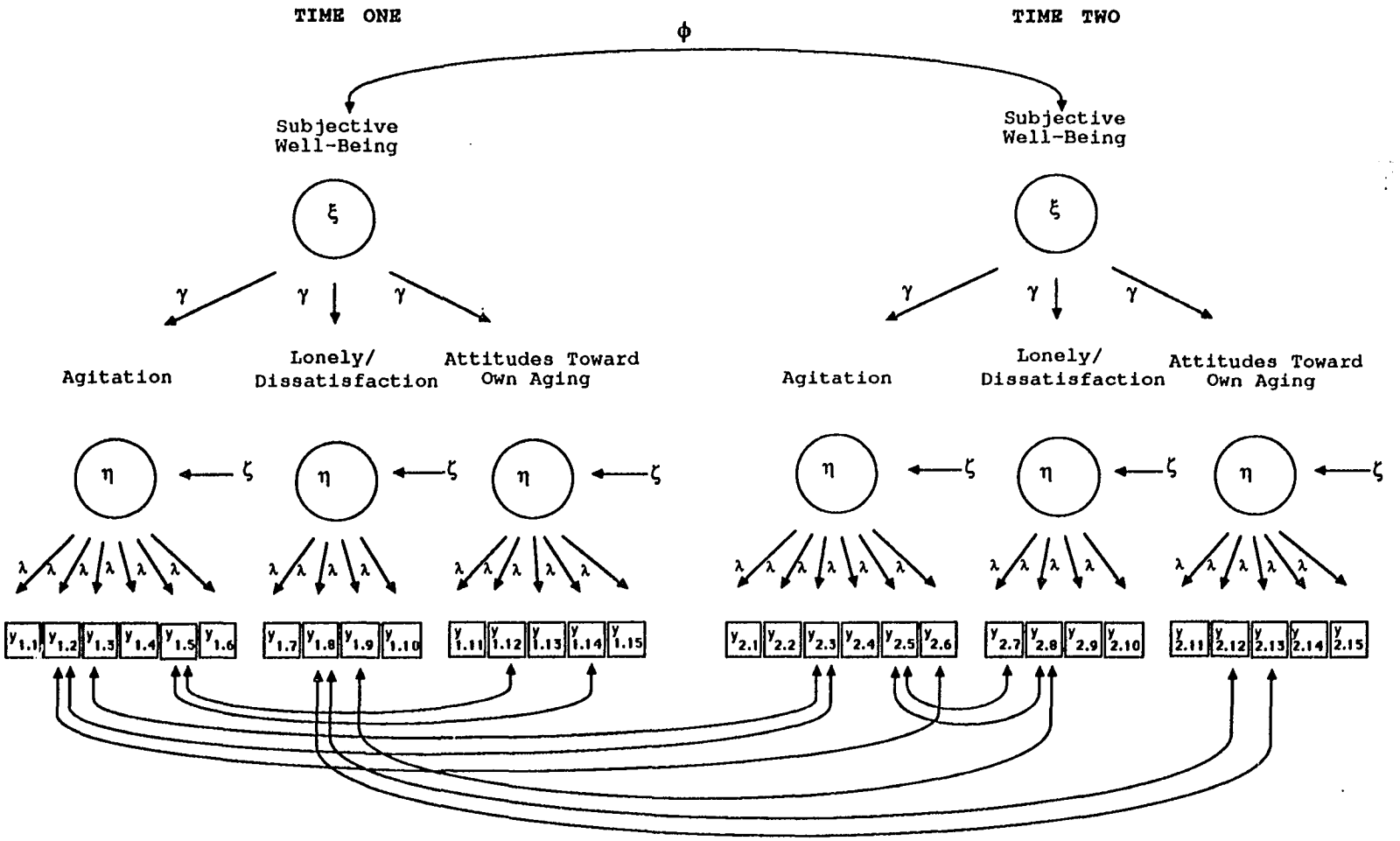

Figure 3. Correlated Measurement Error Variances for Longitudinal Hierarchical Factor Structure of Subjective Well-Being as Measured by the Philadelphia Geriatric Center Morale Scale.

desired chi-square probability level .05 or above was not achieved. In addition, the Goodness of Fit Index is moderate (.84). The gap remaining between this measure of fit and the Adjusted Goodness of Fit Index is large (.82) and suggests that the model does not provide an adequate fit to the rural sample.

On the other hand, the chi-square/df ratio is well below the desired point of 2.0 (1.17) which is an indication of acceptable fit. Because this index of fit is not as dependent upon sample size, these results suggest that the hypothesized longitudinal model does provide a moderate fit to the data. The Total Coefficient of Determination shows that the majority of variance in the PGC Scale is explained by the hypothesized model (.99) and is another indication that the hypothesized model fits the data.

In summary, the results of the substantive model show three important findings. First, the stability over a ten-year period of subjective well-being among older rural adults is moderate. A considerable amount of variance in subjective well-being across time remains unexplained by the hypothesized longitudinal model. Second, the hierarchical factor structure of subjective well-being is consistent for Time 1 and for Time 2; the variance of observable indicators is explained by the first order factors of agitation, lonely dissatisfaction, and attitude

toward one's own aging, and variance in the first order factors is explained by the second order factor, subjective well-being in the same way at Time 1 and Time 2. Third, the longitudinal hierarchical factor structure of subjective well-being fits the data from a rural sample of older adults moderately well when compared over several measures of goodness-of-fit.

CHAPTER 5

SUMMARY, DISCUSSION, IMPLICATIONS, AND RECOMMENDATIONS

Summary

This research provides information concerning the longitudinal stability of subjective well-being as measured by the Philadelphia Geriatric Center Morale scale (Lawton, 1975) and contributes further to the replicability of the hierarchical factor structure of subjective well-being. Maximum likelihood confirmatory factor analysis techniques (Jöreskog & Sörbom, 1984) were used to investigate the fit of a longitudinal hierarchical factor structure model to a sample of older rural adults. The hierarchical factor structure used in this panel study replicated that of Liang and associates (1983, 1985, 1987a, 1987b).

The factor structure of subjective well-being was investigated longitudinally using a panel of older rural adults (n=195) surviving a ten-year, 2-wave investigation. The first wave of data was collected in 1976 with 418 older rural adults ranging in age from 65-99 years. Survivors at the second wave of the study, in 1986, ranged in age from 75-97 years.

Three hypotheses were addressed in the study. The first hypothesis examined the stability of the second order construct, subjective well-being, over time. The second hypothesis tested the replication of the hierarchical

factor structure of subjective well-being at Time 1 and Time 2. The third hypothesis tested the fit of the hypothesized longitudinal hierarchical factor structure model of subjective well-being to rural older adult data.

Several analyses were incorporated in this study. These were divided into three major sets of procedures. First, descriptive analyses were performed to compare survivors to nonsurvivors and the total sample at Time 1. Descriptive procedures also were used to investigate differences in the physical, social, and emotional status of survivors at Time 1 and Time 2. Second, preliminary confirmatory factor analyses were used to provide information helpful in the development and testing of the substantive model, one that examined the longitudinal hierarchical factor structure model of subjective well-being. These preliminary procedures were used to: a) examine the factor structure of subjective well-being with polychoric versus Pearson correlation coefficients as the coefficients of data input; b) examine the full 17-variable model (Lawton, 1975) and the 15-variable model of the PGC scale proposed and tested by Liang & Bollen (1983, 1985; Liang et al., 1987b); c) compare the tests of the Time 1 models of subjective well-being factor structure among survivors, nonsurvivors, and the total sample; and d) compare the tests of the Time 1 and Time 2 survivor models of subjective well-being factor structure

separately. The third major set of analyses investigated the specific hypotheses of the study. Confirmatory factor analyses in this series consisted of: a) tests of the basic model; b) tests of ten subsequent models incorporating the correlation of measurement error variances in additive fashion to improve the fit of the longitudinal model to the data; and c) a comparison of the final correlated measurement error model with an equality constraint model to examine consistency of factor structure within Time 1 and Time 2.

Results of the study provided limited support for the first hypothesis that addressed the stability of the second order construct, subjective well-being, over time. The correlation of subjective well-being over time was statistically significant but moderate. Large amounts of variance (approximately 83%) remained unexplained when this correlation was squared.

The second hypothesis also was supported by the data. The hierarchical factor structure of subjective well-being was replicated for Time 1 and Time 2. That is, variance in the items or observable indicators of the PGC scale was accounted for by the first order latent variables of agitation, lonely dissatisfaction, and attitude toward one's own aging at both Time 1 and Time 2. Variance in these first order factors, in turn, was explained by a second order latent variable, subjective well-being.

The third hypothesis, examining the fit of the model to the rural data, was supported. The longitudinal hierarchical factor structure model provided a moderate fit of the model to the rural sample. Some measures of goodness of fit were less than acceptable while others were adequate. Taken as a whole, however, the model provided support for Liang and associates' (1983, 1985, 1987a, 1987b) conceptualization of a hierarchical factor structure of subjective well-being.

In addition to support for all hypotheses, the results of this longitudinal investigation also showed that while the scale was stable within Time 1 and Time 2, the ways in which individuals answered the items over the ten-year period were not the same. That is, the longitudinal data indicated that, while the mean morale scores of survivors were similar at Time 1 and Time 2, individual subjective well-being did not remain consistent across the ten-year period of time. This moderate correlation suggests that individual subjective well-being is not as stable as earlier hypothesized from cross-sectional studies or studies using ordinary least squares methodology.

These findings add to the growing body of literature that supports a more complex factor structure for subjective well-being (Andrews & McKennell, 1980; Andrews & Withey, 1976; Kammann et al., 1984; Lawton, 1983; Liang & Bollen, 1983, 1985; Liang et al., 1987a, 1987b; McKennell,

1978; Stones & Kozma, 1985). This more complex structure is composed of both unidimensional, at the second order level, and multidimensional, at the first order level, components.

Contrary to earlier reports the stability of subjective well-being over time was not as strong as expected. The hypothesized hierarchical factor structure was found at Time 1 and Time 2 separately but the relationship of subjective well-being across time was moderate indicating that, while limited support for stability was found, changes did occur over time.

Discussion

The results of this study contribute to the literature concerning subjective well-being in four important ways: a) they provide support for the hierarchical factor structure of subjective well-being hypothesized and tested by Liang and associates (1983, 1985, 1987a, 1987b); b) they provide needed information concerning the stability of subjective well-being over time; c) they provide support for the hierarchical factor structure of subjective well-being among older rural adults; and d) they provide an empirical validation of the 15-item PGC scale used by Liang and associates (Liang, 1983, 1985; Liang et al., 1987b).

Support for the Hierarchical Factor Structure of Subjective Well-Being

Subjective well-being demonstrated a hierarchical or nested factor structure in this study. These findings replicate those of Liang and associates (Liang & Bollen, 1983, 1985, 1987a, 1987b). Similarities were found not only in the factor structure of subjective well-being itself but also in the test of the fit of the hypothesized model to the data. Some caution should be used, however, when comparing the findings from the present study with Liang et al.'s (1987a) cross-cultural comparison of subjective well-being factor structure. Their Japanese/American results are based upon an 11-variable model of the PGC scale and differences in measures of fit did exist between results and results reported from the present study and other Liang and associates' studies (1983, 1985, 1987b). It is possible that the differences between the fit of the Japanese/American model and those of the current study and other Liang and associates' studies are due to differences in the construct of subjective well-being. Subjective well-being may not be measured in the same way with 11 and 15 variable models.

Hierarchical Factor Structure Comparisons with 15-Variable PGC Scales

Hierarchical factor structure comparisons between the current study and those of Liang and associates (1983,

1985, 1987b) with the 15-variable PGC scale model showed that subjective well-being, the second order construct, explained large amounts of variance in the first order factors of agitation, lonely dissatisfaction, and attitude toward one's own aging.

At Time 1, subjective well-being explained 96% of the variance in agitation. Eighty-eight percent of the variance in agitation was explained by subjective well-being at Time 2. These percentages were higher than the 61% of variance explained in agitation by subjective well-being reported by Liang and Bollen (1983). The hypotheses of this study investigated the factor structure of subjective well-being, thereby, omitting independent variables that might also contribute to the explanation of variance in first order factors. It is possible that the differences in variance explained by subjective well-being in agitation are due to the historical time of data collection (1968 for the Liang studies, 1976 for Time 1, and 1986 for Time 2). The events that have occurred over these time periods may have affected the ability of subjective well-being to explain amounts of variance in agitation. In addition, the different ages of respondents may have affected the amount of variance explained by subjective well-being. The ages of respondents for Liang and associates and the Time 1 wave of this study covered approximately 35 years, with all older adults studyied

together regardless of age category. Time 2 respondents, however, were all at least 75 years of age categorizing them as old-old adults. It also is possible that the rurality of respondents for this study contributed somewhat to the differences in variance explained in agitation by subjective well-being.

The results of this study and those of Liang and Bollen (1983) were most similar with regard to the percentages of variance explained by subjective well-being in the lonely dissatisfaction factor. Liang and Bollen (1983) reported that 90% of the variance in lonely dissatisfaction was explained by subjective well-being. It would appear that the ability of subjective well-being to explain variance in this first order factor remains consistent across studies regardless of age differences, historical events, or subsample uniqueness.

Liang and Bollen (1983) reported that subjective well-being explained 74% of the variance in attitude toward one's own age. Similarly, at Time 1 in the present study, 78% of the variance in this factor was explained by subjective well-being. At Time 2, however, subjective well-being explained substantially higher amounts of variance in attitude toward one's own aging (96%). As with the agitation factor, it is possible that age-related changes in the perceptions of aging or adaptations to the limitations accompanying the aging process affect the

amount of variance explained in attitude toward one's own aging explained by subjective well-being.

Although subjective well-being explained similarly large amounts of variance in the first order factors of agitation, lonely dissatisfaction, and attitude toward one's own aging, the relative importance of first order factor variance explained by subjective well-being in this study differed from Liang and Bollen (1983). While subjective well-being was more closely related to the lonely dissatisfaction dimension in Liang and Bollen (1983), subjective well-being more nearly described agitation at Time 1 and attitude toward one's own aging at Time 2 in the current study. It is possible that the differences that occur are due to the varying effects of environmental and situational variables, such as changes in independent living, health, and social networks, that influence the interrelationships among the dimensions of subjective well-being and thereby influence the relationship of subjective well-being to first order factors. For example, the drop in variance explained in agitation by subjective well-being may indicate that declines in physical health or difficulties with transportation, housing, income adequacy, or social interaction affect this factor to a greater extent at Time 2 than at Time 1. On the other hand, the increase in variance explained by subjective well-being in the attitude

toward one's own aging factor indicates these unexamined factors were of less importance at Time 2 than at Time 1.

Goodness of Fit Comparisons for 15-Variable Models

The models reported by Liang and Bollen (1983, 1985, 1987) and that of the present study were similar with regard to measures of fit. Chi-square and chi-square/df ratios were similar. The Goodness of Fit Indices also were comparable (Liang & Bollen, .82; McCulloch, .84).

Both Liang and associates' studies and the current research indicated that the goodness of fit could be improved by the addition of correlated measurement error variances. Liang and Bollen (1983) reported the correlation of twelve measurement error variances in their initial study of subjective well-being factor structure. In the replication of the models across subsamples, five pairs of similar correlated measurement error variances were included to improve the fit of the hierarchical factor structure model to the data.

Ten pairs of correlated measurement error variances were correlated to improve the fit of the longitudinal hierarchical model for this study. The larger number of correlated errors needed to provide a moderate fit as compared to Liang and Bollen (1983, 1985, 1987b) was most likely due to the doubling of observed indicators for the panel design (i.e, the 15-variable PGC scale model at Time 1 and at Time 2).

Comparison of Results with the 11-Variable PGC Model

The comparison of the Liang et al. (1987a) study examining Japanese and American differences in subjective well-being with the present one did not have the similarities found in comparisons with other Liang and associate models (1983, 1985, 1987b). The final model used for the Liang et al. (1987a) study contained 11 of the 17 items of the PGC scale (Lawton, 1975). Four items were deleted from the 15-variable models of the PGC scale used for Japanese and American respondents before a common model could be compared across the two cultures. The resulting goodness of fit indices were much better for this reduced model but the results of an 11-variable model are difficult to compare (Hoyt & Creech, 1983) with those of 15-variable models used in the other Liang and associate' studies as well as the present one. The four items deleted to achieve a common model for use with Japanese and American samples were: a) "I am afraid of a lot of things;" b) "Life is hard for me most of the time;" c) I get mad more than I used to;" and d) "Things are better/worse/same than I thought they would be." In contrast, these items performed acceptably with data from older rural survivors used in the present study. The standardized first order factor loadings for each of the four items in the present study were moderate (ranging from

.31 to .61) and, as a result, do not support the shorter scale.

While Liang et al. (1987a) reported support for the factor structure of subjective well-being with their 11-variable model, it is possible that the subjective well-being construct measured by this reduced model is not the same as that measured by the 15-variable model, which has received consistent empirical support in the literature (Liang et al., 1983, 1985, 1987b; Morris & Sherwood, 1975). In addition, the 11-item cross-cultural model may reduce cultural distinctions to such an extent that important differences are ignored that could contribute to a clearer conceptualization of the subjective well-being construct. A more accurate conclusion of this particular Liang et al. study (1987a) might be that the hierarchical factor structure of subjective well-being, while somewhat similar among Japanese and Americans, did not replicate with the number of items as hypothesized for a 15-variable model. The model contained cultural differences in the appropriateness of four of the items used as observed indicators of well-being and its dimensions.

In summary, the results of the current research, particularly when compared with the 15-variable models investigated in three of Liang and associates' studies (1983, 1985, 1987a, 1987b), provided support for the

conceptualization of a hierarchical factor structure for subjective well-being. The similarities in factor loadings; in variances explained by subjective well-being in the first order factors of agitation, lonely dissatisfaction, and attitude toward one's own aging; and in goodness of fit indices showed that the hypothesized model replicated with a rural sample of older adults in much the same way as it did with national representative samples (Liang & Bollen, 1983) and in male/female (Liang & Bollen, 1985) and black/white (Liang et al., 1987b) comparisons.

Stability of Subjective Well-Being over Time

The results of this study, examining the correlation of subjective well-being over a ten-year period among older rural adults, provide information concerning the longitudinal stability of subjective well-being.

Stability of the Second Order Construct, Subjective Well-Being

Subjective well-being was moderately related over time and provided limited support for across-time subjective well-being stability. The correlation of subjective well-being at Time 1 and Time 2 was significant but the strength of the across-time relationship was not as strong as previous literature would suggest. Previous studies examining well-being have indicated that individual levels of subjective well-being remain relatively stable

over time. Costa et al. (1987), for example, reported that subjective well-being did not decline with age among cohorts of men and women 25-74 years of age. Others, using longitudinal data to predict subjective well-being (Baur & Okun, 1983; George & Maddox, 1977; Kozma & Stones, 1983; Mussen et al., 1982; Palmore & Kivett, 1977; Recker & Wong, 1984) reported that subjective well-being was a powerful predictor of itself at a later time; more powerful than other independent variables such as health and social interaction (George, 1978). The moderate correlation reported in this study was based upon Pearson correlation matrices; previous findings concerning subjective well-being stability have used ordinary least squares methodology. The difference between the stability found in the present study and previous investigations may be due to this methodological difference. The moderate correlation of older rural adults' subjective well-being over time may also be due to the particular characteristics of rural environments. The hardship of living in areas characterized as having inadequate medical factilities, public transportation, and housing alternatives as well as having a general lack of economic growth may account for the fact that older rural adults' subjective well-being was not more stable.

The moderate correlation found in the present study suggests, however, that even though average levels of

subjective well-being (as demonstrated by group means) remain fairly consistent over time, individual differences occur in levels of subjective well-being among older rural adults. As individuals become more dependent upon others because of limitations in health, they may find it difficult to maintain previous levels of subjective well-being. The loss of spouses and significant peers, and losses of independent transportation and living arrangements can also be expected to affect levels of subjective well-being during old-old age (Breckenridge et al., 1986; Klemmack & Roff, 1984; Perlman, 1988; Rosenwaike, 1985).

To summarize, the results of this study show that subjective well-being is related across time. It is not, however, as highly correlated as expected from previous literature. This moderate correlation indicates that additional factors within the individual (such as health and ability to get around) and factors present in an older adult's environment (such as availability of transportation, financial resources, and living arrangements) possibly influence levels of subjective well-being. It is possible that when older adults are examined across age groups (such as young-old, old-old, and the very-old) the predictability of these individual and environmental factors and their relationship to the factor structure of subjective well-being will become clearer.

The examination of factors influencing subjective well-being among older adults as a monolithic group, a methodology often present in previous studies, has most likely masked the importance of changes in situational and environmental variables to aging subgroups.

Stability of First Order Factors over Time

The low correlations of first order factors with themselves across time were similar and, while statistically significant, provided weak support for first order factor stability across time (all remained at or below .30). The labeling of the first order factor, lonely dissatisfaction, by Lawton (1975) as a dimension measuring loneliness makes the linking of these results with the reviewed literature difficult. The content of the review, for example, was based on previous studies investigating the loneliness dimensions of this factor. Results from this study showed, however, that the factor, redefined as "life satisfaction," demonstrated weak stability over time.

The across-time correlations of the first order factors with themselves (i.e., agitation with agitation) were no higher than the correlations among different first order factors over time (i.e., agitation with lonely dissatisfaction). These across-time relationships suggest that, among rural adults, the dimensions of subjective

well-being are not traits that remain relatively stable during old age.

Stability of Agitation over Time. Previous studies examining dysphoric mood elements (Lawton, 1972), psychiatric symptoms (George 1981; Lawton, 1977), and negative affect (Lawton et al., 1984) associated with the agitation component suggest that this dimension of subjective well-being might demonstrate consistency across time. Results of the present study, however, did not show a strong relationship between agitation at Time 1 and Time 2. The correlation was statistically significant but the strength of the relationship was weak, indicating that agitation is not a stable trait that can be expected to remain at consistent levels throughout old age. In other words, additional factors relative to the time of measurement contributed to the inability of subjective well-being to explain stable amounts of variance in agitation.

Stability of Lonely Dissatisfaction and Attitude Toward One's Own Aging. The relationships of the remaining two first order factors, lonely dissatisfaction and attitude toward one's own aging, also differed over time. The correlations, although statistically significant, remained below .30. These correlations indicated that the relationships of factors across the two time periods were weak. These dimensions of well-being, as was the case of

agitation, also were most likely influenced by health status, degree of independence, and social network quality present at the time of measurement.

Interrelationships of First Order Factors Within Time 1 and Time 2

There were strong correlations between first order factors at each time, indicating that the dimensions are interrelated within each time by a broader construct, subjective well-being. Well-being explained large amounts of variance in agitation, lonely dissatisfaction, and attitudes toward one's own aging at both Time 1 and Time 2 with percentages of variance explained consistently above 78%; with two of the factors having at least 88% of the variance explained by subjective well-being. To date, little is known about the separate dimensions of the PGC scale or those dimensions from other multidimensional measures of subjective well-being such as the Life Satisfaction Index A (Neugarten et al., 1961). It is important that additional information be obtained concerning independent constructs that influence these various dimensions of well-being as well as ways in which these factors influence other constructs important in the study of older adults. Information specific to each component of subjective well-being should aid in obtaining conceptual clarity of these dimensions and, in turn,

provide information needed to clarify the conceptual definition of subjective well-being.

The relationships found between first order factors in the present study showed that the interrelationships of the dimensions of subjective well-being at each time are stronger than the relationships of individual factors over time. This observation underscores the importance of differentiating between the stability found within time as compared to the stability of subjective well-being across time.

Support for the 15-Variable Model of the PGC Scale

The inconsistency found in the number of items composing the PGC scale makes cross-study comparisons of subjective well-being findings difficult. Studies examining subjective well-being as a unidimensional construct have generally summed the 17-variable model of Lawton's PGC scale (1975) and used this summated score as a measure of subjective well-being (e.g., Kivett, 1988; Mancini & McKeel, 1986; Ward et al., 1984). None of the Liang and associate studies began with the 17-variable model of the PGC scale as reported by Lawton (1975). In the development and replication of the hierarchical factor structure of subjective well-being, Liang and associates hypothesized and tested a 15-variable model of the PGC scale (1983, 1985, 1987b), concurring with Morris and Sherwood (1975) that two of the items measured a construct

other than subjective well-being. In their cross-cultural study (Liang et al., 1987a), the scale was further reduced to an 11-variable model to provide commonality between Japanese and American respondents.

The present study began analyses with the full 17-variable model (Lawton, 1975) because this original composition of the scale has been the one used most frequently in the gerontological literature. The results of preliminary and substantive analyses, however, showed that the 17-variable model did not perform satisfactorily with maximum likelihood procedures. That is, two items were problematic when included in the 17-variable original version of the PGC scale (Lawton, 1975). These items were: a) "How much do you feel lonely;" and b) "I see enough of my friends and neighbors." When these two items were used in the input data matrix, the correlation matrix would not invert and maximum likelihood estimates could not be generated. In light of these computational difficulties, the final substantive model was tested using the 15-variable model hypothesized and tested by Liang and associates (1983, 1985, 1987b). The results of this empirical test of the items composing the PGC scale, therefore, supported the use of this 15-variable model.

The reduction of two items from the PGC scale as reported by Lawton (1975) in this and other studies (Liang & Bollen, 1983, 1985, 1987a, 1987b) brings into question

the appropriateness of labeling for the first order factor, lonely dissatisfaction. The two items, problematic in this study, were labeled by Lawton (1975) as observed indicators of lonely dissatisfaction. The remaining four items ("I sometimes feel life isn't worth living," "I have a lot to be sad about," "How satisfied are you with your life today," and "Life is hard for me much of the time") do not deal with perceptions of loneliness or social interaction. Liang and Bollen (1983, 1985), while not addressing this issue in a formal way in their studies, deleted the "lonely" label from this first order construct and labeled it "dissatisfaction."

The dissatisfaction label, too, would appear to be problematic. The face validity of the remaining four items, for example, shows that only one of the indicators measures dissatisfaction specifically. The label, therefore, remains a misnomer of this first order subjective well-being dimension. The four items do have a common thread--feelings about life. With the exception of one ("I have a lot to be sad about"), statements about life perceptions specifically appear in each. A more appropriate label, "Life Satisfaction," is suggested here to better identify the content measured by this first order construct. The identification of this first order factor as life satisfaction implies that subjective well-being is a higher construct than life satisfaction. The two,

although interrelated, are not synonymous as much previous literature would suggest (Liang & Bollen, 1983; McNeil et al., 1986).

Sample Limitations

Several references have been made to the limitations present in this study. These included sample selection bias, positive skewness in rural sample data, survivor sample size, and the length of time between the first and second wave of the study.

The sample selection bias believed to be inherent in this study was due to the nonrandom exclusion of nonsurvivors, non-located respondents, and surrogate respondents for survivors who were unable to respond to questions of a subjective nature. The nonrandom exclusion of individuals from the test of the substantive model could: a) affect the comparison of the fit of the hypothesized longitudinal model to those model tested by Liang and Bollen (1983, 1985, 1987a, 1987b); and b) affect the skewness of the data.

Comparisons of results from this study with those of Liang and associates (1983, 1985) suggest that sample selection bias did not produce models with greatly biased estimates. The factor loadings and goodness of fit indices for the final model of this study and those of Liang and Bollen (1983, 1985) were similar; providing moderate fits of the models to the data. The comparison of models within

the present study also showed relatively few differences in the tests of fit to data from survivors, nonsurvivors, and the total subsamples models. This suggests that the rural survivors of this study were not relatively different in their response to the PGC scale from nonsurvivors and the total sample measured at Time 1 or from nationally representative respondents.

In addition, concern was expressed over the extreme skewness of the rural survivor data. It seems likely that because the fit of the data to the models in this study and that of Liang and associates (1983, 1985, 1987b) were similar that the responses of these rural adults were not too dissimilar from those of older adults in nationally representative samples. It is likely, however, that Liang and associates (1983, 1985, 1987a, 1987b) also reported results from data that were positively skewed. The fit reported here and elsewhere (Liang & Bollen, 1983, 1985, 1987b) are considered moderate (chi-squares in the range of .82-.84). It would have been desirable to have chi-squares higher than .90 as indicators of fit, however. It is possible that greater variability of responses would have contributed to a better fit of the hypothesized longitudinal model to the rural data.

The additional limitations of this study, survivor sample size and time between measurements, did not appear to jeopardize the results. The similarities found between

the fit of the model in this study and those of Liang and associates (1983, 1985, 1987b) suggest that sample size did not alter the fit of the model. It is uncertain, however, whether additional measurements of subjective well-being, particularly if they had been spaced closer together, would have enabled a more systematic observation of subjective well-being differences over time.

In conclusion, the results of this study provide information concerning the replicability of subjective well-being factor structure as well as information concerning the stability of subjective well-being over time. Information also is provided concerning the structure of the Philadelphia Geriatric Center Morale Scale (Lawton, 1975). The results of this study can be summarized accordingly:

a) support was found for the hierarchical factor structure of subjective well-being proposed and tested by Liang and associates (1983, 1985, 1987a, 1987b);

b) the correlation of subjective well-being across time as well as the correlations of dimensions were moderate to low indicating that subjective well-being is moderately stable but not as stable among older rural adults as previous studies would suggest;

c) the hierarchical factor structure of subjective well-being was replicated with a sample of older rural survivors, with the proposed longitudinal model providing a moderate fit to the data; and

d) the 15-variable model of the PGC scale used by Liang and associates (1983, 1985; Liang et al., 1987b) was empirically validated in this study.

Implications

The results of this study have implications for future research, for theory development, and for the development of public policy and service delivery for older rural adults.

Implications for Research

Stability of Subjective Well-Being. The correlation of subjective well-being over time was moderate. This suggests that additional factors present at the time of measurement have a sizable effect upon subjective well-being. Researchers examining subjective well-being in the future must be mindful of the across-time variability of the construct when investigating its relationship to other factors. Studies that include previous levels of subjective well-being and it dimensions as well as independent situational and environmental factors are needed. Investigations that incorporate this more complex

methodology should provide a clearer understanding of the first order factors of agitation, lonely dissatisfaction, and attitude toward one's own aging as well as clarification of the relationship of these factors to subjective well-being.

Dimensionality of Subjective Well-Being. A further implication of this study deals with the dimensionality of subjective well-being. Results supported others who define subjective well-being as having unidimensional as well as multidimensional components (e.g., Liang & Bollen, 1983, 1985, 1987a, 1987b; Stones & Kozma, 1980). Researchers would be advised to incorporate this more complex conceptualization of subjective well-being into investigative models. There are few data on the predictors of subjective well-being with structural equation models conceptualizing well-being as a construct with an hierarchical factor structure. Studies need to be conducted that examine the interrelationships of predictors to first and second order constructs simultaneously. The failure to recognize the hierarchical factor structure of subjective well-being biases estimates and coefficients and hampers the validity of reported relationships among variables.

Composition of the PGC scale. This study indicates that the 15-variable model of the Philadelphia Geriatric Center Morale Scale should be used rather than the

17-variable model reported by Lawton (1975). The items dealing with loneliness or social interaction in the dimension labeled previously as lonely dissatisfaction did not perform adequately in this study, empirically validating the face validity omission of the items by others (Liang & Bollen, 1983, 1985; 1978b).

The omission of these items also indicates that the labeling of this factor is inappropriate. The alternative, "life satisfaction," suggested in this study hypothesizes that life satisfaction may not be synonymous with subjective well-being as many have indicated previously (e.g., Liang & Bollen, 1983; George, 1981). That is to say, theoretical investigations are needed to clarify the relationship of subjective well-being to life satisfaction.

Implications for Theory

Current weaknesses are evident in subjective well-being scales because of the lack of initial theoretical conceptualization. This lack of conceptual clarity and adequate theoretical underpinning have limited the scientific rigor necessary for a thorough understanding of subjective well-being (George, 1981; George & Bearon, 1980; Lawton, 1977). This void serves as a barrier to the interpretation of results from empirical investigations of subjective well-being.

Several broad theories exist that could provide propositions useful in examining subjective well-being and can be related to the results of the present study. Diener (1984) has reviewed respective theories as they relate to well-being. Examples of these theories are: a) top-down theories, those that hypothesize a global propensity to experience life in a positive way; b) associationistic theories, those that hypothesize a predisposition to positive well-being; c) telic theories, those that hypothesize that subjective well-being is affected by the congruence of needs and goals; and d) activity theories, that hypothesize the well-being is "a by-product of human activity" (p. 564).

The within-time stability of subjective well-being factor structure as opposed to the weaker across-time relationships suggests that the development of convergent theoretical propositions from these different theoretical perspectives would be helpful in clarifying the definition of subjective well-being. For instance, the limited support found for the stability of subjective well-being across time provides evidence that propositions from top-down theories and associationistic theories (theories that are based on the stability of subjective well-being over time) should increase our understanding of subjective well-being. These propositions alone, however, seem to be inadequate to fully explain subjective well-being.

The fact that the across-time subjective well-being correlation is not higher indicates that theories dealing with the ways in which current individual and environmental states (such as those purported by telic and activity theories) affect subjective well-being also are needed to increase our understanding of subjective well-being. Propositions that incorporate trait variables as threshold or baseline measurements of well-being (such as those from top-down and associationistic theories) and that then incorporate state variables (telic and activity theories) might provide the theoretical and conceptual clarification needed in studies concerning subjective well-being.

Furthermore, the successful replication of the hierarchical factor structure of subjective well-being in this and other studies (Liang & Bollen, 1983, 1985, 1987a, 1987b; Stones & Kozma, 1985) indicates that future theoretical propositions should be based on a more complex definition of subjective well-being. This definition should include a unidimensional second order component, subjective well-being, and multidimensional first order components, such as the agitation, lonely dissatisfaction, and attitude toward one's own aging factors found in the PGC measure of well-being.

Implications for Practitioners, Service Providers, and Policy Makers

The results of this study provide limited support for those social scientists who hypothesize that subjective well-being is a stable trait (McNeil et al., 1986). The moderate correlation of subjective well-being over time provide support to individuals establishing policies and providing services to older rural adults. Efforts to improve situational factors (such as improvements of health through improvements in scarce or inadequate medical care) and improvements in environmental factors (such as the establishment of transportation and housing alternatives in rural areas) should result in changes in individual subjective well-being and its dimensions. If the correlation of subjective well-being over time had been high, these situational and environmental changes could not be expected to translate into subjective well-being improvements. Older rural adults' levels of well-being could be expected to remain consistent regardless of changes in situational and environmental factors.

Individuals responsible for establishing policies that affect older rural adults should recognize that levels of well-being may be influenced by situational factors in the immediate environment. Individual subjective well-being fluctuates even though average or group mean well-being levels appear to be stable. These

results, therefore, underscore the importance of addressing individual differences within old age subgroups. Policies that address particular environmental deficits might be expected to make significant changes in the quality of life of older rural adults.

Recommendations for Future Research

The findings of this research suggest directions for future research. Studies should be conducted that investigate issues relating to theoretical conceptualization and clarity of subjective well-being and to the instrumentation of subjective well-being scales in terms of factor structure, composition, and formatting. First, more information is needed concerning the theoretical formulation and conceptual clarity of the first order factors of subjective well-being. The work of Hoyt et al. (1980) provide support for the importance of understanding the dimensions of broad constructs such as subjective well-being. In an investigation of the components of the Life Satisfaction Index A (Neugarten et al., 1961), Hoyt et al. (1980) found that the dimensions of subjective well-being did not perform the same way in separate predictive equations. Some independent variables were common significant predictors of all life satisfaction dimensions while other independent variables predicted only one. Until more is known about the separate components,

progress toward theoretical and conceptual clarity of subjective well-being is likely to remain limited.

The successful replications of hierarchical factor structure of subjective well-being in this and other studies (Liang & Bollen, 1983, 1985; Stones & Kozma, 1985) indicate that future theoretical propositions should be based on a more complex definition of subjective well-being with a unidimensional second order factor and multidimensional first order factors. Additional work is required, however, to determine just what this factor structure means in more comprehensive structural equation models. For example, what is the relationship of the hierarchical factor structure of subjective well-being to variables previously mentioned in the literature as important to subjective well-being, such as health and social interaction?

Results of this study showed limited support for the stability of subjective well-being over time. Future research should consider the implications these results have for investigating well-being among monolithic elderly populations. Subjective well-being and its relationship to agitation, lonely dissatisfaction, and attitude toward one's own aging may be different depending upon whether the older persons studied are young-old, old-old, or very-old individuals.

Research also is needed regarding the composition of subjective well-being scales. The deletion of two items from the first order construct labeled lonely dissatisfaction by Lawton (1975), both measuring dimensions of social interaction, suggests that the names of this factor labeled as "lonely dissatisfaction" by Lawton (1975) and as "dissatisfaction" by Liang and associates (1983, 1985, 1987a, 1987b) are inappropriate. Additional research is needed to replicate the appropriateness of omitting the loneliness items from this dimension of well-being, and more theoretical and empirical research is needed to evaluate the labeling this modified first order construct, "life satisfaction," as was suggested in this study.

In addition, research is needed to replicate the empirical support found here for the 15-variable model of the Philadelphia Geriatric Center Morale Scale as hypothesized and tested by Liang and Bollen (1983, 1985). If future studies have difficulties with the two items problematic in the present research, the 15-variable model of the PGC scale should be considered a more appropriate instrument for the measurement of subjective well-being.

Studies should be conducted that replace the current dichotomous format of the Philadelphia Geriatric Center Morale Scale (Lawton, 1975) with Likert-type responses. The extreme positive skewness found among these data is believed to have caused computational problems with the

preliminary and substantive models tested in this study. That is, the skewness of the data interfered with the ability of matrices to invert which caused nonconvergence problems. It is impossible to judge a priori what changes in subjective well-being factor structure could occur with a Likert response format. The change to these responses, however, would increase the variability possible for each observable indicator and reduce the likelihood of nonconvergence.

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APPENDIX A

Sampling Strategy

Example: Compact Cluster Sampling Procedure

(Exhibit A)

Sample Selection NC AES 132 VO (Caswell County, NC)

Townships	① Enumeration District	② Housing Units (Census)	③ Housing Units Adj.	④ Cumulative H.U. 650	⑤ Cumulative Clusters	⑥	⑦	⑧ Paper Zones (n=8)	⑨ Selected Clusters
Anderson	16	323	105	105	20	1-20	20	I	IB, ID
	17	191	62	167	31	21-31	11		
Dan River	4	357	106	273	51	32-51	20		IA, IC, IID
	5	409	120	393	73	52-73	22	II	IIA, IIB
Hightowers	14	331	99	492	91	74-91	18		IIC, IIIC
	15	102	32	524	97	92-97	6		
Leasburg	13	351	105	629	117	98-117	20	III	IIIA, IIIB, IIID
Locust Hill	8	107	33	663	123	118-123	6		IVA, IVD
	9	321	99	761	141	124-141	18		IVB
Milton	1	91	31	792	147	142-147	6	IV	
	2	180	61	853	157	148-157	11		VC
	3	382	130	983	183	158-182	25	V	VA, VB
Pelham	6	509	141	1124	209	184-209	26		VD, VC
	7	405	115	1239	230	210-230	21	VI	VIA, VIB, VIC, VID
Stoney Creek	18	203	55	1293	240	231-240	10		
	19	425	115	1408	262	241-262	22	VII	VIIA, VIIB, VIID
Yanceyville	10	395	135	1573	287	263-286	24		VIIC, VIIC
	11	173	59	1632	297	287-297	12	VIII	VIIIA, VIIID
	12	356	121	1733	320	298-320	22		VIIIB
		5,637		1733				n=8	K=32

Desired sample size = 830

Sampling ratio = 1X6

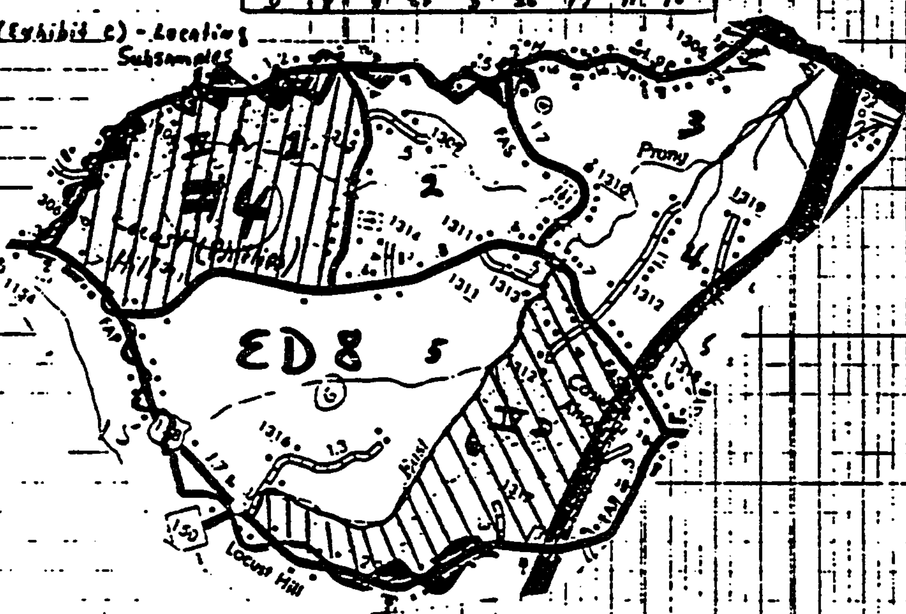
Vijay R. Kishk
Project Director

(Exhibit B)

(Random Numbers Drawn for Zones)

(Sub-Samples)	I	II	III	IV	V	VI	VII	VIII
A	33	15	31	2	17	23	1	8
B	1	31	35	16	14	10	10	28
C	32	36	8	32	31	12	32	6
D	8	9	28	3	26	17	11	16

(Exhibit C) - Locating Subsamples



Compact Cluster Sampling Procedure

1. Decide on sampling ratio or size
2. Where:
   n = desired sample size
   N = population
   Sampling ratio = $\frac{n}{N}$
3. Col. 1: List sampling unit (city block statistics, E.D.'s, etc.)
4. Col. 2: Record housing units per sampling unit (e.g. E.D.)
5. Col. 3: Record no. of persons in sampling unit (of special interest - i.e., population)
6. Col. 4: Calculate cumulative no. persons per sampling unit
7. Col. 5: Calculate cumulative clusters by multiplying col. 5 x the sampling ratio $\frac{n}{N}$ (range)
8. Col. 6: Determine no. of clusters within the sampling units. Col. 7: Determine Actual Number of Clusters
9. Col. 8: Determine "paper zone" (number arbitrary except that it must be a multiple of the sampling size); from this, decide how many clusters fall into said zone by dividing the sample size by the no. of "paper zone". Go to col. 7 and count off desired number of clusters within a paper zone. This cutoff point forms the boundary of the paper zone
10. Col. 9: Decide on the number of desired subsamples per paper zone. Using this number, go to table of random numbers and select number of subsamples between the numbers 1 and the upper limit of the no. of clusters within a paper zone. (See Exhibit B)
11. Using a map, tabulate the sampling units (e.g. E.D.) and divide equal according to the number designated for that unit in col. 7. Housing units should be equally divided. This can be done by ① counting the units; or ② using a map with a designated number, consecutively and subdivisions. Using a table of random numbers, select the desired no. of subsamples. Enumerators then go to every residence within the selected areas. See Exhibit C.

APPENDIX B

Questionnaire

QUESTIONNAIRE[1]

Caswell Revisited: A Ten Year Follow-Up on the Rural Elderly

Subject Number _____

•Subject's Name _____
Last First Middle

•Subject's Address _____
Street & Number (or route) Town

•Subject's Phone Number _____

Record of Calls and Callbacks

Calls	Date	Time Began	Time Finished	What Happened (General Reaction)
1				
2				
3				

Questionnaire: _____ complete _____ incomplete

Interviewer: _____

•Only these questions are asked to surrogate respondents

[1]Some items on this questionnaire were taken or adapted from the OARS Multidimensional Functional Assessment Questionnaire, Older Americans Resources and Services Program of the Duke University Center for the Study of Aging and Human Development, Durham, North Carolina.

[For office use only]
Card No. 1
Data Set ___ (1)
Subject # ___ ___ ___ (2 3 4)
Card # ___ ___ (5 6)

CIRCLE ONLY ONE RESPONSE UNLESS OTHERWISE NOTED.

*1. Sex of Subject ___ (7)

1 Male
2 Female

*2. Race of Subject ___ (8)

1 White (Caucasian)
2 Black (Negro)
3 Other (Specify) _____

I. GENERAL INFORMATION
"I am going to ask you several kinds of questions. There are no right or wrong answers. Just give the answer that is right for you. Most of the questions will need only one answer. Listen carefully to each question before you give me your answer. I will mark your answer on this sheet".

---

*3. Location of Permanent Residence ___ (9)

1 Town (inside corporate limits)
2 Rural

*4. How many years of school did you complete? ___ ___ (10 11)

_____ years

*5. How old are you? _____ ___ ___ ___ (12 13 14)

When were you born? _____
(Month) (Day) (Year)

*6. Are you currently single, married, widowed, divorced or separated?

1 Single How long? _____ ___ ___ ___ (15 16 17)
2 Married How long? _____ ___ ___ ___ (18 19 20)
3 Widowed How long? _____ ___ ___ ___ (21 22 23)
4 Divorced How long? _____ ___ ___ ___ (24 25 26)
5 Separated How long? _____ ___ ___ ___ (27 28 29)

*7. How many times have you moved since 1976? ___ (30)

1 Have not moved
2 1 time
3 2 times
4 3 times
5 4 or more times

IF RESPONSE TO ITEM 7 WAS (1), GO TO ITEM 9

*8. The last time you moved was it from.... ___ (31)

1 One place in Caswell County to another?
2 Another area in North Carolina, but not Caswell County?
Where? _____
3 A different state?
Where? _____
4 Abroad?
Where? _____

*9. How many years have you lived in this neighborhood? (community) ___ (32)

1 Under one year
2 2-5 years
3 6-9 years
4 10-15 years
5 16-20 years
6 21-30 years
7 Over 30 years

•10. Do you own your home or rent it? ___ 33
(IF OWN, ASK IF THERE IS A MORTGAGE ON THE HOME.)

1 Own home (No mortgage)
2 Own home (Mortgage)
3 Rent house (Yourself)
4 Live in relatives' house
(relationship _____)
5 Retirement home
6 Rest home
7 Nursing home
8 Other (specify _____)

•11. Who lives here with you? (May check more than one)

1 No one ___ 34

2 Husband or wife ___ 35

3 Son(s) (How many? _____) ___ ___ 36 37

4 Daughter(s) (How many? _____) ___ ___ 38 39

5 Parents (How many? _____) ___ ___ 40 41

6 Brothers and sisters (How many? _____) ___ ___ 42 43

7 Other relatives (How many? _____) ___ ___ 44 45

8 Friends (How many? _____) ___ ___ 46 47

9 Others (Relationship _____) ___ ___ 48 49

12. Have you ever thought about moving? ___ 50

1 No
2 Yes

•13. Are you planning to move? ___ 51

1 No
2 Yes
3 Don't know

14. What kind of location do you think that a person your age should consider when planning to move?
(May give more than one answer)

a _____ ---
52

b _____ ---
53

c _____ ---
54

d _____ ---
55

15. At the present time you are living (for example, alone). Which of the following arrangements do you think is best for you (and your husband or wife)? ---
56

1 To live by yourself(selves) away from relatives
2 To live by yourself(selves) near relatives
3 To live with your (or spouse's) relatives

16. You are living here now. Other than here, which of these places would you most prefer to live? ---
57

1 One story apartment
2 Apartment building (high rise)
3 Nursing or convalescent home
4 Home for the aged (retirement home)
5 Mobile home
6 Don't know

II. WORK AND RETIREMENT

"Next I would like to know about your work or retirement."

---

17. In regard to working, are you presently.... ---
58

1 Employed full time
2 Employed part time
3 Retired
4 Retired on disability
5 Not employed

IF WORKING, ASK ITEMS 18 19 AND 20.

IF RETIRED, GO TO ITEM 21.

*18. What kind of work are you presently doing? Be specific as to type. ___ ___ 59 60

---

19. Which of these best describes how you feel about your work? You... ___ 61

3 Like it very much
2 Have no strong feelings about it
1 Dislike it very much

20. You are presently working. However, tell me which of these you think you will probably do in the next five years with regard to your work? ___ 62

1 Continue working at the same job
2 Work at something else
3 Retire, because it will be required
4 Other
5 Don't know

IF WORKING, GO TO ITEM 25.

IF RETIRED, ASK ITEMS 21, 22, 23.

*21. How long have you been retired? ___ 63

1 Less than one year
2 2-4 years
3 5-9 years
4 10-15 years
5 16-20 years
6 Over 20 years

*22. Why did you retire? ___ 64

1 Poor health (own decision)
2 Poor health (employer's decision)
3 Preferred leisure
4 Complusory retirement age
5 Laid off or job discontinued
6 Other

23. How do you like being retired? Do you... ___ 65

3 Like it very much
2 Dislike it very much
1 Have no strong feelings about it

IF RESPONSE TO ITEM 23 WAS (2), ASK ITEM 24.

24. Why do you dislike being retired? ___ 66

---

*25. What kind of work did you do at 50? (Be specific) ___ 67

III. FAMILY AND FRIENDS

"Next I would like to talk about your family and friends."

---

*26. How many children do you have who are living? _____ ___ ___ 68 69

*27. How many children do you have who are not living? ___ ___ 70 71

IF NO LIVING CHILDREN, GO TO ITEM 32.

Card No. 2
Data Set ___ 1
Subject # ___ ___ ___ 2 3 4
Card # ___ ___ 5 6

*28. I would like to know how close you live to your children. How many children do you have...
(May check more than one)

In this household? _____ ___ 7

In this town (Co.)? _____ ___ ___ 8 9

Within 49 miles? _____ ___ ___ 10 11

Within 50-250 miles? _____ ___ ___ 12 13

Over 250 miles? _____ ___ ___ 14 15

•29. Counting visits to them as well as their visits here, how often do you see your children who are... (Ask only those categories checked under item 28.)

Distance	Daily	Weekly	Monthly	2, 3, 4, Times	Yearly	Less frequently	
	(Circle only one in each row)						
In this town (county)?	1	2	3	4	5	6	___ 16
Within 49 miles?	1	2	3	4	5	6	___ 17
Within 50-250 miles?	1	2	3	4	5	6	___ 18
Over 250 miles?	1	2	3	4	5	6	___ 19

30. When you get together with your children, which of these do you usually do? ___ 20

1 You usually go to visit them
2 They usually come to visit you
3 You usually exchange visits about equally

31. Children can be of concern in later life. Do your children cause you worry in any way? If yes, in what ways? ___ ___ 21 22

1 No ____
2 Yes ____ Describe _____

_____

_____

_____

•32. How many brothers and sisters do you have who are living? _____ ___ ___ 23 24

IF NO LIVING BROTHERS OR SISTERS, GO TO ITEM 36.

•33. I would like to know how many brothers and sisters you have....

In this household?	_____	25
In this town (Co.)?	_____	26 27
Within 49 miles?	_____	28 29
Within 50-250 miles?	_____	30 31
Over 250 miles?	_____	32 33

•34. Counting visits to them as well as their visits here, how often do you see your brothers and sisters who are....
(Ask only those categories checked under item 33.)

Distance	Daily	Weekly	Monthly	2, 3, 4, Times Yearly	Yearly	Less Frequently	
	(Circle only one in each row)						
In this town (county)?	1	2	3	4	5	6	34
Within 49 miles?	1	2	3	4	5	6	35
Within 50-250 miles?	1	2	3	4	5	6	36
Over 250 miles?	1	2	3	4	5	6	37

35. When you get together with your brothers or sisters, which of these do you usually do? 38

1 You usually go to visit them
2 They usually come to visit you
3 You usually exchange visits about equally

36. About how many times did you talk to someone--friends, relatives, or others on the telephone in the past week (either you called them or they called you?) IF SUBJECT HAS NO PHONE, QUESTION STILL APPLIES. ___ 39

    3 Once a day or
    2 2-6 times
    1 Once
    0 Not at all

37. How often do you visit with friends and neighbors? Would you say that you visit.... ___ 40

    4 Frequently--At least once a week?
    3 Occasionally--At least once a month?
    2 Seldom?
    1 Never?

38. Do you find yourself feeling lonely quite often, sometimes, or almost never? ___ 41

    0 Quite often
    1 Sometimes
    2 Almost never

39. Do you see your relatives and friends as often as you want to or are you somewhat unhappy about how little you see them? ___ 42

    1 As often as want to
    2 Somewhat unhappy about how little

40. When you go from one place to another how do you usually travel? Do you.... ___ 43

    1 Drive your own car?
    2 Ride with a spouse, ride with a child?
    3 Drive someone else's car?
    4 Ride the bus?
    5 Ride with a neighbor, friend or relative?
    6 Get a taxi?
    7 No transportation? Why? _____

      _____

    8 Other? _____

IV. HEALTH

"I would like to know something about your health."

---

41. How would you rate your overall health at the present time--excellent, good, fair or poor? ___ 44

    3 Excellent
    2 Good
    1 Fair
    0 Poor

*42. Is your health now better, about the same, or worse than it was five years ago? ___ 45

    3 Better
    2 About the same
    0 Worse

*43. How much do your health troubles stand in the way of your doing the things you want to do-- not at all, a little (some), or a great deal? ___ 46

    3 Not at all
    2 A little (some)
    0 A great deal

•44. Do you have any of the following illnesses at the present time?

[CHECK "YES" OR "NO" FOR EACH OF THE FOLLOWING. IF "YES", ASK: "How much does it interfere with your activities, not at all, a little (some), or a great deal?", AND CIRCLE THE NUMBER FOR THE APPROPRIATE ANSWER.]

[IF "YES", ASK: "How much does it interfere with your activities?]

YES	NO	NOT AT ALL	A LITTLE	A GREAT DEAL		
		1	2	3	Arthritis	47 48
		1	2	3	Glaucoma	49 50
		1	2	3	Asthma	51 52
		1	2	3	Emphysema	53 54
		1	2	3	Tuberculosis	55 56
		1	2	3	High blood pressure	57 58
		1	2	3	Heart trouble	59 60
		1	2	3	Circulation trouble in arms and legs	61 62
		1	2	3	Diabetes	63 64
		1	2	3	Ulcers (of the digestive system)	65 66
		1	2	3	Other stomach or intestinal disorders	67 68

(Question 44 continued on next page)

YES	NO	NOT AT ALL	A LITTLE	A GREAT DEAL		
		1	2	3	Liver disease	69 70
		1	2	3	Kidney disease	71 72
		1	2	3	Other urinary tract disorders (including prostrate trouble)	73 74
		1	2	3	Cancer or Leukemia	75 76

Card No. 3

1 2 3

4 5 6

		1	2	3	Anemia	7 8
		1	2	3	Effects of stroke	9 10
		1	2	3	Parkinson's disease	11 12
		1	2	3	Cerebral Palsey	13 14
		1	2	3	Multiple Sclerosis	15 16
		1	2	3	Muscular Dystrophy	17 18
		1	2	3	Effects of Polio	19 20

(Question 44 continued on next page)

YES	NO	NOT AT ALL	A LITTLE	A GREAT DEAL		
		1	2	3	Thyroid or other glandular disorders	21 22
		1	2	3	Skin disorders such as pressure sores or leg ulcers	23 24
		1	2	3	Speech impediment or impairment	25 26
		1	2	3	Nerves or nervousness	27 28

*45. What are you doing for your health problems? Do you...
(May check more than one)

Yes (1)	No (2)		
		Take regular medication as prescribed by Doctor?	29
		Decide on own medication needed and take it?	30
		Use braces or crutches suggested by a doctor?	31
		Just live with own problem and accept it?	32
		Other (Specify) _____	33

*46. I am interested in knowing some of the things that you did about your health during this past year. Did you...
(May check more than one)

Yes (1)	No (2)		
		Visit a doctor because of sickness? Where? _____	34 35
		Visit a doctor for a check-up? Where? _____	36 37
		Visit a chiropractor? Where? _____	38 39
		Visit a dentist? Where? _____	40 41
		Have to be hospitalized? Where? _____	42 43
		Buy non-prescription medicines?	44 45
		Buy prescription medicines?	46 47
		Purchase glasses, hearing aids, braces, crutches?	48 49
		Receive a visit by a public health nurse or a medical social worker?	50
		Receive assistance at home by homemaker service?	51
		Stay in a nursing home? Where? _____	52
		Use Medicaid services?	53
		Use Medicare services?	54

*47. How is your eyesight (with glasses or contacts) -- excellent, good, fair, poor or totally blind? ___ 55

4 Excellent
3 Good
2 Fair
1 Poor
0 Totally blind

*48. How is your hearing -- excellent, good, fair, poor or totally deaf? ___ 56

4 Excellent
3 Good
2 Fair
1 Poor
0 Totally deaf

49. If you become sick, who would you call? (Record first and most important source) ___ 57 ___ 58

1 Doctor
2 Son
3 Daughter
4 Relative (other than children)
(Give relationship _____)
5 Friend
6 Neighbor
7 Druggist
8 Minister
9 Hospital or clinic
10 Police
11 Other (Specify) _____

•50. I am going to read a list of ways in which medical bills are sometimes paid. Indicate by saying yes or no whether any of your medical or health bills during the past year were paid in these ways.

Yes (1)	No (2)		
		Paid entirely by you (or spouse)	59
		Paid partly by you (or spouse)	60
		Paid by relatives or friends	61
		Paid by medical insurance (other than Medicare)	62
		Paid by Medicare (Social Security Administration)	63
		Paid by Medicaid (Department of Social Services)	64
		Other sources? (Specify) _____	65

51. Do you feel the need of health care in addition to that which you are now getting? 66 67

1 No
2 Yes, What? _____

_____

_____

•52. I'm interested in your ability to get around. Are you.... 68

6 Able to go practically any place you want to go?
5 Able to get around the house, but seldom go out?
4 Able to get around the house, but with difficulty?
3 Confined to a chair most of the day?
2 Stay in bed at all times?
1 Other (Specify) _____

53. Do you eat the same foods as you did when you were 50 years old? 69

1 No
2 Yes

IF ANSWER TO ITEM 53 WAS NO (1) ASK ITEM 54.

54. In what ways have your eating habits changed? ___ ___ ___ (70 71 72)

---

55. Who usually eats with you at mealtime? ___ (73)

3 Family
2 Friends
1 Other
0 No one (eat alone)

V. ACTIVITIES

"Next I would like to know how you spend your time."

Card No. 4
Data Set ___ (1)
Subject # ___ ___ ___ (2 3 4)
Card # ___ ___ (5 6)

56. In general how many times a month do you get together with other people in a group for some organized activity, for example, church, club or group meetings? ___ (7)

3 4 or more times
2 2 or 3 times
1 Once
0 Never

57. Do you have as much contact as you would like with a person that you feel close to, someone that you can trust and confide in? ___ (8)

2 Yes
0 No

58. What are your favorite pastimes or hobbies? Please say YES or NO to <u>each</u> of the following pastimes.

Yes (1)	No (2)		
		Television	9
		Radio	10
		Reading	11
		Visits and trips	12
		Commercial entertainment (movies, plays)	13
		Church activities	14
		Clubs and civic organizations	15
		Cards and table games	16
		Writing	17
		Having a friend over	18
		Gardening	19
		Sewing	20
		Arts and crafts	21
		Sit and think	22
		Having family over	23
		Other (Specify) _____	24

59. Can you think of some things that you would like to do, but you do not have the opportunity right now? ___ 25

1 No
2 Yes, what? _____

_____

60. Which of the following words best describe how much free time that you have each day? ___ 26

1 Most of the day
2 Half of the day
3 A few hours
4 Almost none

VI. INCOME

"Now, for a few minutes I would like for us to talk about income."

---

61. Where does your income (money) come from (yours and your husband's/wife's)?
(Check YES or NO for each of the following)
(Break down to MONTHLY income)

Yes (1)	No (2)	If yes, how much		
			Earnings from employment (wages, salaries or income from your business)	___ 27
			Income from rental, interest from investments, savings, insurance policies, etc.	___ 32
			Social Security (Include S. S. disability)	___ 37
			SSI payment (government checks- Supplemental Security Income)	___ 42
			V. A. benefits	___ 47
			Disability payments not covered by Social Security, SSI, or V. A.	___ 52
			Unemployment compensation	___ 57
			Retirement pension	___ 62

(Question 61 continued on the next page)

Yes (1)	No (2)	If yes, how much		
			Regular welfare payments Dept. Soc. Services, organizations, agencies, churches)	67 68 69 70 71

Card No. 5

1 2 3 4

5 6

			Regular assistance from family members	7 8 9 10 11
			Alimony	12 13 14 15 16
			Other	17 18 19 20 21

•62. Next I would like to talk to you about having enough money for what you need. Which of these best describes how far your money goes? 22

3 You have enough money for everything that you need
2 You have enough money if you're careful
1 You do not have enough money for things that you need

IF RESPONSE TO ITEM 62 WAS (3) OR (2), GO TO ITEM 64.

*63. What kinds of things do you not have enough money for? (You may check more than one)

Yes (1)	No (2)		
		Medicine	23
		Food	24
		Housing	25
		Household operations	26
		Furnishings	27
		Clothing	28
		Transportation	29
		Medical care	30
		Personal Care (grooming)	31
		Recreation	32
		Heat, lights (electricity)	33
		Other (What?) _____	34

VI. SERVICES AND ASSISTANCE

"Now I want to ask you some questions about services you are or have been receiving, and services that you feel you need."

64. I am going to read out the name of an agency or service. Then I will ask you if you have heard about it and if it has helped you.
(Note: Surrogates answer for "have helped" category only.)
(May circle more than one)

Have Not Heard	Have Heard / No Help	Have Heard Helped		
1	2	3	Senior citizens' clubs	35
1	2	3	Home health care	36
1	2	3	Homemaker services	37
1	2	3	Health department	38
1	2	3	Church	39
1	2	3	Medicare	40
1	2	3	Medicaid	41
1	2	3	Social Security Administration	42
1	2	3	Department of Social Services	43
1	2	3	Vocational Rehabilitation	44
1	2	3	Mental Health Association	45
1	2	3	Agricultural Extension Service	46
1	2	3	Caswell County Council on Aging	47
1	2	3	Caswell County Weatherization Program	48
1	2	3	Caswell Parish Ministry to the Elderly	49
1	2	3	Friendly Visitors	50

(Question 64 continued on the next page)

Have Not Had	Have Had/No	Have Helped		
1	2	3	Telephone Reassurance	51
1	2	3	Fellowship Meals	52
1	2	3	Chore Services	53
1	2	3	Joy	54
1	2	3	Caswell Section 8 housing	55
1	2	3	Other (what? _____ _____)	56

*65. Can you think of services that would be helpful to you if they were available? (May mention more than one) (NOTE: ALSO ASK OF SURROGATES) ___ ___ ___ ___ ___ 57 58 59 60 61

1 Yes (What services?) _____

_____

2 No

VII. LIFE SATISFACTION

"We are interested in knowing how you feel about life."

---

66. What do you consider as the happiest time in your life? Why? What were you doing then? ___ 62

_____

_____

_____

67. What do you consider is your most important purpose in life today? ___ 63

_____

_____

68. All in all, how much unhappiness would you say you find in life today? ___ 64

3 Almost none
2 Some, but not much
1 A good deal

69. How often do you feel that there's just no point in living-- often, sometimes, or hardly ever? ___ 65

1 Often
2 Sometimes
3 Hardly ever

70. What do you consider to be your <u>biggest</u> problems or worries?
(<u>Check YES under each appropriate answer</u>)

Yes (1)	No (2)		
		making ends meet	66
		world situation	67
		keeping a job	68
		money in old age	69
		health	70
		a good place to live	71
		family	72
		other (specify) _____	73

Card No. 6
Data Set ___ 1
Subject # ___ ___ ___ 2 3 4
Card # ___ ___ 5 6

71. I am going to mention some things that sometimes give some problems. How much do they trouble you, never, sometimes, or often?

(INTERVIEWER: FREQUENTLY REPEAT "NEVER", "SOMETIMES", "OFTEN")

Never	Sometimes	Often		
1	2	3	Money	7
1	2	3	Housing	8
1	2	3	Loneliness	9
1	2	3	Transportation	10
1	2	3	Education (lack of)	11
1	2	3	Free time	12
1	2	3	Hearing	13
1	2	3	Eye sight	14
1	2	3	Nerves	15
1	2	3	Health	16
1	2	3	Food (lack of)	17
1	2	3	Diet ("right kind")	18
1	2	3	Energy	19
1	2	3	Housework	20
1	2	3	Yardwork	21
1	2	3	Other (relatives, etc.) _____	22

LIFE SATISFACTION - (Continued)

"Please answer yes or no to <u>each</u> of the following questions unless asked otherwise."

72. Do things keep getting worse as you get older? ___ 23

1 Yes
2 No

73. Do you have as much pep as you did last year? ___ 24

1 Yes
2 No

74. How much do you feel lonely -- not much or a lot? ___ 25

1 A lot
2 Not much

75. Do little things bother you more this year? ___ 26

1 Yes
2 No

76. Do you see enough of your friends and relatives? ___ 27

1 Yes
2 No

77. As you get older are you less useful? ___ 28

1 Yes
2 No

78. If you could live where you wanted, where would you live? ___ 29

1 Elsewhere (some answer other than here)
2 Here

79. Do you sometimes worry so much that you can't sleep? ___ 30

1 Yes
2 No

80. As you get older, are things (better, worse, same) than you thought they would be? ___ 31

1 Worse
2 Same
3 Better

81. Do you feel sometimes that life isn't worth living? ___ 32

1 Yes
2 No

82. Are you as happy now as when you were younger? ___ 33

1 Yes
2 No

83. Most days do you have plenty to do? ___ 34

1 Yes
2 No

84. Do you have a lot to be sad about? ___ 35

1 Yes
2 No

85. Did people have it better in the old days? ___ 36

1 Yes
2 No

86. Are you afraid of a lot of things? ___ 37

1 Yes
2 No

87. Is your health good, or not so good? ___ 38

1 Not so good
2 Good

88. Do you get mad more than you used to? ___ 39

1 Yes
2 No

89. Is life hard for you most of the time? ___ 40

1 Yes
2 No

90. How satisfied are you with your life today? (Not satisfied, satisfied) ___ 41

1 Not satisfied
2 Satisfied

91. Do you take things hard? ___ 42

1 Yes
2 No

92. Do you think a person has to live for today and not worry about tomorrow? ___ 43

1 No
2 Yes

93. Do you get upset easily? ___ 44

1 Yes
2 No

[NOTE TO INTERVIEWER: THESE NEXT TWO QUESTIONS UTILIZE THE "LADDER" ACCOMPANYING YOUR MATERIALS. HAVE THE PICTURE OF THE "LADDER" IN HAND.]

SAY TO THE RESPONDENT:

94. Here is a picture of a ladder. Suppose we say that the top of the ladder (pointing) represents the best possible life for you and the bottom (pointing) represents the worst possible life for you. Where on the ladder (moving finger up and down ladder) do you feel you stand at the present time? ___ 45

_____ (Code step on ladder)

95. Now look at this ladder once more. Suppose we say that the top of the ladder (pointing) represents perfect health and the bottom (pointing) represents the most serious illness. Where on the ladder (moving finger up and down ladder) would you say your health is at the present time? ___ 46

_____ (Code step on ladder)

*96. I have a few questions regarding the ways in which family, friends and others sometimes help each other. Look at this card and tell me which of these persons have helped you in the past year with the following. You may name more than one.

[NOTE TO INTERVIEWER: GIVE CODE CARD TO SUBJECT.]

(RECODE CODE)

1 family
2 friends
3 neighbors
4 persons from church
5 others (not agencies) Who? _____

cleaning _____						
		47	48	49	50	51
cooking _____						
		52	53	54	55	56
car maintenance _____						
		57	58	59	60	61
maintenance on house _____						
		62	63	64	65	66
gardenwork _____						
		67	68	69	70	71
financial _____						
		72	73	74	75	76
Card No. 7						
	1	2	3	4	5	6
assistance in sickness _____						
		7	8	9	10	11
companionship (visiting, talking, listening) _____						
		12	13	14	15	16
shopping _____						
		17	18	19	20	21
seeing that bills are paid _____ (taken or sent to proper offices)						
		22	23	24	25	26

97. Say to the respondent:

I'm going to read out some things that occasionally happen in the lives of older people. Please tell me if any of these have happened to you in the last 10 years. Using this card, tell me approximately when it occurred (1-3 years ago, 4-6 years ago, or 7-10 years ago).

[NOTE TO INTERVIEWER: GIVE CODE CARD TO SUBJECT.]

Event	No 1	Yes 2	If yes, tell when occurred	Description (where indicated)	
				(Describe)	
Change in sleep habits					27 28
				(Describe)	
Change in numbers of family get-togethers					29 30
Divorce or separation					31 32
Retirement					33 34
Changes in residence					35 36
				(How many?)	
Death of child (Give last)					37 38
Marriage					39 40
				(Describe)	
Victim of crime					41 42
				(Describe)	
Major illness (last one)					43 44

INTERVIEWER:

98. Is _____ dependent upon someone for daily help? ___ 45
(name of respondent)

1 No
2 Yes (relationship) _____

IF RESPONSE TO ITEM 98 WAS (2), ASK ITEMS 99 THROUGH 100.

•99. Who provides most of the help? _____ ___ ___ 46 47
(relationship)

•100. Tell me what kinds of help you/they give? ___ ___ ___ ___ ___ 48 49 50 51 52

_____

_____

_____

_____

_____

•101. Are there others who help _____? ___ 53
(name of respondent)

1 No
2 Yes

IF RESPONSE TO ITEM 101 WAS (2), ASK ITEMS 102-103.

•102. Who are some of these people? Give relationships. ___ ___ ___ ___ ___ 54 55 56 57 58

_____

_____

_____

_____

_____

APPENDIX C

Correlation Matrices

17-Variable Pearson Correlation Matrix for Survivors at Time 1 *

	1.1	2.1	3.1	4.1	5.1	6.1	7.1	8.1	9.1	10.1	11.1	12.1	13.1	14.1	15.1	16.1	17.1
1.1	1.0																
2.1	.41	1.0															
3.1	.24	.31	1.0														
4.1	.26	.13	.21	1.0													
5.1	.42	.45	.30	.29	1.0												
6.1	.38	.32	.23	.35	.65	1.0											
7.1	.21	.38	.39	.18	.39	.26	1.0										
8.1	.25	.22	.31	.07	.29	.24	.38	1.0									
9.1	.31	.38	.18	.15	.31	.33	.33	.19	1.0								
10.1	.35	.37	.27	.10	.40	.30	.35	.28	.33	1.0							
11.1	.18	.31	.24	.12	.13	.10	.39	.27	.27	.36	1.0						
12.1	.25	.35	.35	.27	.28	.22	.44	.20	.38	.44	.39	1.0					
13.1	.42	.31	.26	.29	.34	.33	.27	.12	.29	.30	.20	.27	1.0				
14.1	.30	.28	.16	.13	.09	.24	.18	.15	.16	.18	.19	.21	.44	1.0			
15.1	.26	.14	.14	.12	.20	.19	.12	.04	.11	.15	.09	.16	.39	.39	1.0		
16.1	.32	.35	.22	.19	.11	.19	.27	-.01	.23	.18	.27	.30	.40	.31	.21	1.0	
17.1	.14	.30	.03	.11	.20	.31	.18	-.07	.29	.24	.10	.18	.24	.19	.19	.24	1.0

* Coefficients rounded to nearest hundredths.

17-Variable Polychoric Correlation Matrix for Survivors at Time 1*

	1.1	2.1	3.1	4.1	5.1	6.1	7.1	8.1	9.1	10.1	11.1	12.1	13.1	14.1	15.1	16.1	17.1
1.1	1.0																
2.1	.61	1.0															
3.1	.37	.47	1.0														
4.1	.43	.23	.31	1.0													
5.1	.56	.61	.42	.39	1.0												
6.1	.56	.50	.35	.54	.82	1.0											
7.1	.30	.55	.52	.28	.55	.40	1.0										
8.1	.31	.29	.42	.07	.44	.34	.56	1.0									
9.1	.48	.56	.29	.22	.43	.48	.45	.27	1.0								
10.1	.54	.56	.40	.20	.54	.48	.51	.37	.49	1.0							
11.1	.28	.46	.37	.19	.20	.16	.54	.38	.42	.52	1.0						
12.1	.37	.53	.48	.44	.40	.40	.64	.32	.52	.63	.55	1.0					
13.1	.61	.48	.38	.45	.48	.51	.37	.16	.41	.47	.31	.44	1.0				
14.1	.48	.46	.26	.23	.10	.36	.24	.14	.25	.31	.29	.32	.64	1.0			
15.1	.40	.23	.20	.19	.29	.31	.23	.08	.16	.23	.13	.27	.58	.56	1.0		
16.1	.50	.53	.33	.33	.25	.29	.44	.23	.37	.41	.42	.43	.56	.48	.34	1.0	
17.1	.21	.45	.03	.16	.31	.48	.29	.07	.43	.35	.16	.32	.38	.26	.31	.33	1.0

* Coefficients rounded to nearest hundredths.

15-Variable Pearson Correlation Matrix for Survivors at Time 1*

	1.1	2.1	3.1	4.1	5.1	6.1	7.1	8.1	9.1	10.1	11.1	12.1	13.1	14.1	15.1
1.1	1.0														
2.1	.49	1.0													
3.1	.21	.31	1.0												
4.1	.23	.15	.14	1.0											
5.1	.48	.45	.30	.26	1.0										
6.1	.40	.36	.22	.36	.65	1.0									
7.1	.33	.34	.18	.15	.32	.38	1.0								
8.1	.37	.36	.27	.07	.38	.31	.32	1.0							
9.1	.14	.30	.18	.08	.12	.10	.19	.28	1.0						
10.1	.25	.29	.35	.29	.28	.25	.34	.39	.34	1.0					
11.1	.43	.31	.28	.28	.31	.31	.25	.29	.19	.27	1.0				
12.1	.28	.26	.14	.12	.06	.22	.16	.18	.19	.19	.43	1.0			
13.1	.25	.14	.20	.10	.19	.18	.07	.14	.07	.18	.35	.38	1.0		
14.1	.35	.36	.22	.17	.07	.15	.20	.12	.24	.29	.38	.33	.19	1.0	
15.1	.17	.25	-.02	.14	.18	.29	.25	.21	.06	.16	.21	.21	.21	.18	1.0

* Coefficients rounded to nearest hundredths.

15-Variable Pearson Correlation Matrix for Nonsurvivors at Time 1*

	1.1	2.1	3.1	4.1	5.1	6.1	7.1	8.1	9.1	10.1	11.1	12.1	13.1	14.1	15.1
1.1	1.0														
2.1	.43	1.0													
3.1	.34	.30	1.0												
4.1	.20	.19	.13	1.0											
5.1	.45	.39	.31	.30	1.0										
6.1	.43	.39	.24	.37	.45	1.0									
7.1	.35	.31	.16	.14	.29	.28	1.0								
8.1	.31	.27	.17	.14	.33	.19	.25	1.0							
9.1	.35	.17	.12	.19	.28	.14	.32	.40	1.0						
10.1	.32	.28	.10	.33	.20	.18	.32	.40	.61	1.0					
11.1	.40	.25	.12	.15	.19	.22	.27	.18	.27	.38	1.0				
12.1	.33	.32	.14	.14	.18	.22	.16	.13	.19	.25	.61	1.0			
13.1	.24	.12	.14	.06	.12	.14	.13	.12	.15	.18	.37	.42	1.0		
14.1	.31	.34	.23	.15	.17	.23	.22	.24	.25	.37	.38	.31	.33	1.0	
15.1	.19	.18	.09	.19	.12	.14	.14	.21	.20	.26	.23	.30	.24	.28	1.0

* Coefficients rounded to nearest hundredths.

15-Variable Pearson Correlation Matrix for the Total Sample at Time 1*

	1.1	2.1	3.1	4.1	5.1	6.1	7.1	8.1	9.1	10.1	11.1	12.1	13.1	14.1	15.1
1.1	1.0														
2.1	.42	1.0													
3.1	.28	.30	1.0												
4.1	.24	.16	.16	1.0											
5.1	.43	.41	.31	.29	1.0										
6.1	.41	.36	.23	.34	.54	1.0									
7.1	.34	.34	.16	.14	.31	.30	1.0								
8.1	.33	.32	.23	.11	.35	.24	.28	1.0							
9.1	.27	.21	.16	.15	.22	.11	.29	.40	1.0						
10.1	.28	.31	.23	.28	.23	.19	.33	.43	.54	1.0					
11.1	.40	.28	.19	.22	.27	.26	.27	.23	.24	.33	1.0				
12.1	.30	.29	.16	.13	.13	.23	.15	.17	.19	.24	.51	1.0			
13.1	.26	.15	.13	.09	.16	.17	.12	.15	.14	.13	.38	.39	1.0		
14.1	.32	.36	.22	.17	.14	.21	.22	.23	.26	.35	.38	.29	.27	1.0	
15.1	.15	.24	.05	.13	.16	.21	.21	.23	.19	.24	.24	.24	.22	.27	1.0

* Coefficients rounded to nearest hundredths.

15-Variable Pearson Correlation Matrix for Survivors at Time 2*

	1.2	2.2	3.2	4.2	5.2	6.2	7.2	8.2	9.2	10.2	11.2	12.2	13.2	14.2	15.2
1.2	1.0														
2.2	.41	1.0													
3.2	.31	.36	1.0												
4.2	.09	.16	.21	1.0											
5.2	.25	.41	.35	.11	1.0										
6.2	.39	.51	.41	.34	.42	1.0									
7.2	.15	.38	.23	.16	.43	.33	1.0								
8.2	.25	.24	.20	.06	.41	.27	.34	1.0							
9.2	.27	.24	.19	.08	.22	.21	.31	.42	1.0						
10.2	.27	.25	.19	.08	.32	.20	.37	.29	.40	1.0					
11.2	.30	.35	.11	.13	.21	.16	.16	.22	.19	.36	1.0				
12.2	.27	.23	.26	.14	.16	.31	.16	.22	.15	.28	.23	1.0			
13.2	.21	.20	.18	.12	.22	.14	.24	.16	.18	.24	.30	.33	1.0		
14.2	.20	.24	.10	.09	.17	.23	.28	.19	.21	.35	.26	.15	.11	1.0	
15.2	.20	.12	.14	.18	.22	.18	.21	.18	.20	.13	.18	.28	.21	.11	1.0

* Coefficients rounded to nearest hundredths.

30-Variable Pearson Correlation Matrix for Substantive Model*

	1.1	2.1	3.1	4.1	5.1	6.1	7.1	8.1	9.1	10.1	11.1	12.1	13.1	14.1	15.1
1.1	1.0														
2.1	.49	1.0													
3.1	.21	.31	1.0												
4.1	.23	.15	.14	1.0											
5.1	.48	.45	.30	.26	1.0										
6.1	.40	.36	.22	.36	.65	1.0									
7.1	.33	.34	.18	.15	.32	.38	1.0								
8.1	.37	.36	.27	.07	.38	.31	.32	1.0							
9.1	.14	.30	.18	.08	.12	.10	.19	.28	1.0						
10.1	.25	.29	.35	.29	.28	.25	.34	.39	.34	1.0					
11.1	.43	.31	.28	.28	.31	.31	.25	.29	.19	.27	1.0				
12.1	.28	.26	.14	.12	.06	.22	.16	.18	.19	.19	.43	1.0			
13.1	.25	.14	.20	.10	.19	.18	.07	.14	.07	.18	.35	.38	1.0		
14.1	.35	.36	.22	.17	.07	.15	.20	.12	.24	.29	.38	.33	.19	1.0	
15.1	.17	.25	-.02	.14	.18	.29	.25	.21	.06	.16	.21	.21	.21	.18	1.0
1.2	.28	.24	.06	.06	.19	.14	.03	.18	.14	.08	.18	.12	.04	.05	.10
2.2	.13	.30	.20	.02	.16	.19	.15	.20	.13	.12	.13	.04	.07	.02	.21
3.2	.22	.27	.33	-.06	.16	.13	.01	.20	.10	.09	.20	.13	.18	.05	.18
4.2	-.06	.07	.04	.02	-.02	.02	.04	-.07	-.07	-.04	.08	-.02	-.01	.02	.15
5.2	.15	.22	.07	-.10	.04	.13	.03	.01	.12	.01	.06	.02	-.08	.04	.14
6.2	.25	.33	.15	.02	.20	.28	.16	.12	-.03	.08	.19	.13	.01	.10	.12
7.2	.10	.03	.19	.00	.06	.14	.02	.10	.03	.14	.11	.06	-.03	-.08	.09
8.2	.22	.18	.18	-.08	.11	.08	.16	.26	.28	.24	.14	.14	.02	.12	.04
9.2	.03	.10	.03	-.06	.13	.00	.03	-.02	.03	.02	-.01	-.05	-.04	-.03	.07
10.2	.04	.04	.07	.04	-.02	-.01	.01	-.05	.06	.11	.18	.10	.07	-.03	.09
11.2	.12	.17	.22	.15	.26	.19	.14	.08	.16	.17	.23	.07	.09	.04	.05
12.2	.20	.13	.14	.05	.02	-.01	.11	.15	-.04	.09	.18	.12	.20	.06	.07
13.2	.14	.08	.12	-.02	.16	.11	.02	-.10	-.07	.01	.13	.13	.22	.06	.14
14.2	.10	.17	.11	.06	.12	.15	.08	.09	-.01	.17	.07	-.01	-.04	.07	.01
15.2	.10	.05	-.01	.10	.18	.21	.12	.08	.02	.04	-.01	.08	.06	-.10	.13

(table continues)

	1.2	2.2	3.2	4.2	5.2	6.2	7.2	8.2	9.2	10.2	11.2	12.2	13.2	14.2	15.2
1.2	1.0														
2.2	.41	1.0													
3.2	.31	.36	1.0												
4.2	.09	.16	.21	1.0											
5.2	.25	.41	.35	.11	1.0										
6.2	.39	.51	.41	.34	.42	1.0									
7.2	.15	.38	.23	.16	.43	.33	1.0								
8.2	.25	.24	.20	.06	.41	.27	.34	1.0							
9.2	.27	.24	.19	.08	.22	.21	.31	.42	1.0						
10.2	.27	.25	.19	.08	.32	.20	.37	.29	.40	1.0					
11.2	.30	.35	.11	.13	.21	.16	.16	.22	.19	.36	1.0				
12.2	.27	.23	.26	.14	.16	.31	.16	.22	.15	.28	.23	1.0			
13.2	.21	.20	.18	.12	.22	.14	.24	.16	.18	.24	.30	.33	1.0		
14.2	.20	.24	.10	.09	.17	.23	.28	.19	.21	.35	.26	.15	.11	1.0	
15.2	.20	.12	.14	.18	.22	.18	.21	.18	.20	.13	.18	.28	.21	.11	1.0

* Coefficients rounded to nearest hundredths.