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The multidimensional structure of the Life Satisfaction Index A and its application in research on aging

Redmond, Cleve, Ph.D.

Iowa State University, 1990

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The multidimensional structure of the Life Satisfaction Index A and its application in research on aging

by

Cleve Redmond

A Dissertation Submitted to the
Graduate Faculty in Partial Fulfillment of the
Requirements for the Degree of
DOCTOR OF PHILOSOPHY

Department: Sociology and Anthropology
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For the Graduate College

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Ames, Iowa

1990

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

GENERAL INTRODUCTION

The Role of Life Satisfaction in Social Gerontology

Much of the early theoretical work in social gerontology focused on determining what factors led to "successful aging." Satisfaction with life has been the concept most used to assess successful aging. Life satisfaction has probably been the most heavily analyzed dependent variable in social gerontology (Maddox and Wiley, 1976). Despite criticisms of its overuse (e.g., Passuth and Bengtson, 1988), life satisfaction continues to be heavily researched. Given the tradition of advocacy in gerontology, it seems unlikely that how older persons evaluate their lives will cease to be an issue of interest.

The focus on life satisfaction has its foundation in some of the earliest theories unique to social gerontology. In particular, activity theory (Havighurst and Albrecht, 1953) and disengagement theory (Cumming and Henry, 1961; Lemon, Bengtson, and Peterson, 1972) guided much of the early research in the field. Activity theory posited that persons who remained socially active in later life would be happiest, while disengagement theory suggested that society and the individual gradually withdraw from one another, in a mutually beneficial arrangement. This withdrawal was seen

to benefit the individual by releasing him or her from unwanted obligations. Society benefitted from the individual's withdrawal by allowing it to prepare for the individual's ultimate death in a nondisruptive manner.

Research on activity and disengagement theories has found mixed support for both theories. Some support has been found for the activity hypothesis (e.g., Lemon et al., 1972; Longino and Kart, 1982; Palmore, 1968), particularly with regard to informal activity. There appears to be little empirical support for the disengagement hypothesis (McPherson, 1983); however, older individuals do tend to withdraw. Foner and Schwab (1981) found that retirees do not tend to replace lost work roles with new ones. Further, Ulhenberg (1988) points out that the elderly voluntarily withdraw through preferences for early retirement and independent living arrangements.

Although activity and disengagement theories no longer hold the central theoretical positions they once did, life satisfaction continues to be widely researched. Theories taken from general sociology and applied to social gerontology also address the issue of happiness in later life. Theories such as social exchange (Dowd, 1975) and modernization (Cowgill, 1974; Cowgill and Holmes, 1972) posit a gloomy future for aged as they are seen to possess

little that is valued by younger age groups. As a result, society withdraws from its older members.

This ongoing interest in life satisfaction, or subjective well-being, has led to multiple measurement approaches. Some research has relied on single questionnaire items about overall life satisfaction or happiness. In other cases subjects are asked how satisfied they are with various life domains, such as family, housing, employment, and health. Occasionally, respondents have been evaluated by psychologists. Often a series of questionnaire items has been used to measure the concept. These scales are generally based on multidimensional models of life satisfaction.

Over the last few decades, several multiple-item scales have been developed and widely applied to assess subjective well-being. In particular, variations of the Affect Balance Scale (Bradburn, 1969), the Philadelphia Geriatric Center Morale Scale (Lawton, 1972), and the Life Satisfaction Index A (Neugarten, Havighurst, and Tobin, 1961) have been used extensively. Each of these measures is based on a multidimensional life satisfaction concept, although the underlying dimensions are different for each of the scales. The Affect Balance Scale (ABS) is designed to measure positive and negative affect. The Philadelphia Geriatric

Center (PGC) Morale Scale was revised by Lawton in 1975, and is designed to measure agitation, attitudes toward one's own aging, and lonely dissatisfaction. The Life Satisfaction Index A (LSIA) was designed to measure five component dimensions of life satisfaction: zest, resolution and fortitude, congruence between desired and achieved goals, positive self-concept, and mood tone. The PGC Morale Scale and the LSIA were both designed specifically for use with older respondents. The ABS was designed for general use. Although each of these scales is multidimensional in nature, they are typically applied in a unidimensional manner.

The Life Satisfaction Index A in Gerontological Research

The LSIA in various forms has probably been the most widely used subjective well-being measure in social gerontology. The LSIA has been in use for nearly 30 years and much of our current understanding of subjective well-being in later life is based on research using the LSIA. Further, the inclusion of the LSIA in large national surveys focusing on elderly populations (e.g., Harris, 1975, 1981) ensures its continued use well into the future. Although the LSIA was designed to measure five dimensions of life satisfaction, it was not subjected to any methodological analyses for several years after its introduction. The

analyses that have been conducted since then have found that the LSIA is multidimensional but does not conform to the five factors suggested by Neugarten et al. (1961).

of LSIA factor analyses (Bigot, 1974; Lohmann, 1980), Factor analyses have led to general agreement among researchers about the dimensionality of the LSIA (Adams, 1969; Hoyt and Creech, 1983; Liang, 1984, Wilson, Elias, and Brownlee, 1985), although substantially different conclusions have occasionally been reached (Bigot, 1974; Lohmann, 1980). Despite the numerous methodological analyses of the LSIA, no consensus exists as to the best way to apply the LSIA and it is still used in a variety of forms. Further, despite conclusive evidence that the LSIA is not unidimensional and strong recommendations that LSIA dimensions be analyzed separately (George, 1981; Knapp, 1976), it is still routinely treated as a unidimensional measure, even by those arguing against such treatment (George, Okun, and Landerman, 1985).

In light of the heavy reliance of gerontological researchers on the LSIA, the degree to which the methodological research has been ignored is particularly troubling. Research that has examined the component dimensions of the LSIA individually has found those dimensions to be related to other variables in distinctive

ways, with theoretical implications (Knapp, 1976; Hoyt et al., 1980). Findings such as those suggest that our present understanding of subjective well-being may be quite superficial. Motivated by this concern, the present research examines the multidimensional structure of the LSIA, the consistency of that structure and its relationships with other variables across age-groups and time, and its application in a mental health study.

Explanation of Dissertation Format

This research is arranged in the alternate dissertation format. It contains three sections, each of which is a paper designed for submission to a professional journal. This series of papers explores the factor structure of the LSIA, causal variables affecting the LSIA factors, and then applies a multidimensional LSIA model in an examination of psychological distress and life satisfaction in a rural population.

The first paper examines, in detail, the factor structure of the LSIA, using a large national data set. Previous methodological analyses of the LSIA are reviewed, and three factor structures suggested by earlier researchers are compared. These three models are configured as second-order factor models, and are evaluated through confirmatory factor analysis.

Using the factor structure suggested by the first paper, the second paper evaluates the consistency of the factor structure, across age groups and across time, through the use of two national cross-sectional surveys. Similarly, the consistency of causal relationships between typical predictor variables and the LSIA dimensions is evaluated. Covariance structure modeling is used to compare model parameters across subgroups.

The final paper in this series applies a multidimensional LSIA model in research exploring the effects of economic stress on psychological distress and well-being. Rural Iowans were surveyed during a period of rural economic stress. Prevalence of depressive symptoms and functional anxiety were assessed. The effects of economic stress and other predictor variables were regressed on the psychological distress measures and the life satisfaction dimensions. Age-specific models were also tested.

SECTION 1. THE LIFE SATISFACTION INDEX A: A TEST OF THREE ALTERNATIVE STRUCTURES

The Life Satisfaction Index A:
A test of three alternative structures

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Support for this research was provided by the Midwest Council for Social Research on Aging. Data were provided by the Inter-University Consortium for Political and Social Research.

INTRODUCTION

The assessment of the subjective well-being of the elderly has been a recurrent research topic in gerontology for over four decades. Over time, this research has increasingly focused upon a few relatively standard measures of well-being. In particular, some variation of the Life Satisfaction Index (Neugarten, Havighurst, and Tobin, 1961) has been used in many of the studies on the elderly. The widespread use of this measure does not, however, reflect a consensus among social gerontologists on how to operationalize well-being. Other measures, such as the Philadelphia Geriatric Center Morale Scale (Lawton, 1972, 1975), are also used frequently. Moreover, the application of the Life Satisfaction Index has a history of multiple variations and conflicting interpretations.

The original version of the Life Satisfaction Index-A, the LSIA, was developed during the Kansas City Studies of Adult Life by Neugarten and her associates (1961) as a short discrete-answer scale to measure the five factors they believed contributed to life satisfaction. Since its introduction, the LSIA has been used widely in aging research and has been the subject of several methodological analyses. These methodological analyses have consistently shown that the LSIA is multidimensional but does not conform to the structure proposed by Neugarten et al. So far, these

analyses have not produced a consensus on the number, composition, and interpretation of the underlying dimensions. Despite these ambiguities, the LSIA (or one of its variants) remains one of the most frequently used measures of life satisfaction in social gerontology research. It may be due to these conflicting interpretations that most studies using the LSIA treat it as a unidimensional measure.

The current study will assess three alternative models for the structure of the LSIA. Prior analyses have either been limited to small regional samples or based upon the same national survey. The proposed models will be evaluated using data from a more recent national survey to determine if any of the alternative models are adequate for describing the structure of the LSIA. After testing the fit of the proposed models, the implications for future research in life satisfaction will be explored.

The Development and Factor Structure of the LSIA

Using data collected from noninstitutionalized older adults in the metropolitan Kansas City area, Neugarten et al. (1961) sought to develop a measure of successful aging. In addition to devising a scale that required an in-depth interview, the researchers constructed a short instrument

that could be easily used in future studies. Using data from lengthy interviews, the researchers analyzed and refined measures of adjustment and morale used in earlier studies and concluded that life satisfaction was composed of five components. One component, "Zest," was thought to measure the extent to which one takes pleasure from the round of activities that constitute everyday life. A second factor, "Resolution and Fortitude," measured the degree that a person regards life as meaningful and accepts resolutely their earlier life experiences. The third component, "Congruence," was seen as an indicator of the congruence between desired and achieved major life goals. A fourth factor, "Positive Self Concept," measures whether a person holds a positive image of self. "Mood Tone," the fifth component, was designed to indicate the degree to which the individual maintains happy and optimistic attitudes and mood. Neugarten et al. concluded that an individual would be regarded as being at the positive end of the continuum of psychological well-being to the extent that he or she had positive scores on these five components.

Neugarten et al. (1961) initially developed the Life Satisfaction Ratings (LSR) to measure the five components of life satisfaction. The LSR relied on the use of trained judges to evaluate responses from in-depth interviews. The

ratings of a clinical psychologist were used to validate the instrument. The researchers then developed two short instruments, which were validated against the LSR, to similarly measure the five components of life satisfaction. The first of these instruments, the Life Satisfaction Index A (LSIA), consisted of 20 agree/disagree items. Although the scale was designed to measure five dimensions, the scoring method treats the scale as unidimensional. The scoring is a simple summation of the "positive" responses to each of the questions. In some instances the positive response is the agree response, in others it is the disagree response. Unsure responses were effectively treated as negative responses. The original 20 items and scoring scheme are presented in Table 1.1.

At the time the LSIA was developed, Neugarten et al. (1961) also developed a second scale, the Life Satisfaction Index B (LSIB), containing open ended and check list items. The LSIA and LSIB were designed to be used either jointly or independently. Using data from the Kansas City studies, they observed correlations with the LSR of .55 and .58 for the LSIA and LSIB, respectively. For persons aged 65 and above, the correlations of the scales with the psychologist's evaluations were .55 for the LSIA and .59 for the LSIB. Neugarten and her associates concluded that the

Table 1.1. The LSIA and item scoring

Item		Response		
		Agree	Disagree	Unsure
1)	As I grow older, things seem better than I thought they would.	1	0	0
2)	I have gotten more of the breaks in life than most of the people I know.	1	0	0
3)	This is the dreariest time of my life.	0	1	0
4)	I am just as happy as when I was younger.	1	0	0
5)	My life could be happier than it is now.	0	1	0
6)	These are the best years of my life.	1	0	0
7)	Most things I do are boring or monotonous.	0	1	0
8)	I expect some interesting and pleasant things to happen to me in the future.	1	0	0
9)	The things I do are as interesting to me as they ever were.	1	0	0
10)	I feel old and somewhat tired.	0	1	0

11)	I feel my age, but it does not bother me.	1	0	0
12)	As I look back on my life, I am fairly well satisfied.	1	0	0
13)	I would not change the past even if I could.	1	0	0
14)	Compared to other people my age, I've made a lot of foolish decisions in my life.	0	1	0
15)	Compared to other people my age, I make a good appearance.	1	0	0
16)	I have made plans for things I'll be doing a month or a year from now.	1	0	0
17)	When I think back over my life, I didn't get most of the important things I wanted.	0	1	0
18)	Compared to other people, I get down in the dumps too often.	0	1	0
19)	I've gotten pretty much what I expected out of life.	1	0	0
20)	In spite of what some people say, the lot of the average man is getting worse, not better.	0	1	0

development of their instruments had been "only moderately successful" (1961, p. 143). They noted that these measures, if interpreted with caution, could be useful for certain applications in populations of persons over 65 years of age.

Previous Analyses of the LSIA

A variety of analyses of the LSIA have been conducted examining the component items and the underlying factor structures. Using 100 responses from a survey of elderly residents of a rural Kansas community, Wood, Wylie and Sheafor (1969) concluded that only 13 of the original 20 items should be used. They proposed the use of this smaller set of items to measure well-being, and named their subscale the Life Satisfaction Index Z (LSIZ). They also suggested a scoring scheme that treated "don't know" responses as a separate intermediate category. Scoring "2" for a positive answer, "1" for an undecided response, and "0" for a negative response, the researchers observed a correlation of .57 between the LSIZ and the LSR. Wood et al. did not evaluate the factor structure of the LSIA or LSIZ.

In an analysis of 508 non-institutionalized residents of small towns in Missouri, Adams (1969) concluded that the LSIA was composed of four factors rather than five. The first three factors, which Adams identified as mood tone,

zest for life, and congruence, corresponded to components specified by Neugarten et al., although the items identified as comprising these dimensions varied somewhat from the original formulation. The fourth factor seemed to include elements of both the resolution/fortitude and congruence dimensions and remained unnamed. No factor relating to self-concept was clearly identified. Adams also suggested two of the 20 items be omitted from the LSIA. These two items were: "I feel my age, but it does not bother me," and "Compared to other people my age, I've made a lot of foolish decisions in my life."

Lohmann (1980) used a sample of 259 persons that included nursing home residents, homebound elderly, and community aged in Knoxville, Tennessee, to conduct a factor analysis of seven life-satisfaction measures, including the LSIA. Lohmann concluded that there were two dimensions contributing to subjective well-being. The first factor was primarily characterized by negatively phrased items, while the second factor was composed of positively worded items. LSIA items were found to contribute to each of the two dimensions.

Using data on persons 65 years of age and older from the 1974 Harris and Associates national survey "The Myth and Reality of Aging in America," Hoyt and Creech (1983)

examined the LSIA using exploratory factor analysis. Their findings suggested cross-racial differences in the underlying factor structure. Searching for an underlying structure common across race and sex, they proposed an eight-item three-factor solution. The factors found by Hoyt and Creech were described as satisfaction with the past, satisfaction with the present, and future orientation/optimism. They noted weak evidence of a fourth factor related to negative mood tone. Wilson, Elias and Brownlee (1985) reported finding strong support for the Hoyt and Creech three factor model in their study of 791 University of Missouri retirees.

The factor structure of the LSIA was further examined by Liang (1984), who used a confirmatory factor analysis to test an 11-item structural equation model that included three first-order factors and one second-order factor. Liang, like Hoyt and Creech (1983), used data from the 1974 Harris survey on aging. Based on prior research, (e.g., Adams, 1969; Hoyt and Creech, 1983), Liang proposed mood tone, zest, and congruence as first-order factors and subjective well-being as the second-order factor. Liang then examined the 18 LSIA items included in the survey and selected 11 of them on the basis of face validity, reliability, and the pattern of correlated measurement errors. The sample was randomly divided into four

subsamples of relatively equal size. An exploratory analysis using one of the subsamples was conducted to estimate reliabilities and correlations. Item selection was then finalized and the proposed model was tested on each of the remaining three subsamples with consistent findings.

The factor solutions proposed by Adams, Hoyt and Creech, and Liang were all in general agreement on the definitions of three factors, most often labeled mood tone, zest, and congruence, although the specific items that went into these factors varied somewhat in the three studies. A comparison of the items presumed to load onto each factor is presented in Table 1.2. Hoyt and Creech's satisfaction with the present factor and Liang's mood tone factor consisted of the same three items. Adams' mood tone factor also contained those three items as well as three additional items. One of those additional items, "Most of the things I do are boring or monotonous," appeared in the zest dimension of Liang's model. All three models were in basic agreement as to the contents of the congruence factor (satisfaction with the past in the Hoyt and Creech solution); the only difference was an additional item in the Liang model. Adams' zest dimension contained six items. Hoyt and Creech included two of these in their future orientation/optimism factor. Liang used three of the same items as Adams in his

zest factor and included the aforementioned item from Adams' mood tone dimension.

The present study will evaluate the factor structures proposed in this earlier research. While the basic solutions proposed have some similarities, there is still considerable ambiguity as to an optimal strategy for the use and interpretation of LSIA items in assessing psychological well-being. Liang (1984) and Hoyt and Creech (1983) both used the same national data for their analyses, while Adams based his analysis on data from small towns in one midwestern state. By evaluating the alternative models using more recent national data, support may be found for one of the proposed interpretations. Given the current uncertainty regarding the structure of this measure, many researchers continue to treat the LSIA as a simple summated unidimensional measure. Using a multidimensional model of life satisfaction is likely to produce results substantively distinct from those achieved through a unidimensional approach (Hoyt et al., 1980; Knapp, 1976). If this study demonstrates consistency by supporting one of the previously hypothesized multidimensional structures, it could have important implications for future research employing the LSIA as an indicator of life satisfaction.

Table 1.2. Proposed factor structures of the LSIA

Item		Adams	Liang	Hoyt and Creech
1)	As I grow older, things seem better than I thought they would.	Z		
2)	I have gotten more of the breaks in life than most of the people I know.	U	C	
3)	This is the dreariest time of my life.	M		
4)	I am just as happy as when I was younger.	M	M	M
5)	My life could be happier than it is now.	M	M	M
6)	These are the best years of my life.	M	M	M
7)	Most things I do are boring or monotonous.	M	Z	
8)	I expect some interesting and pleasant things to happen to me in the future.	Z	Z	Z
9)	The things I do are as interesting to me as they ever were.	Z	Z	
10)	I feel old and somewhat tired.	Z	Z	
11)	I feel my age, but it does not bother me.			

12)	As I look back on my life, I am fairly well satisfied.	C	C	C
13)	I would not change the past even if I could.	C	C	C
14)	Compared to other people my age, I've made a lot of foolish decisions in my life.			
15)	Compared to other people my age, I make a good appearance.	Z		
16)	I have made plans for things I'll be doing a month or a year from now.	Z		Z
17)	When I think back over my life, I didn't get most of the important things I wanted.	U		
18)	Compared to other people, I get down in the dumps too often.	M		
19)	I've gotten pretty much what I expected out of life.	C	C	C
20)	In spite of what some people say, the lot of the average man is getting worse, not better.	U		

NOTE: M = Mood tone; Z = Zest; C = Congruence; U = Unnamed

METHODS

The LSIA Second-Order Factor Model

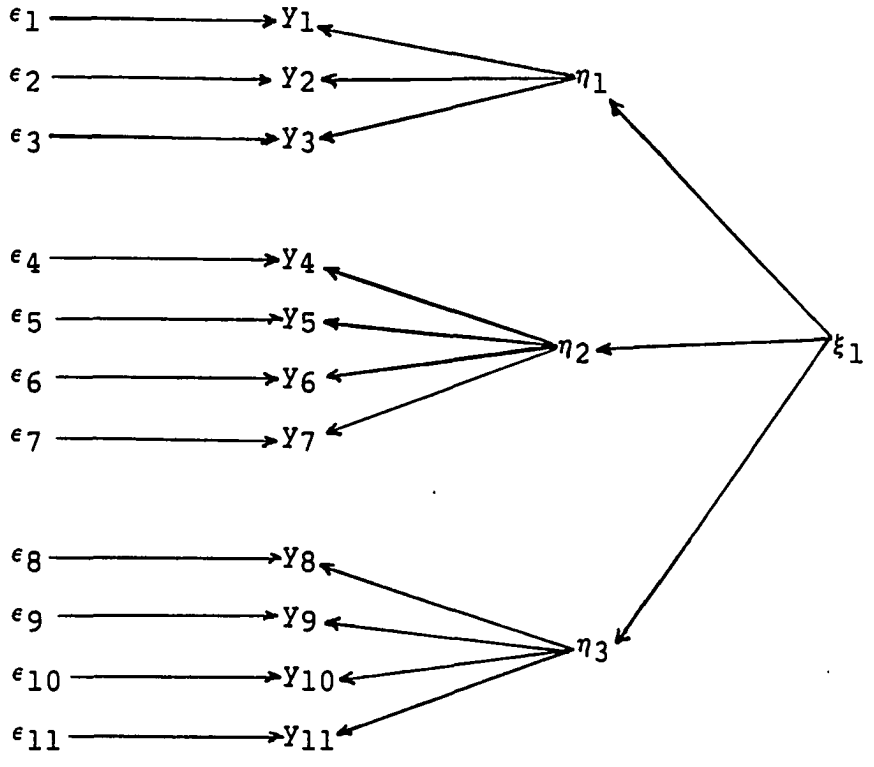
A structural equation confirmatory factor analytic approach was used to compare the factor structures of the LSIA proposed by Liang (1984), Hoyt and Creech (1983), and Adams (1969). Liang's factor solution was tested as it was originally proposed. The solution suggested by Hoyt and Creech was modified to the three first-order, one second-order factor configuration of Liang's approach. Adams' solution was tested in the same manner. The decision to include a second-order factor is consistent with the basic theoretical notion of psychological well-being. In addition, the use of a similar model across the three alternative formulations should enhance the comparability of the results. The fourth (unnamed) factor identified by Adams was not included.

The second-order factor structure used in this comparison implies that each item loads on a single first-order factor and that the correlation between these factors is explained by the underlying second-order factor (subjective well-being). Liang's model is diagrammed in Figure 1.1. The y's are the observable indicators (LSIA items). The epsilons are the measurement errors associated

with the observable indicators (assumed to be uncorrelated). The etas are the three first-order factors (mood tone, zest, and congruence). Ksi is the second-order factor (subjective well-being). Lambdas are the factor loadings between the observed indicators and the first-order factors. Gammas are the factor loadings between the first-order factors and the second-order subjective well-being factor. In order to achieve model identification, the first lambda associated with each first-order factor is set to 1.0, as is the first gamma between the first- and second-order factors. This procedure permits the model to be identified by setting the metrics of the latent variables.

Data and Analyses

Data used in the analyses were taken from the 1981 national survey "Aging in the Eighties" conducted by Harris and Associates (1981). These data were collected from a multistage random cluster sample of adults in the United States. The research design included an oversampling of respondents 55 and older, as well as over samples of blacks and hispanics. The analysis is based upon respondents aged 65 and older (N = 1837). As proposed by Wood et al. (1969), a neutral LSIA item response was scored as a separate middle category.



y_j: Observed LSIA items

ϵ_j: Measurement errors in the observed LSIA items.

ξ_1: Second-order subjective well-being factor.

η_1: First-order mood tone factor.

η_2: First-order zest factor.

η_3: First-order congruence factor.

Figure 1.1. Factor structure of the Life Satisfaction Index A proposed by Liang.

Models were estimated using LISREL VI (Joreskog and Sorbom, 1985). Confirmatory factor analyses were conducted using Pearson correlations in conjunction with maximum likelihood estimation, and with polychoric correlations in conjunction with unweighted least-squares estimation. Authors such as Henry (1982) and Olsson (1979) have discussed the problems of treating discrete measures as continuous, noting that factor solutions may be substantially affected by the procedure. Polychoric correlations are appropriate for discrete data, unweighted least-squares is appropriate in the absence of multivariate normality. Johnson and Creech (1983) used simulated data to analyze the effects of using parameter estimates based upon categorized variables. They reported that the estimates for the categorized variables were generally consistent with the continuous measures. Liang and Bollen (1983) reported that estimates of the Philadelphia Geriatric Center Morale Scale based upon polychoric correlations tended to produce higher reliabilities for measured variables than those based upon Pearson's correlations. In the present study, solutions from the two methods were computed and compared for consistency.

The three factor solutions based on Pearson correlation and maximum likelihood estimation will be compared using the

Bentler and Bonett (1980) Index, the GFI (Goodness-of-fit Index), and AGFI (Adjusted Goodness-of-fit Index) developed by Joreskog and Sorbom (1981), and the relative likelihood ratio (Chi^2 per degrees of freedom). The models based on polychoric correlations and unweighted least-squares estimates will be evaluated using the GFI and the AGFI. A direct statistical comparison of the alternative models is not possible since the models are not hierarchically related. The specific items included in each of the formulations do not load on the same first-order factors in all cases.

RESULTS

Summaries of the model estimations and goodness of fit tests are presented in Tables 1.3 and 1.4, polychoric correlations with unweighted least-squares estimation (POLY-UL) in Table 1.3, and Pearson correlations with maximum likelihood estimation (PRSN-ML) in Table 1.4. In general, the two methods of estimation yielded similar results, although the factor loadings of the observed indicators are larger in every case for the POLY-UL estimates. These loadings were above .45 for every item in each model when POLY-UL estimates were used and above .40 in all but one instance when using the PRSN-ML method.

The POLY-UL second-order loadings ranged from .648 (Hoyt and Creech's zest dimension) to .998 (Adams' zest dimension). Loadings on the second-order factor for the mood tone dimension were high for all three models, above .90 for the Adams and Liang models, and above .85 for the Hoyt and Creech model. High second-order loadings for the zest dimension were also present in the Adams and Liang structures. The proportion of variance in the first-order factors explained by Adams' model was .822 (mood tone), .995 (zest), and .467 (congruence). Corresponding proportions of variance explained by the Liang model were .926, .784, and .536. The proportions of variance accounted for by the by

Table 1.3. Summary of LSIA factor analysis: Polychoric correlations--unweighted least-squares estimation

		Adams	Liang	Hoyt and Creech
Standardized second-order factor loadings				
		Loading	Loading	Loading
Mood tone		.906	.963	.879
Zest		.998	.885	.648
Congruence		.684	.732	.743
Standardized first-order factor loadings				
	Item#	Loading	Loading	Loading
Mood tone	3	.603		
	4	.798	.839	.851
	5	.648	.674	.659
	6	.714	.773	.776
	7	.734		
	18	.675		
Zest	1	.644		
	7		.719	
	8	.575	.551	.760
	9	.802	.830	
	10	.623	.597	
	14	.538		
	16	.508		.637
Congruence	2		.573	
	12	.790	.719	.758
	13	.499	.498	.548
	19	.477	.451	.463
Goodness-of-fit measures				
GFI		.980	.993	.996
AGFI		.972	.989	.991

Table 1.4. Summary of LSIA factor analysis: Pearson correlations -- maximum likelihood estimation

		Adams	Liang	Hoyt and Creech
Standardized second-order factor loadings				
		Loading	Loading	Loading
Mood tone		.903	.902	.830
Zest		1.012	.899	.668
Congruence		.631	.689	.670
Standardized first-order factor loadings				
	Item#	Loading	Loading	Loading
Mood tone	3	.488		
	4	.662	.719	.715
	5	.528	.545	.539
	6	.579	.640	.650
	7	.555		
	18	.502		
Zest	1	.532		
	7		.551	
	8	.476	.456	.626
	9	.643	.674	
	10	.495	.484	
	14	.379		
	16	.411		.522
Congruence	2		.442	
	12	.569	.517	.559
	13	.431	.423	.453
	19	.443	.436	.434
Goodness-of-fit measures				
Chi^2(df)		572.60(87)	112.95(41)	28.23(17)
Chi^2/df		6.582	2.755	1.661
GFI		.956	.989	.996
AGF		.940	.982	.992
BBI		.886	.971	.991

the Hoyt and Creech model in the first-order factors was slightly less (.773, .420, and .552). Overall, the congruence dimension tended to load less well on the second-order factor (subjective well-being) and was not explained as well by the models as were the mood tone and zest factors.

Four measures of goodness-of-fit were computed for the models estimated by PRSN-ML. The measures presented were selected to offset (or partially offset) the effects of sample size. Due to its dependence on sample size, the relative likelihood ratio (Chi^2/degrees of freedom) has no clear threshold value to assess overall model fit (Wheaton, 1988), but it is useful when comparing the fits of competing models (lower values indicating better fits). The Liang and Hoyt and Creech models seem to fit better than the Adams model, using this statistic. Liang's model has a relative likelihood ratio of 2.76 and the Hoyt and Creech model a value of 1.66. Adams' model scores 6.58 on this test. The Index suggested by Bentler and Bonett (1980) shows the improvement achieved by the hypothesized model over a "null" model (a model that includes no causal linkages). A Bentler and Bonett Index of .9 or better is presumed to indicate an adequate fit. As with the relative likelihood ratio test, the Bentler and Bonett Index suggests an adequate fit for

the Liang and Hoyt and Creech models, and a somewhat less convincing fit for the Adams model. The final two measures of overall model fit (the GFI and the AGFI) were applied to both the PRSN-ML model estimates and the POLY-UL estimated models. These measures suggest that all three factor structures fit relatively well, although the Liang and Hoyt and Creech models score somewhat higher than the Adams model. The GFI and AGFI scores were very similar for both methods of model estimation.

PRSN-ML estimation of the Adams model resulted in a Heywood case (note that the standardized second-order factor loading on the zest dimension is larger than 1). While numerous situations can lead to a Heywood case (see Rindskopf, 1984), likely causes here include the high correlation between the zest and mood tone factors, and violations of normality. No such problem occurred with the POLY-UL estimates. Steps could have been taken to adjust the Adams PRSN-ML estimates (see Rindskopf, 1983, 1984), but the Adams model generally appeared to be much less promising than the other two.

DISCUSSION

Previous studies have suggested a general lack of consensus among researchers about the underlying factor structure of the LSIA. The next step in the research process was to confirm and critically compare the previous findings with newer nationally representative data. The results of this research strongly support the existence of interpretable and consistent dimensions within the LSIA. This represents the first replication of the proposed models using an independent national sample.

The factor structures proposed by Adams, Liang, and Hoyt and Creech were not specific to the data used in their research. The present research supports, to some degree, the factor structures proposed by each of these authors. Based on the amount of error explained in the first-order factors and the general goodness-of-fit measures, the Liang model is supported most strongly, however; just as important is that the general model tested in this research (first-order factors of mood tone, zest and congruence, linked to a common second-order factor) is relatively stable when containing as few as eight, or as many as 15, of the original LSIA items.

In the original research articles summarizing each of their factor analyses, the authors point out the

inconsistencies of their findings with that of the originally hypothesized structure of the LSIA. This study does nothing to refute those findings. The data used in this research support the contention of Adams, Liang, and Hoyt and Creech, that the LSIA is composed of factors representing mood tone, zest for life, and congruence of life expectations and achievements. To this end, the Liang model seems to perform slightly better than the other two tested.

In light of the consistent behavior of the LSIA factor structure across samples and time, the need to treat it as multidimensional is clear. Since at least three factors can be interpreted and measured by the scale in a variety of populations, it is important to examine how the determinants of subjective well-being affect each of its individual dimensions. Perhaps some of the disappointing results from prior research that examined the relationship of life satisfaction with predictor variables has been due to failing to address differences across these dimensions. It is likely that each of the LSIA dimensions is related in a distinct manner to certain independent variables. For example, it could be hypothesized that current health status would have a stronger association with mood tone, and perhaps zest for life, than with congruence. Mood tone is

more present-oriented than the other dimensions and, as such, is more likely to be affected by declines in health status. An earlier study by Knapp (1976) did analyze the relationship of independent variables with the component factors of the LSIA. He found substantial differences in regressor influence upon the individual dimensions of the LSIA, with theoretical implications. Future research should critically examine previous findings that were based on a unidimensional model of subjective well-being.

Beyond the issues of fit and dimensionality is the question of whether the LSIA adequately measures subjective well-being. Clearly, if Neugarten, Havighurst and Tobin (1961) were correct in their five-dimensional model of life satisfaction, the LSIA falls short of its goal. Previous studies of the LSIA have failed to find evidence that factors representing positive self-concept and resolution and fortitude are present in the scale. As pointed out by Adams and Liang, one solution is to add items to the LSIA that measure those dimensions, or other theoretically plausible dimensions. In one such study, Liang (1985) analyzed a four first-order factor model of subjective well-being that utilized items from both the LSIA and the Affect Balance Scale (Bradburn, 1969). While it would be prudent for future surveys to include additional items that

represent dimensions of well-being missing from the LSIA, researchers using previously collected data may have only the present LSIA items to measure subjective well-being. Indeed, the presence of the LSIA items on large national surveys ensures their continued use. Although its comprehensiveness may be questionable, the three first-order, one second-order factor LSIA model has been shown to behave consistently across samples, and when used properly, should yield substantively interpretable results.

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SECTION 2. VARIATIONS IN THE DETERMINANTS OF LIFE SATISFACTION BY AGE AND ACROSS TIME

Variations in the determinants of life satisfaction by age and across time

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INTRODUCTION

The concept of life satisfaction has been central to much of the work in social gerontological theory. Although a number of researchers have explored the relationship between age and life satisfaction, little research has been published that attempts to demonstrate the stability of life satisfaction measures across time, and the stability of the causal relationships between life satisfaction and those factors that appear to influence it. Further, despite the well documented multidimensional nature of life satisfaction (Adams, 1969; Hoyt and Creech, 1983; Lohmann, 1980; Liang, 1984; Redmond, 1990), the majority of research in the area has treated life satisfaction as a unidimensional concept (e.g., Chappell and Badger, 1989; Doyle and Forehand, 1984; George, Okun, and Landerman, 1985).

Research that has treated the dimensions of life satisfaction separately has often found that that predictor variables influence the component dimensions of life satisfaction differentially (Hoyt et al., 1980; Knapp, 1976). It has also been suggested that age may be related in distinct ways to each of the dimensions of life satisfaction (Knapp, 1976; Redmond, 1990). If this is the case, then age effects may be masked in models that treat life satisfaction as a unidimensional concept.

Previous research on the relationship between age and life satisfaction has yielded mixed results. In many cases, lower levels of life satisfaction have been reported among older research subjects. Frequently, however, the lower life satisfaction among older persons can be explained by other factors that are often associated with old age (Doyle and Forehand, 1984; Larson, 1978). In particular, poor health and financial problems have consistently been found to be indicators of low levels of life satisfaction. In his review of subjective well-being research, Larson concluded that health, socioeconomic factors, marital status, and degree of social interaction were strongly related to life satisfaction. Larson also reported that other variables such as age, race, and employment were not conclusively related to subjective well-being.

The effects of a number of variables on life satisfaction were tested by Edwards and Klemmack (1973) using a sample of 507 persons 45 years of age and older living in four Virginia counties. The strongest predictors of life satisfaction found by Edwards and Klemmack were socioeconomic status (SES), perceived health status, and informal nonfamilial activity. Age was not found to be a significant factor after controlling for SES. Similar results were reported by Spreitzer and Snyder (1974) in a

study based on a national sample. They found life satisfaction to be most strongly related to self-assessed health and economic sufficiency. Spreitzer and Snyder did not find evidence of a linear effect of age on life satisfaction, but did observe an age-sex interaction in which women under 65 years of age tended to be more satisfied with life than men. Conversely, men over 65 reported higher levels of life satisfaction than women.

In another study based on national data, George et al. (1985) observed the effects of predictors to vary across age-groups. George and her associates found that age moderated the effects of such variables as marital status, health, and income on life satisfaction. Health was relatively more important to older respondents than to middle-aged and younger adults. Being married was a strong predictor of satisfaction for middle-aged and older adults, but not for younger adults. Income was most important for the middle-aged. Education was important across all age-groups, although its effects were less direct for the middle-aged and old.

Other research has suggested that there are age differences in the dimensionality of life satisfaction (Cutler, 1979). Cutler conducted age-specific factor analyses on a set of twelve items measuring different areas

of life satisfaction (e.g., satisfaction with marriage, satisfaction with health, and satisfaction with financial situation). The factor patterns from these analyses were different for each of the seven age-groups included. Cutler's research also indicated that the relative importance of the life satisfaction domains varied across age-groups. In contrast to Cutler's findings, Herzog and Rodgers (1981) examined the domains of life satisfaction and concluded that there were only small differences in the underlying age-specific factor structures.

In a rare example of longitudinal research in this area, Palmore and Kivett (1977) looked for change in life satisfaction over a four-year period in a panel study of community residents aged 46 to 70. They found levels of satisfaction to be very stable over the study period as well as across all age-sex cohorts. Attempts to predict change in life satisfaction were largely unsuccessful, with health the only predictor variable reaching statistical significance.

The present research examines a multidimensional measure of life satisfaction and the stability of its relationships to commonly researched predictor variables over a seven-year period, using two national cross-sectional surveys focusing on older Americans. The relationship of

age to life satisfaction and its predictors will be examined for constancy across time, across age-groups, and across cohorts, over the seven-year span between these two surveys. It is the causal relationships that are the focus of this research, rather than changes in the average levels of life satisfaction and its predictors. The effects of financial status, health, loneliness, sex, educational attainment, race, and marital status will be assessed for stability across age-groups and cohorts over the two surveys included in this analysis.

METHODS

Data

Data used in this research were taken from two national surveys, "The Myth and Reality of Aging in America" (Harris and Associates, 1975) and "Aging in the Eighties: America in Transition" (Harris and Associates, 1981). Data for these studies were collected in 1974 and 1981, respectively. Each of these surveys contained a representative cross-sectional sample of persons 18 years of age and over, as well as additional samples of older persons. The 1974 survey included cross-sectional samples of the general population 55 to 64 years of age, and of blacks 65 years of age and older. The 1981 survey included oversamples of persons aged 55 to 64, aged 65 and over, blacks, and hispanics.

The present analysis included only blacks and whites aged 58 to 85, and was limited to cases that included complete data with respect to the items used in this research. The samples from each of these two surveys were then weighted by age, sex, and race, to their relative population proportions (based on census data). Prior to deletion of cases with incomplete data, sample sizes were 2041 from the 1974 survey and 1693 from the 1981 survey. Final sample sizes were 1936 and 1619 from the 1974 and 1981

surveys, respectively. The samples were then divided into a total of eight subgroups (four each, from the 1974 and 1981 surveys) based on age. The ages defining the subgroups were: 58 to 64 years of age, 65 to 71 years of age, 72 to 78 years of age, and 79 to 85 years of age.

Previous research using these data have shown slightly lower levels of life satisfaction among persons 55 years of age and older in 1981 than in 1974 (Harris, 1981). The same research found slightly higher percentages of persons 65 years of age and older reporting that not having enough money to live on was a very serious problem for them in the 1981 survey, than in the 1974 survey (17 percent versus 15 percent, respectively). While this is not surprising in light of the severe increases in the cost of living that occurred during the years between the two surveys, time of measurement effects are confounded with cohort effects, so conclusions should be made with caution. Twenty-one percent of the same age-group reported that poor health was a very serious problem for them, in both the 1974 and 1981 surveys. Similarly, percentages reporting that loneliness was serious problem for them in 1974 and 1981 were 12 and 13, respectively.

The life satisfaction items were not asked of respondents under the age of 55 in the 1981 survey. Subject

selection in this research was limited to persons aged 58 and over, in order to simplify the analysis of cohort effects, while using age 65 as one of the dividing points between age-groups. Since the period of time between surveys was seven years, age-groups were constructed using seven-year intervals. Persons over age 85 were not included due to dwindling sample sizes. The weighted sample distributions are reported in Table 2.1.

Measures

From among those questions included in both the 1974 and 1981 surveys, items were selected to measure respondent characteristics, social support, financial status, health, and life satisfaction based on theoretical and methodological grounds.

The three dimensions of life satisfaction included in this study were assessed using items from the Life Satisfaction Index A (LSIA), originally developed by Neugarten, Havighurst, and Tobin (1961). Previous research has shown the LSIA to be multidimensional (Adams, 1969; Hoyt and Creech, 1983; Liang, 1984; Redmond, 1990). The factor structure used here was derived from work done by Liang in his analysis of data from the 1974 Harris survey, and later confirmed by Redmond using the 1981 Harris survey. Liang

Table 2.1. Respondent characteristics by year of survey after weighting by age, sex and race

	1974		1981	
	N	Percent	N	Percent
Age				
58 to 64	754	38.9	625	38.6
65 to 71	587	30.3	494	30.5
72 to 78	394	20.4	324	20.0
79 to 85	201	10.4	176	10.9
Sex				
Male	840	43.4	711	43.9
Female	1096	56.6	908	56.1
Race				
White	1784	92.1	1482	91.6
Black	153	7.9	137	8.4
Marital status				
Married	1110	57.3	933	57.6
Not married	826	42.7	686	42.4
Education				
No formal	40	2.1	22	1.3
1st to 7th grade	379	19.6	208	12.9
8th grade	384	19.8	235	14.5
some high school	344	17.8	277	17.1
high school graduate	363	18.7	392	24.2
some post high school	280	14.5	273	16.9
college graduate	79	4.1	110	6.8
some post graduate	68	3.5	102	6.3
Total	1936	100.0	1619	100.0

used a second-order factor model to describe the LSIA. In this research, the first-order factors described by Liang are treated as correlated concepts, but no second-order global life satisfaction concept is included.

This formulation of the LSIA includes 11 of the original 20 items to construct three component dimensions of life satisfaction: mood tone, zest for life, and congruence of life goals and achievements. Respondents were asked to agree or disagree to each of the items. As suggested by Wood, Wylie, and Sheafor (1969), neutral responses were scored as an intermediate category, rather than scored with the negative responses. In this case, positive outlook responses were scored 3, negative outlook responses were scored 1, and neutral responses were scored 2.

The specific items making up the mood tone dimension were: (1) I am just as happy as when I was younger, (2) My life could be happier than it is now, and (3) These are the best years of my life. Zest was composed of four items: (1) I expect some interesting and pleasant things to happen to me in the future, (2) The things I do are as interesting to me as they ever were, (3) I feel old and somewhat tired, and (4) Most of the things I do are boring or monotonous. The four congruence items used were: (1) As I look back on my life, I am fairly well satisfied, (2) I would not change

my past life, even if I could, (3) I have gotten pretty much what I expected out of life, and (4) I have gotten more of the breaks in life than most of the people I know.

Respondent characteristics included in the analyses were: sex (1 = male, 2 = female), race (1 = white, 2 = black), marital status (1 = not married, 2 = married), and education (1 = no formal education, 2 = first through seventh grade, 3 = eighth grade, 4 = some high school, 5 = high school graduate, 6 = some post-high school education, 7 = college graduate, and 8 = some post-graduate education). See Table 2.1, for the distributions of these characteristics in the sample analyzed.

Three additional measures were included in the model that fall into the general categories of social support, financial condition, and health. Respondents were asked to what degree loneliness, not having enough money to live on, and poor health, were problems for them (1 = very serious problem, 2 = somewhat serious problem, 3 = hardly a problem at all). The item regarding poor health as a problem was the only health item available in both surveys.

Income was not selected as a measure of financial well-being since the measures in 1974 and 1981 were not readily comparable, and there were large numbers of respondent refusals to the income questions. Additionally, previous

research has suggested that it is financial stress, rather than income per se, that is associated with life satisfaction (e.g., Spreitzer and Snyder, 1974).

Recent literature has suggested the presence of a confidant is the most important indicator of social support in determining life satisfaction (Chappell and Badger, 1989). Other research has suggested that level of involvement in informal nonfamilial activities is important (Edwards and Klemmack, 1973). The loneliness item was chosen as the best available measure of subjective social support included in both Harris surveys. Further, previous research has found reported loneliness to be strongly and negatively related to measures of emotional well-being (Lee, 1983). These measures are summarized by sample subgroups in Table 2.2.

Analysis

Subgroup covariance matrices were analyzed with LISREL VI (Joreskog and Sorbom, 1985). A series of stacked-model comparisons were made in order to test time of measurement, age-group, and cohort differences in the factor loadings and measurement errors of the life satisfaction items, and in the effects of the predictor variables on the dimensions of life satisfaction. The use of stacked-models involves the

Table 2.2. Mean levels of loneliness, money to live on, and health by age-group and year of survey

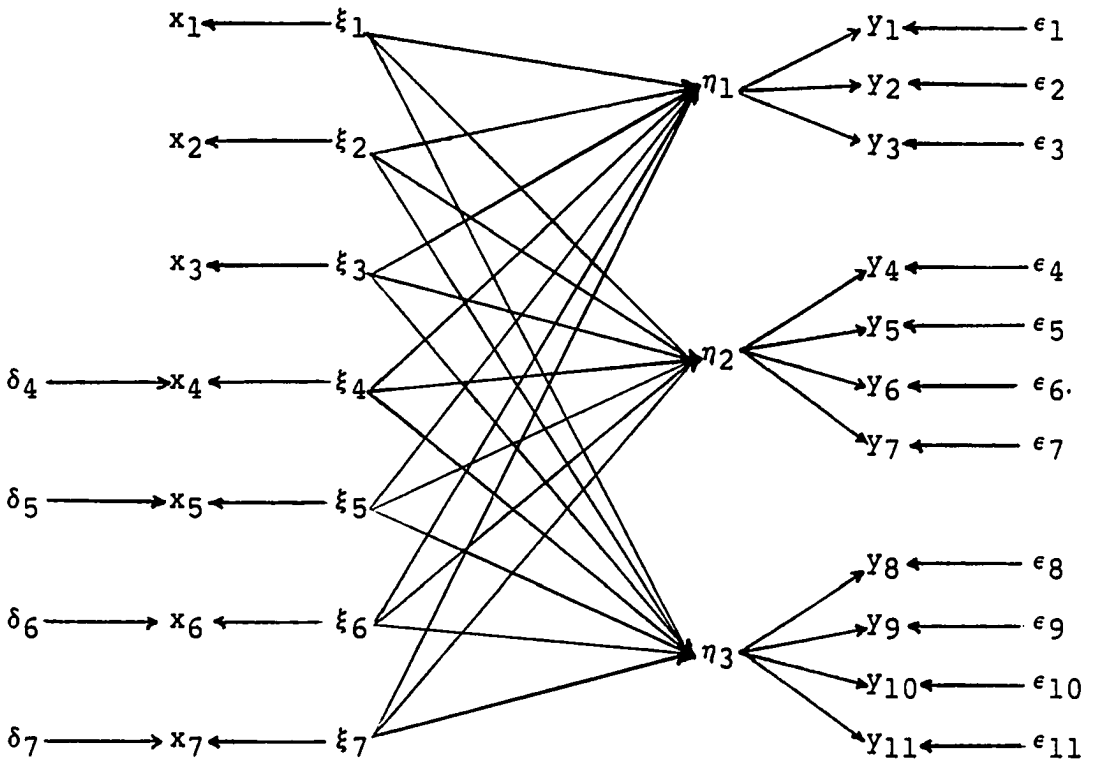
	1974		1981	
	Mean	SD	Mean	SD
58 to 64 years of age				
Loneliness	2.59	.699	2.71	.616
Money to live on	2.34	.808	2.41	.783
Health	2.28	.830	2.48	.780
65 to 71 years of age				
Loneliness	2.59	.695	2.68	.623
Money to live on	2.38	.792	2.41	.752
Health	2.33	.785	2.46	.759
72 to 78 years of age				
Loneliness	2.48	.745	2.56	.722
Money to live on	2.44	.749	2.41	.774
Health	2.24	.803	2.28	.810
79 to 85 years of age				
Loneliness	2.39	.801	2.49	.756
Money to live on	2.47	.735	2.52	.715
Health	2.10	.841	2.23	.811
All ages (58 to 85)				
Loneliness	2.55	.721	2.64	.661
Money to live on	2.39	.776	2.42	.765
Health	2.27	.814	2.41	.788

simultaneous estimation of model parameters across subgroups of data. Parameters can be freely estimated for individual subgroups or constrained to be equal across various subgroups. By comparing the relative fits of nested models inferences can be made about the contributions of specific model parameters.

The covariance analyses conducted here assume variables are measured on an interval scale. The limited number of response categories used to measure variables in this research is cause for some concern. Findings regarding the effects of using categorical variables has been mixed. Some authors have found relatively minor distortions in results (e.g., Johnson and Creech, 1983) while others report more substantial variations (e.g., Henry, 1982). Bentler and Chou (1987) suggest that variables with four or more categories can be used without much worry. A strategy recommended for analyzing ordinal data in LISREL models is the use of polychoric correlation coefficients. Using data from the same surveys used here, previous analyses on the life satisfaction portion of the models considered here by Liang (1984) and Redmond (1990) found only small model variations when polychoric correlation coefficients were used in place of Pearson correlation coefficients. The statistical theory underlying structural equation modeling

is based on the distribution of covariances, rather than on correlations (Bentler and Chou, 1987), so the use of covariance matrices is recommended. Futher, the use of standardized coefficients is particularly problematic when making comparisons across populations with differing variances.

In this research, general model specifications included uncorrelated measurement errors among the observed variables, and freely correlated latent exogenous concepts. As suggested by Hayduk (1987) and Entwisle and Hayduk (1982), the measurement errors in the observed predictor variables were specified, rather than estimated. In addition to avoiding identification problems in the models considered here, this procedure has the general benefit of giving the researcher some control over the interpretation of the exogenous concepts. Borrowing an example from Hayduk that is directly relevant to this research; education can be conceptualized in at least two manners, as amount of learning, or level of certification. Years of schooling is probably a relatively reliable measure of educational attainment, but a quite unreliable measure of learning. If the measurement errors were freely estimated, it would be less clear exactly what concept was being applied in a model. The general model analyzed is presented in Figure 2.1.



x_i: Observed predictor variables

y_j: Observed LSIA items

δ_i: Measurement errors in the observed predictor variables

ϵ_j: Measurement errors in the observed LSIA items

ξ_k: Predictor variable true scores (ξ_1 = sex, ξ_2 = race, ξ_3 = marital status, ξ_4 = education, ξ_5 = loneliness is a problem, ξ_6 = enough money to live on is a probelem, ξ_7 = poor health is a problem; all correlated)

η_1: Latent LSIA dimensions (η_1 = mood tone, η_2 = zest, η_3 = congruence; all correlated)

Figure 2.1. The general life satisfaction model

In this research, the observed predictor variables are defined at face value. Education refers to credentialing, and problems with loneliness, for example, is taken to refer to only the loneliness aspect of social support. The next step is the imprecise establishment of the specific measurement errors. In the case of the dichotomous classification variables (sex, race, and marital status), measurement error was expected to be minimal. These variables were assumed to be measured without error (treated as fixed-X variables in LISREL), consistent with the recommendations of Joreskog and Sorbom (1985).

For the nondichotomous predictor variables estimations of measurement error were made based on response tendencies predicted for older respondents, the number of response categories in the items, and previous research when available. The variance of the education item, containing eight categories, was estimated to be ten percent measurement error. This estimate allows for some classification errors, most notably in the post-high-school less than college-graduate category. This estimate is also consistent with findings reported by the U.S. Department of Commerce (1975) and Wolfle and Ethington (1986), and estimates by Hayduk (1987) using a similarly worded item. The remaining measures were all based on items asking about

the severity of problems. There is some research to suggest that older respondents may tend to underreport problems (Riley and Foner, 1968). These items, with three categories each, were assumed to be less reliable than the education item and measurement error was estimated at twenty percent. These estimates were incorporated into the analysis by multiplying the variances of the items involved by the proportion of measurement error assumed, and fixing the corresponding theta-deltas in the LISREL model to these values. Unfortunately, the accuracy of these estimates is unknown; however, it is reasonable to assume that these estimates reflect the true situation better than assumptions of no measurement error. Parameter estimates and significance tests of model parameters were slightly affected by levels of measurement errors assumed, although the overall goodness-of-fit statistics for these models were not sensitive to the levels of measurement error chosen. Model estimations made for comparison, with no measurement error and with double the estimated measurement error, produced Chi^2 values within one percent of those produced by the models using the levels described above.

Prior to testing the age, period, and cohort models, preliminary analyses were conducted on each of the eight subgroups. Causal paths found to be nonsignificant in all

of the subgroups were eliminated from further analysis. Following the subgroup analyses, the measurement portion of the model for the life satisfaction dimensions was analyzed to determine the appropriateness of assuming invariant factor loadings across subgroups. That is, are the individual life satisfaction items related to their underlying dimensions in the same way for each of the eight subgoups?

Following determination of the measurement model, three general causal models were evaluated: (1) a model in which all subgroups were constrained to have identical causal effects within each of the two sampling points, (2) a model in which causal paths within age-equivalent subgroups were constrained to be equal across times of measurement, and (3) a model in which causal paths were constrained to be equal for cohorts across times of measurement.

The time of measurement model tests the hypothesis that the relationships between the predictor variables and the life satisfaction dimensions are the same for the four subgroups within each survey regardless of age, but vary between 1974 and 1981. If historical (period) factors resulted in changes in the relative importance of variables affecting life satisfaction, this model should fit the data better than the model in which all causal paths are held

equal for all eight subgroups (gamma invariant model). Age and cohort effects are not precluded by the acceptance or rejection of this model.

The age-equivalent model tests for the consistency in the relationships between the predictor variables and the life satisfaction dimensions for similar age-groups in the two surveys. That is, the determinants of life satisfaction will be the same for persons of equal ages regardless of which point in time the data was collected. If aging or life stage affects the determinants of life satisfaction, this model should fit the data better than the gamma invariant model. It is possible for a combination of cohort and time of measurement effects to resemble age effects.

The cohort model tests whether the relationships between the predictor variables and the life satisfaction dimensions are constant for persons within the same birth cohorts across the two surveys. This model should fit the data if the life experiences unique to these cohorts have led them to evaluate their lives in differing ways. This model could also fit, given the right combination of age and time of measurement effects.

RESULTS

Analyses of the eight subgroups found four causal paths to be nonsignificant (at the .05 level) for all subgroups. These causal paths, sex to mood tone, race to mood tone, education to mood tone, and education to congruence, were eliminated from further analysis. Summary statistics for the subgroup analyses are presented in Table 2.3. As suggested by Wheaton (1988), multiple measures of model fit are reported. Included in Table 2.3 are: Chi^2 and degrees of freedom, Chi^2 per degrees of freedom, the GFI, and Critical-N (CN), developed by Hoelter (1983).

Table 2.3. Summary statistics of model fits for individual subgroups

	N	Chi^2 (df=97)	Chi^2/ df	GFI	CN
1974 subgroups					
58 to 64 years of age	754	553	5.70	.921	165
65 to 71 years of age	587	149	1.53	.972	477
72 to 78 years of age	394	100	1.03	.975	474
79 to 85 years of age	201	81	.83	.882	300
1981 subgroups					
58 to 64 years of age	625	326	3.36	.946	232
65 to 71 years of age	494	151	1.56	.967	394
72 to 78 years of age	324	109	1.13	.938	205
79 to 85 years of age	176	103	1.07	.938	205

The Likelihood-ratio Chi^2 statistic is dependent upon sample size. Small deviations from a perfect fit are statistically significant when using large sample sizes. Similarly, the Chi^2 per degree of freedom statistic is also dependent upon sample size, although this statistic can be used to provide useful information when comparing models for relative improvement in fit when freeing, or constraining model parameters. Critical-N is an estimate of the sample size up to which a model could not be rejected based on the Chi^2 test. CN values reported here are for the .05 level of significance. A rough rule of thumb suggests that CN values of 200 times the number of groups in the model represents an acceptable model fit. Bollen and Liang (1988) caution that CN is sensitive to sample size, with models based on large samples more likely to be accepted.

The Goodness-of-Fit Index (GFI) and the root mean square residual (RMSR) are reported by the LISREL program. Joreskog and Sorbom (1985) report that the GFI measures the relative amount of variances and covariances accounted for by the model. They report that the GFI is independent of sample size, and is not sensitive to departures from normality. The distributional properties of the GFI are unknown, but values close to one are associated with a good model fit. The root mean square residual is an indicator of

the average residual variances and covariances, and is useful in comparing different models estimated with the same data (Joreskog and Sorbom).

Evaluation of the measurement model for the life satisfaction dimensions suggested that factor loadings (lamda-Ys in LISREL) for all subgroups could be constrained to be equal. Allowing the factor loadings to be estimated for each subgroup reduced the overall Chi^2 by only 75.43 while using 56 degrees of freedom. There was somewhat less convincing evidence that the measurement errors of the life satisfaction items were also invariant across subgroups (change in Chi^2 = 186.60, degrees of freedom used = 77). In subsequent analyses factor loadings were constrained to be invariant for all subgroups, but error variances were freely estimated.

Following selection of the measurement model, the causal effects were considered. Three general models were fit: a model in which all causal paths (LISREL gammas) were constrained to be zero (Model 1), a model constraining all causal paths to be invariant across subgroups (Model 2), and a model in which all causal paths were allowed to be unique for each subgroup (Model 3). Errors in the observed variables were assumed to be uncorrelated, while the latent exogenous concepts were all assumed to be correlated.

Results of these model estimations indicated that the presence of the causal paths added significantly to the model fit. The Chi^2 per degree of freedom declined from 3.27 for Model 1, to 1.92 for Model 2. The change in Chi^2 per change in degrees of freedom between Models 1 and 2 was 81.16. CN for Model 1 was 1173, while CN for model 2 was 1989 (suggesting a reasonable fit). Only limited support was found for a substantial improvement in fit when causal paths were free to vary between subgroups (Chi^2 per degree of freedom improvement from Model 2 = 1.78, Model 3 CN = 2030). Estimation of the time-specific, age-specific, and cohort-specific models were used to determine which, if any, of these models could account for the bulk of the improvement in fit between Models 2 and 3. Each of these three models is hierarchically nested between Models 2 and 3, but they are not hierarchically related to one another.

Differences between the 1974 and 1981 groups were considered first. In this model (Model 4), all the causal paths between the exogenous variables and the life satisfaction dimensions were constrained to be equal for the four 1974 age subgroups and for the four 1981 age subgroups. The life satisfaction factor loadings were held invariant across all eight subgroups. Based on the goodness-of-fit measures considered (those reported in the subgroup

analyses, and the root mean square residual), no substantial improvement in fit was achieved through the use of time-of-measurement effects relative to Model 2.

The next model evaluated (Model 5) constrained the causal paths to be invariant for similar age groups across points of measurement. That is, the gammas for the 1974 subgroup aged 57-64, were constrained to equal the gammas for the 1981 subgroup aged 57-64, and so on. Life satisfaction factor loadings were invariant across all subgroups. The fit indices suggest a slight improvement in fit relative to the gamma invariant model (Model 2).

Model 6, the third model evaluated relative to Models 2 and 3, posited cohort effects across the measurement period. Specifically the causal paths in the 1974 subgroup aged 57 to 64, and the 1981 subgroup aged 65 to 71, were held invariant, as were the 1974 65 to 71 year old subgroup and the 1981 72 to 78 year old subgroup, and the 1974 72 to 78 year old and 1981 79 to 85 year old subgroups. Restrictions were not placed on the 1974 79 to 85, and 1981 57 to 64 year old, subgroups. As in the previous models, the factor loadings were invariant across all subgroups. This model explains just slightly more of the Chi^2 difference between Models 2 and 3 than did the age effects model (Model 5), but at a larger cost in degrees of freedom. The results of fitting Models 4 through 6 are summarized in Table 2.4.

Table 2.4. Summary statistics of age, period, and cohort models

	Chi^2(df)	Chi^2/ df	GFI	CN	RMSR	Chi^2/df_2	Chi^2/df_3
Model 2	1892(983)	1.92	.923	1989	.051		1.78
Model 4	1859(966)	1.92	.925	1991	.053	1.94	1.75
Model 5	1771(932)	1.90	.933	2018	.046	2.37	1.34
Model 6	1759(915)	1.92	.926	1996	.052	1.95	1.55
Model 3	1689(864)	1.94	.936	1978	.046	1.78	

Model 2: Causal paths and factor loadings invariant.

Model 4: Time of measurement effects, factor loadings invariant.

Model 5: Age effects, factor loadings invariant.

Model 6: Cohort effects, factor loadings invariant.

Model 3: Causal paths free, factor loadings invariant.

Chi^2/df_2: Change in Chi^2/change in degrees of freedom relative to Model 2.

Chi^2/df_2: Change in Chi^2/change in degrees of freedom relative to Model 3.

The previous analyses suggested that age was most useful in explaining the differences in the causal relationships among the subgroups. The initial analyses conducted on the individual subgroups indicated that the model fit less well for the youngest age groups. These two results led to the fitting of an additional series of nested models that considered the impact of age on the causal factors affecting life satisfaction.

The first of these models (Model 7) constrains the causal paths of all subgroups aged 65 and above to be equal, while constraining the two subgroups under 65 to be equal. The results of fitting Model 7 were relatively encouraging, as evidenced by the Chi^2 per degree of freedom change from Model 2.

Following estimation of Model 7, the causal path equivalence constraint was lifted from the youngest subgroups in Model 8. Model 8 accounts for a large proportion of the difference in fit between the gamma invariant (Model 2) and gamma free (Model 3) models, using relatively few degrees of freedom. Models 7 and 8 are summarized in Table 2.5.

Finally, within the framework of the causal relationships suggested by Model 8, the invariance of the life satisfaction factor loadings was reevaluated for the

Table 2.5. Summary statistics of models based on subgroups of under 65 year olds versus over 65 year olds

	Chi^2(df)	Chi^2/ df	GFI	CN	RMSR	Chi^2/ df_2	Chi^2/ df_3
Model 2	1892(983)	1.92	.923	1989	.051		1.78
Model 7	1813(966)	1.88	.923	2041	.054	4.64	1.30
Model 8	1759(949)	1.85	.923	2068	.054	3.93	0.92
Model 3	1689(864)	1.94	.936	1978	.046	1.78	

Model 2: Causal paths and factor loadings invariant.

Model 7: Causal paths held invariant across both subgroups of under 65 year olds, and invariant for all subgroups of over 65 year-olds, factor loadings invariant across all subgroups.

Model 8: Causal paths held invariant for subgroups of over 65 year olds, causal paths free to vary among subgroups of under 65 year olds, factor loadings invariant across all subgroups.

Model 3: Causal paths free, factor loadings invariant.

Chi^2/df_2: Change in Chi^2/change in degrees of freedom relative to Model 2.

Chi^2/df_2: Change in Chi^2/change in degrees of freedom relative to Model 3.

youngest subgroups. Model 9 constrained the factor loadings for the youngest pair of subgroups to be equivalent, but free to vary from the loadings to which the other 3 pairs of subgroups were constrained. The last model (Model 10) allows the factor loadings to be estimated freely for the two youngest subgroups. Model 9 appears to be an improvement over Model 8, while Model 10 does not seem to be substantially better than Model 9. This sequence of tests is summarized in Table 2.6. The causal path and factor loading estimates for Model 9 are reported in Tables 2.7 and 2.8.

Table 2.6. Summary statistics of models testing factor loading invariance of subgroups of under 65 year olds

	Chi^2(df)	Chi^2/ df	GFI	CN	RMSR	Chi^2/ df_0
Model 8	1759(949)	1.85	.923	2068	.054	
Model 9	1726(941)	1.83	.923	2090	.053	4.05
Model 10	1711(933)	1.83	.923	2091	.053	1.84

Model 8: Causal paths held invariant for subgroups of over 65 year olds, causal paths free to vary among subgroups of under 65 year olds, factor loadings invariant across all subgroups.

Model 9: Causal paths and factor loadings held invariant among subgroups of over 65 year-olds, causal paths free to vary and factor loadings held invariant among subgroups of under 65-year olds.

Model 10: Causal paths held invariant for subgroups of over 65 year olds, causal paths and factor loadings free to vary between subgroups of under 65 year-olds.

Model 3: Causal paths free, factor loadings invariant.

Chi^2/df_2: Change in Chi^2/change in degrees of freedom relative to Model 2.

Chi^2/df_2: Change in Chi^2/change in degrees of freedom relative to Model 3.

Table 2.7. Summary of Model 9: Causal paths

		Subgroup		
		1974 58-64	1981 58-64	All 65-85
LSIA dimension	Predictor	Gamma	Gamma	Gamma
Mood tone				
	Marital Status	.552***	.385***	.261***
	Not Lonely	.105	.339***	.370***
	Finances	.101	.316***	.069*
	Health	.116*	-.081	.252***
Zest				
	Sex	.040*	.060**	.021
	Race	-.163**	-.011	-.036
	Marital Status	.080***	.103***	.009
	Education	.027***	.021*	.036***
	Not Lonely	.114***	.080*	.207***
	Finances	-.060*	.120***	-.022
	Health	.103***	.055	.214***
Congruence				
	Sex	-.013	.124**	.031
	Race	.197**	.114	-.015
	Marital Status	.113**	.083	.013
	Not Lonely	.095*	.156**	.155***
	Finances	.166***	.281***	.073***
	Health	-.023	-.088	.096***

*Significant at .05 level.

**Significant at .01 level.

***Significant at .001 level.

Table 2.8. Summary of Model 9: LSIA factor loadings

		Subgroup		
		1974 58-64	1981 58-64	All 65-85
LSIA dimension	Item	Loading	Loading	Loading
Mood tone				
	1	1.000	1.000	1.000
	2	.940	.940	.759
	3	.906	.906	.809
Zest				
	4	1.000	1.000	1.000
	5	2.201	2.201	1.408
	6	1.971	1.971	1.223
	7	1.497	1.497	1.099
Congruence				
	8	1.000	1.000	1.000
	9	1.152	1.152	1.072
	10	1.217	1.217	1.242
	11	.910	.910	1.132

DISCUSSION

Using stacked-group LISREL procedures, data from two national cross-sectional surveys were used to assess the constancy of the effects of several predictors on three dimensions of life satisfaction, taken from the LSIA. In general, little variation among age-groups was found in either the causal relationships, or the factor loadings on the life satisfaction dimensions. For those over age 65, both the causal paths and factor loadings can be constrained to equal, regardless of age-group, or which survey the age-group was taken from, with little sacrifice in model fit.

Those under 65, however, seem to differ from the older respondents with regard to both causal relationships, and life satisfaction factor loadings. The causal relationships also seem to vary across the two points of measurement, for these younger groups. It is not possible from the analyses conducted here, to establish how much of this difference is due to differences in what actually determines life satisfaction for the younger respondents, and how much may be a reflection of measurement inadequacy. The LSIA was designed for use with older subjects, and some items may not be entirely appropriate for preretirement-aged persons. Conversely, it seems reasonable to assume that persons at different life stages may indeed base their life assessments

on different priorities, as suggested by George et al. (1985). With many persons retiring at, or near, age 65, that milestone is a logical point to find such differences. It appears that health may be a somewhat more important determinant for those over 65 than for the groups aged 58-64. Similarly, the over-65 groups seem to exhibit somewhat less emphasis on money problems. These observations are consistent with those of George and her associates.

Obviously, it is not possible to conclude with certainty that an age (life course) effect is responsible for the subgroup differences observed in this research, rather than some combination of period and cohort effects. However, given the number of parameters involved and constrained, and the substantive interpretation these results suggest, it is difficult to make a strong case against the life course explanation.

Overall, the implications of this research are that the LSIA is a well behaved measure for respondents over the age of 65 (up to age 85). The causal effects of the predictor variables considered here are also stable for persons in this age range. It appears that caution should be exercised when using the LSIA to compare younger and older respondents, insofar as the measurement model does not appear to be the same for those under and over age 65.

Although it was not discussed in detail, examination of the parameter estimates from the models considered shows that the causal effects of the exogenous variables are not consistent across LSIA dimensions. This is easily illustrated by the pattern of causal paths found to be nonsignificant across all subgroups. Also, for example, it appears that health is not related to congruence as strongly as it is to mood tone and zest. This highlights the usefulness of treating the LSIA as a multidimensional rather than unidimensional measure. Additionally, the estimated factor loadings and modification indices provided by LISREL (not reported here) indicate that there may be age effects associated with the zest dimension. In several instances substantial improvements in fit could have been achieved by freeing one of the zest items to load onto the mood tone or congruence factors.

These findings serve to illustrate the potential for theoretical development through dimensional analyses of life satisfaction. To that end, it may be useful to consider global life satisfaction, as measured by the LSIA, to be caused by its dimensions, rather than indicated by them, as is the case in a second-order factor model. In this manner, exogenous effects can be evaluated in terms of their impacts on the specific dimensions of life satisfaction, and the

relative importance of the life satisfaction dimensions on global life satisfaction could be compared among groups.

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SECTION 3. ECONOMIC STRESS AND AGE DIFFERENCES IN PSYCHOLOGICAL DISTRESS AND LIFE SATISFACTION

Economic stress and age differences in psychological distress and life satisfaction

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INTRODUCTION

Economic decline in the rural midwest region of the United States during the 1980s has had a significant impact on rural farm and community residents. In economic terms, what began as an acute crisis in the farm economy has evolved into a chronic condition encompassing the surrounding rural communities (Blundall, 1989; Lasley, 1987). The exodus of the younger, and in many instances the more economically stable, segment of the population has produced a rural populace that is increasingly economically distressed (DeLeon et al., 1989; O'Hare, 1988) and elderly (Goudy and Burke, 1989). For example, at least one in five residents of rural Iowa counties (no place over 2,500) are 65 years of age or older (Goudy and Burke). In some of the smallest rural towns over 40 percent of the residents are elderly. These trends have important implications for the capacity of the rural informal support systems to respond to the needs of the remaining population.

These trends are particularly important because they have taken place in areas where formal supports were already less available than in urban areas. Traditionally, rural areas are thought to compensate for the lack of formal supports with a stronger sense of community and a strong informal support system (Kivett, 1985; Lee and Lassey,

1980). However, recent research suggests that the social networks of the elderly residents in rural communities are not adequate to compensate for disadvantages in areas such as economics, health, and housing (Lee and Whitbeck, 1987).

Psychological Well-Being and Distress of the Elderly

Previous research on the relationship between age and life satisfaction has yielded mixed results. Lower levels of life satisfaction have frequently been reported among older persons. Often, however, the age effects disappear after controlling for other factors that are correlated with age (Doyle and Forehand, 1984; Larson, 1978). Poor health and financial problems, in particular, have consistently been found to predict low levels of life satisfaction. For older adults, health has generally been found to be the best predictor of psychological well-being (e.g., George et al., 1985; Larson, 1978; Spreitzer and Snyder, 1974). Larson, in his review of subjective well-being research, concludes that health, socioeconomic factors, marital status, and degree of social interaction are strongly related to life satisfaction. Larson also concludes that other variables such as age, race, and employment are not clearly related to subjective well-being. It has also been suggested that age may be related in distinct ways to the component dimensions

of life satisfaction, concealing age effects in models that treat life satisfaction as a unidimensional concept (Knapp, 1976; Redmond, 1990a). Additionally, analyses by Hoyt et al. (1980) that utilized a multidimensional model of life satisfaction found significant relationships between socioeconomic status (SES) and health and mood, and between age and health and zest for life. Knapp also found health (mobility) to be a significant predictor of zest in his multidimensional analysis. Hoyt et al. and Knapp also found social support and involvement variables to be significant predictors of the dimensions of life satisfaction.

The elderly, like other age segments of the population, experience mental health problems. Studies have estimated that 15 to 22 percent of the community-based elderly experience depressed moods and from 10 to 15 percent have depression that should be clinically treated (Blazer and Williams, 1980; Gurland et al., 1980; Gurland and Cross, 1982). Both elderly men and women experience these problems. Women tend to report more symptoms of depression in middle-age and early old age, but more old-old men have clinically diagnosed depression (Gurland et al., 1980).

Much as was the case with life satisfaction, there has been some uncertainty regarding the relationship between age and psychological distress. In a review of previous

research, Feinson (1985) argued that there was not much support for the interpretation of a significant relationship between age and psychological distress. While some studies have reported higher levels of depressive or other psychopathological symptoms among the elderly (e.g., Schwab, Fennell and Warheit, 1974), other studies have reported either mixed results or higher levels for younger persons (Eaton and Kessler, 1981; Frerichs, Aneshensel and Clark, 1981). Still others found no significant differences by age (Gaitz and Scott, 1972; Uhlenhuth et al., 1983). In further analyses Feinson (1985, 1987) noted that much of the distress experienced by older men and women could be attributed to other factors which are correlated with age. For example, much depression in the elderly may be secondary depression, in response to physical illness, loss of a spouse, or similar problems that often accompany old age.

Psychological Effects of the Rural Economic Crisis

It has been well established that the farm crisis is having an ongoing impact upon the quality of life in rural areas. With the precipitous drop in the value of land, a long-term economic decline has encompassed much of the rural population in the North Central region of the United States (Jolly and Barkema, 1985; Lasley, 1987). The farm crisis

has been shown to have direct negative impacts upon rural communities, families and individuals (Bultena, Lasley and Geller, 1985; Geller, Bultena and Lasley, 1988; Heffernan and Heffernan, 1986). The relationship between stress, particularly economic stress, and psychological well-being and mental health is well documented (Doyle and Forehand, 1984; Ross and Huber, 1985; Spreitzer and Snyder, 1974). However, there is little data available on the relative impact of such events across age groups.

There are some reasons to expect that the current economic crisis in rural areas would be less likely to affect the elderly. Economic stress and business failures have been more likely among younger operators in rural areas. In general, older farm owners and operators were in a better financial situation to weather the immediate economic crisis.

On the other hand, there are many ways in which the elderly may be more affected by the current situation than are younger persons. The economic downturn has certainly affected retirement plans and resources. Many older operators have selected early retirement. The economic situation has also had many indirect effects. The economic stability of the business and human service sector has declined. Numerous businesses in small communities have

failed. Many services are no longer available in close proximity to rural residences. Research has shown that the elderly may be particularly affected by community-wide problems (Comstock and Helsing, 1976).

The impact of the farm crisis has not been limited to formal supports. Many younger residents of rural areas have been forced to migrate to urban areas, or out of the region entirely, in search of employment opportunities. As a result, intergenerational relationships have been affected. The support networks remaining in the rural areas are also changing dramatically. With the out-migration of the younger residents, the remaining population is increasingly aged. As a result, the farm crisis influences the basic character of the rural community.

The present research will examine the relationship between age and psychological distress and well-being in a population under economic stress. As discussed previously, economic and physical well-being have consistently been found to be significant predictors of psychological distress and well-being. Further, the present rural economic crisis should not be affecting all age-groups equally. While all ages are affected to some degree, the financial impact should be most direct on younger and middle-aged rural residents. Previous research has suggested that financial

considerations are relatively more important in determining the life satisfaction of middle-aged persons than those younger or older (George et al., 1985). On the other hand, middle-aged persons have typically reached the peak of their financial well-being, whereas younger persons may still be struggling to succeed. This implies that the farm crisis may be affecting younger adults more negatively than other groups. This stress should be reflected in high incidences of reported personal economic stress accompanied by high levels of anxiety and depressive symptoms and low levels of life satisfaction among younger rural residents.

Personal economic stress brought on by the farm crisis should be somewhat less acute for older rural residents. As such, health concerns are expected to remain the most important factors in determining psychological outcomes for older persons living in rural areas. As a result, relatively high levels of depressive symptoms and lower life satisfaction should be exhibited by the oldest, and youngest segments of the adult rural population, but for different reasons. Somewhat more specifically, the happiness (mood) dimension of life satisfaction should be lower in the younger population segments due to economic stress, whereas zest for life should be lower in older segments of the population due to declining health.

METHODS

Survey Procedures

The population for this study consisted of adults, age 18 or older, living in households located in rural Iowa. The definition of rural used in this study corresponds with the U.S. Census Bureau definition of all persons living in communities of 2,500 or less or in the country. The sample was stratified to assure regional representation across the state of Iowa. The design was also weighted to oversample residents of rural-farm households.

Interviews were conducted by telephone and were computer assisted. Respondents were selected from households through a two-step procedure. First, after someone in the household was contacted, the interviewer determined the number of adults aged 18 or older living in the household. The respondent would ask for, and record, the first name of each of these persons. Second, a random selection table was used by the computer program to determine which respondent should be interviewed. If that person was not at home, a call-back was arranged when the selected person would be available. No substitutions were permitted.

A total of 575 rural household telephone numbers were randomly selected for the initial sampling list. Of these numbers, 46 (8.0%) were found to be non-working numbers or ineligible households (respondent too ill, household in urban area, etc.). Of the remaining 529 households, 36 (6.8%) could not be successfully contacted/resolved during the calling period, and in 79 (14.9%) the selected respondent refused to be interviewed. At least seven call attempts, placed at different times of the day, and different days of the week, were made prior to determining that a number was classified as a non-contact. Interviews were completed with 414 of the respondents, representing a 78.3 percent response rate.

Sample Characteristics

Nearly two-thirds of the respondents (65.9%) live in rural-farm households. As noted, this segment of the rural population was oversampled. Rural-farm households account for approximately one-third of the rural population in Iowa (Goudy, 1983). Another 26.8 percent of the sample were non-farm households in the country or in small rural communities of 2,500 or fewer persons. A small proportion of the respondents, 6.3 percent, resided in larger communities.

Over half of the respondents (58.9%) were female and nearly all were white (99.2%). Corresponding with the shifting age distribution in the rural areas of the state, approximately 6 of every ten respondents were aged 45 or older. The high proportion of the elderly in this area of the state is reflected in the sample containing 13.5 percent aged 65 to 74 and 5.8 percent aged 75 and above. The age and sex distributions of the sample are presented in Table 3.1.

Table 3.1. Age and sex distributions

	N	Percent
Sex		
Male	170	41.1
Female	244	58.9
Age		
18-24	19	4.8
25-34	56	14.2
35-44	77	19.5
45-54	85	21.6
55-64	81	20.6
65-74	53	13.5
75-90	23	5.8

Measures of Psychological Distress and Life Satisfaction

Depression

Depression is the most important type of mood disturbance included in the category of affective disorders. There are a few scales that may be used to measure the presence of depressive symptoms in surveys. These measures do not make a diagnosis of depression in the strict medical sense. One of the better established measures is the National Institute on Mental Health Center for Epidemiologic Studies Depression Scale (CES-D). The CES-D scale was developed for use in studies of the epidemiology of depressive symptomatology in the general population (Radloff, 1977). While not designed to discriminate among types of depression, nor to distinguish primary depressive disorders from secondary depression, it is intended to identify the presence and severity of depressive symptoms in the general population. The CES-D has been shown to discriminate between clinically depressed patients and others (Weissman et al., 1977). It has also been administered in rural populations and clinically correlated cutoff points have been established (Husaini et al., 1980).

The present study uses a variation of the CES-D identified by Ross and her associates (Ross and Huber, 1985; Ross, Mirowsky, and Huber, 1983). This variant of the scale

uses 12 of the original 20 items. The items selected all load onto a common dimension in a factor analysis. Two of the excluded items do not work equally well for men and women, two are generally poor indicators, and four tend to load onto a distinct dimension. Ross and Huber (1985) report alpha reliabilities of .85 for women and .82 for men using this modified CES-D scale.

The CES-D is administered by asking respondents how many days in the prior week they had experienced each of a series of depressive symptoms. Some of the symptoms included were: felt depressed, felt lonely, had trouble concentrating, felt fearful, and had trouble sleeping. The traditional scoring method, used to calculate the clinically correlated cutoffs, is to code each response into four categories and add them together to produce the final scale measure (0 = did not experience symptom during the week, 1 = experienced the symptom one or two days during the week, 2 = experienced the symptom three or four days during the week, and 3 = experienced the symptom five or more days during the week).

Anxiety

In addition to examining depression, a set of questions designed to measure functional anxiety were added to the survey. These questions, drawn from a set of scales

developed by Warheit (Schwab et al., 1974; Warheit et al., 1986), have been shown to work in surveys of rural populations (Beeson and Johnson, 1987). These measures of anxiety do not have established cutoff points corresponding with clinical diagnoses. The anxiety items ask respondents how often worry and nervousness affect areas in their lives such as work, social activities, and family life.

Life satisfaction

Life satisfaction among the elderly has been a recurrent research topic in social gerontology for several decades. Much of this research has utilized a few relatively standard measures of life satisfaction. In particular, some variation of the Life Satisfaction Index (Neugarten, Havighurst, and Tobin, 1961) has been used in many of the studies on the elderly. One of the original versions of this Index, the Life Satisfaction Index A (LSIA), was developed by Neugarten et al. (1961) as a short discrete-answer scale to measure the five factors they believed constituted life satisfaction. Subsequent methodological analyses have consistently shown that the LSIA is multidimensional, but does not conform to the structure proposed by Neugarten et al. The emergent interpretation is of a three-factor solution (Hoyt and Creech, 1983; Liang, 1984; Redmond, 1990a, 1990b). General agreement is that these factors represent mood tone, zest

for life, and congruence of life expectations and achievements. It has been suggested that each of the LSIA dimensions may be related in a distinct manner with certain independent variables (Knapp, 1976; Redmond, 1990a). Earlier studies that have treated the LSIA as a multidimensional measure have found important variations in the relationship of independent variables with the component factors of the LSIA (Hoyt et al., 1980; Knapp, 1976, Redmond, 1990b). Therefore, life satisfaction analyses in this research were conducted for each of the component dimensions of the LSIA. Unlike the original scoring scheme in which respondents only agreed or disagreed with LSIA items, a five point scale was used for each item in this research ranging from strongly agree to strongly disagree.

RESULTS

The results show a strong relationship between the measures of psychological distress and the age of the respondents. As presented in the first two columns of Table 3.2, both depression and anxiety are high for the youngest age-group and gradually decline through age 74. However, both depression and anxiety are significantly higher for the 75 and older age-group. Many of the earlier studies examining the relationship of psychological distress with age have not considered this oldest group separately. This is clearly an important concern. The depression score for this old-old age-group is nearly as high as that for the youngest age-group. The increase in the anxiety symptom score is not as dramatic, but is higher than for respondents aged 55 through 74. Thus, while the current economic crisis is thought to more directly affect younger persons, this, or other factors, are contributing to high levels of distress among the oldest segment of the rural population.

Both similarities and differences with this pattern were found for the three dimensions of life satisfaction. The old-old did show a drop in mood tone and zest relative to the younger age groups. However, they also demonstrated increased congruence. These high levels of congruence between desired and achieved goals are being reported by the

Table 3.2. Mean psychological distress and life satisfaction scores by age-group

Age	CES-D	Anxiety	Mood	Zest	Congruence
18-34	8.32	3.89	9.48	14.96	12.96
35-54	5.80	2.92	9.51	15.08	13.88
55-64	6.08	2.25	9.59	14.81	13.99
65-74	3.98	1.36	9.69	14.51	13.98
75+	8.16	2.68	9.08	12.95	14.64

oldest respondents despite their increased levels of psychological distress and lower levels of optimism.

As noted earlier, it is possible that many of the associations being discussed here could be attributed to other factors which are correlated with age. In particular, marital status and health are both related to psychological distress and well-being and are also correlated with age. Moreover, as noted earlier, it is not clear that the economic stress caused by the current farm crisis has affected all age-groups equally. To address these concerns, regressions were run on each of the psychological distress and life satisfaction measures. The 11-item version of the LSIA was also included in these analyses, for comparison with its component dimensions.

Independent variables used in the regressions were: marital status (0 = not married, 1 = married), self-reported

health (0 = good, 1 = fair or poor), sex (0 = male, 1 = female), household income (0 = less than $20,000, 1 = more than $20,000), age (in years), and economic stress. The economic stress measure was the sum of a series of items that measured negative economic outcomes in the past year (e.g., having a loan foreclosed, having trouble making payments, etc.). The results of the analyses are summarized in Table 3.3.

Consistent with the literature on stressors, the measure of economic stress is significantly related to each of the psychological distress and well-being measures. Economic stress has a positive effect on psychological distress, increasing the levels of both depressive and anxiety symptoms. The effect for the well-being items is negative, decreasing the level of mood tone, zest for life, and congruence of past goals with the present.

Self-reported health is also significant for each of the psychological distress and satisfaction measures. Persons who have poorer self-reported health are more likely to have depressive and anxiety symptoms. They are also more likely to have lower scores on mood tone, zest and congruence. Marital status was significant only for anxiety, with married respondents reporting higher levels of anxiety than respondents not currently married. Gender and income were not significant predictors of any of the

Table 3.3. Regressions on psychological distress and life satisfaction

	CES-D	Anxiety	LSIA	Mood	Zest	Congruence
Marital Status	-.067	.102*	.058	.074	.070	-.004
Economic Stress	.403***	.395***	-.359***	-.324***	-.184***	-.316***
Poor Health	.249***	.223***	-.218***	-.117*	-.224***	-.163**
Sex	.046	-.015	.046	.053	.043	.012
Age	-.082	-.157**	-.701	-.136*	-.157**	.112*
Income	.012	-.010	-.201	-.043	.008	-.013
R^2	.254	.262	.193	.138	.132	.150

*Significant at .05 level.

**Significant at .01 level.

***Significant at .001 level.

psychological distress or satisfaction measures. Models were also run with income as a dichotomous variable with alternative cutoff levels, and as a continuous variable (coded as the median of the survey income categories). In no case was income found to be significant, nor were the significance test results for the other variables in the model affected.

Age had a significant effect on four of the six measures considered. Consistent with Feinson (1987), age did not show a significant relationship with depressive symptoms once controls for the other measures were introduced. There was, however, a significant relationship between age and the other measure of psychological distress, anxiety. This relationship indicated that younger respondents were more likely to experience anxiety than older ones. Thus, support was not found for higher levels of psychological distress among the elderly after controlling for differences in economic stress, marital status, health and gender.

On the other hand, the analyses do show some important patterns of association between age and life satisfaction that have important implications for the elderly. No age effect was evident for the LSIA when used as a unidimensional measure. Nonetheless, all three of its

component dimensions exhibited significant age effects. Both mood tone and zest have significant negative relationships with age. That is, the older the respondent, the lower the reported mood tone and zest. While increases in psychological distress were not associated with increasing age, significant declines in two measures of well-being were observed.

The relationship between age and the third dimension of psychological well-being, congruence, is also significant. However, in this instance it is a positive association. Older persons report higher levels of congruence between desired and achieved goals. It would appear that the elderly are able to maintain positive evaluations of their life accomplishments at a time when they may actually be relatively unhappy.

Some previous research has suggested that there may be differences in the causal mechanisms determining subjective well-being for persons of different ages (George, Okun, and Landerman, 1985; Redmond, 1990b). Consistent with these findings, the sample was divided into three age-groups, and regressions were run for each of the dependent variables. Age groups were composed of those 18 to 44 years of age, 45 to 64 years of age, and 65 years of age and older. These age subgroups were chosen to roughly correspond to early,

middle, and late adulthood. Independent variables were the same as those included in the whole-sample regression analysis. Age was maintained as an independent variable in the age-specific regressions since the age ranges within the subgroups were relatively large. The results of these regressions are reported in Tables 3.4 to 3.6.

The age-specific regressions show some interesting patterns. It appears that economic stress is most the most important determinant of depressive symptoms in the youngest age-group, while health is a more important predictor for the oldest group. There was some evidence of age effects in the two youngest subgroups. For those under the age of 45, a negative age effect was observed. For those in the 45 to 64 year-old category, the effect of age on depressive symptoms was positive. The middle age-group regression on the CES-D was also the only model in which a sex effect achieved significance (higher levels of depressive symptoms for women). The patterns found in the age-specific anxiety regressions are quite similar to those of the sample as a whole.

It is interesting to note that more of the variance in the total LSIA was explained in the regression for the youngest group than for either of the two older age-groups. In fact, the model F-test for the oldest group is not

Table 3.4. Regressions on psychological distress and life satisfaction for 18- to 44-year olds

	CES-D	Anxiety	LSIA	Mood	Zest	Congruence
Marital Status	-.020	.106	-.060	-.060	-.055	-.034
Economic Stress	.520***	.473***	-.496***	-.406***	-.296	-.496***
Poor Health	.136	.190*	-.214**	-.131	-.169	-.217**
Sex	-.018	-.036	.124	.129	.019	.145
Age	-.162*	-.186*	.150	.025	.085	.238**
Income	-.021	.041	-.015	-.059	.056	-.029
R^2	.321	.277	.324	.194	.137	.357

*Significant at .05 level.

**Significant at .01 level.

***Significant at .001 level.

Table 3.5. Regressions on psychological distress and life satisfaction for 45- to 64-year olds

	CES-D	Anxiety	LSIA	Mood	Zest	Congruence
Marital Status	-.026	.152	.128	.164	.207	-.067
Economic Stress	.317***	.330***	-.271**	-.285**	-.143	-.182
Poor Health	.234**	.169*	-.199*	-.130	-.161	-.163
Sex	.189*	.038	-.028	.030	.025	-.115
Age	.177*	.051	.003	.072	-.032	-.035
Income	.122	-.036	-.078	-.086	-.156	.054
R^2	.210	.178	.127	.118	.101	.093

*Significant at .05 level.

**Significant at .01 level.

***Significant at .001 level.

Table 3.6. Regressions on psychological distress and life satisfaction for respondents 65 years of age or older

	CES-D	Anxiety	LSIA	Mood	Zest	Congruence
Marital Status	-.098	.142	.111	.235	.042	-.006
Economic Stress	.308*	.373**	-.255	-.264	-.082	-.224
Poor Health	.507***	.398**	-.258	-.058	-.400**	-.067
Sex	-.060	-.026	.055	.115	.137	-.123
Age	.046	.032	-.104	-.131	-.315*	.222
Income	-.005	.009	.031	.113	.059	-.089
R^2	.409	.374	.198	.211	.346	.091

*Significant at .05 level.

**Significant at .01 level.

***Significant at .001 level.

significant at the .05 level, nor were any predictor effects significant at this level. Consistent with most of the literature, economic stress and health were found to be significant for the younger two groups.

Surprisingly, congruence was most effectively predicted in the youngest age-group, and least effectively in the oldest group. Economic stress, health, and age were all significant in the youngest age-group regression. The comparatively better model fit for the youngest group was not expected, since congruence is based on a lifetime evaluation. The poor fit in the oldest group may be due, in part to the smaller sample size, but that is clearly not the principle cause. The subgroup regression F-test does not approach significance ($p > .90$) for this age-group.

In sharp contrast to the congruence findings, zest was best explained in the oldest subgroup. Health appears to be the principle factor determining zest for this group. Age was also significantly and negatively related to zest. In neither of the two younger subgroups, did any predictor significance reach the .05 level.

The mood dimension results indicated that economic stress was important for the younger two groups. The regression for the oldest group was not statistically significant.

DISCUSSION

Only one of the measures of psychological outcomes used in this study has established scoring procedures which permit the estimation of potential need for mental health assistance. The CES-D has been widely used as an indicator of the prevalence of depressive symptoms in the general population. Individuals scoring above an established cutoff point are persons who would likely be judged as depressed if they were clinically examined. This group is also likely to include many who are temporarily depressed or mildly depressed but not disabled by their feelings.

In prior studies, the percentage above the standard cutoff has ranged from around 9 to 20 percent. In one of the early applications of the CES-D in an urban area, 19.8 percent of Kansas City area white respondents scored above the cutoff (Comstock and Helsing, 1976). A semi-urban sample from Maryland reported 17.0 percent with scores of 16 or higher on the CES-D (Comstock and Helsing, 1976). In two studies in rural areas, Husaini and Neff (1982) reported standard cutoff percentages of 12.7 for rural Tennessee, and 15.0 for rural Oklahoma.

In this study, the proportion of the respondents with a CES-D score that was above the cutoff was 21.3 percent. Not only is this proportion higher than reported in earlier

studies, it is substantially higher than the proportion reported in prior rural studies. It has been ten years since the rural studies reported by Husaini and Neff (1982) were conducted. It would appear that the chronic economic stress experienced in the interim has had a substantial impact upon rural mental health. While it is not possible to directly test this assertion with the present data, there is some independent evidence to support this conclusion. Beeson and Johnson (1987) reported significant increases in levels of depression between 1981 and 1986 in the rural component of a longitudinal survey conducted in Nebraska.

Table 3.7 presents the estimates of percentage of the population with high depressive symptom scores by age. Tne age-groups with the highest proportion in need of potential intervention are 18 to 34, 55 to 64, and 75 and older age-groups. In each of these age-groups over 30 percent may need some assistance. Interestingly, the 65 to 74 year-olds have a very low proportion in the potential assistance category. Only 8.9 percent of this age-group scored above the cutoff point. This age-group may have been at a point in the life course to have missed much of the direct impact of the economic crisis. Many may have retired prior to, or at the beginning of the farm crisis and, thus, managed to avoid much of the direct financial loss suffered by others.

In contrast, the 55 to 64 year-old group may be experiencing the direct impact of the crisis on their work and retirement planning. In contrast with the next older age-group, the 65 to 74 year-old respondents are not as likely to have experienced the health declines that increase psychological distress.

Table 3.7. Depression by age

Age	Percent Above CES-D Cutoff
18-35	35.8
35-54	18.6
55-64	30.9
65-74	8.9
75+	31.6

This discussion highlights the importance of recognizing the mental health care needs of the elderly in rural areas. The multivariate analyses demonstrate that age, as an independent predictor, does not have a consistent effect upon depression, and appears to have little or no effect upon depression for persons 65 years of age and older. Thus, in terms of theoretical interpretations, it appears that the level of depressive symptoms identified among the old-old are due to factors other than age.

Economic stress and poor health are strong predictors of psychological distress for all ages. However, since the oldest age-group has relatively higher levels of economic stress and poor health, they are one of the higher need groups in terms of mental health care.

The results of the life satisfaction analyses are complex. When the LSIA measures were summed to form a single unidimensional measure, only economic stress and health were found to be important determinants. However, when the component dimensions were analyzed separately, a much more interesting pattern of effects emerged. Support was found for age effects; effects that would have been obscured had only a unidimensional life satisfaction measure been employed. Further patterns became apparent when analyses were conducted on the age-specific subgroups.

The differential determinants of life satisfaction observed for respondents at different phases of adulthood are consistent with a life-course or role theory interpretation. Of course, such conclusions cannot be emperically demonstrated using cross-sectional data since age and cohort are confounded. These results were similar to those of George et al. (1985) with respect to the relatively higher importance of economic factors for middle-aged and younger adults, and the higher importance of health

for older repsondents. These effects were not evident across all dimensions of life satisfaction, however. In findings not inconsistent with Hoyt et al. (1980) and Knapp (1976), health appeared to be the most important determinant of zest for older respondents. Also consistent with Hoyt et al. was the significant effect of age on zest for the oldest age-group. The findings with respect to congruence were not anticipated, although it might be speculated that it is the first portion of adulthood in which the most rapid progress is made toward achieving one's economic goals. This research focused on the role economic stress, and it is likely that other factors not considered, such as family relationships and informal social activity, may be the important determinants of congruence after early adulthood.

These results strongly suggest that much is yet to be understood about life satisfaction across the life course, and highlights the need for additional research on the relationship of age, and other variables, to the specific dimensions of life satisfaction. Further, results based on previous research using unidimensional models of life satisfaction should be viewed with caution.

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GENERAL SUMMARY

The preceding three papers evaluated the factor structure of the Life Satisfaction Index A (LSIA), evaluated the consistency of the LSIA and its relationship to established predictor variables, and applied the LSIA, in multidimensional form, to a substantive issue. Taken as a whole, the three papers presented here demonstrate the consistency of a three-factor model of life satisfaction derived from the Life Satisfaction Index A for application to older age groups. This research suggests that there may be differences in the factor structure of the LSIA in persons over versus under 65 years of age. Further, there is evidence that the determinants of life satisfaction vary across age-groups. Also evident from this research is the methodological and substantive rationale for analyzing the dimensions of the LSIA as distinct variables.

The first paper in this series found that a second-order factor model with three first-order factors described the LSIA well. While it was concluded that Liang's (1984) model was the best fitting of the three models considered, the fact that all three models based on mood tone, zest, and congruence dimensions fit relatively well, is just as important. Also reassuring was the fact that the three models fit well using a newer national data set.

When the results from papers 2 and 3 are considered, one additional recommendation should be added to the paper 1 conclusions. Specifically, a model in which overall life satisfaction is considered to be caused by its three dimensions, rather than indicated by them, is suggested. It is clear from the second and third papers that the determinants of life satisfaction affect its dimensions differentially, and in ways that are theoretically interesting. If a second-order life satisfaction were fit in a path analytic framework, with the predictor variables influencing the second-order factor, rather than the three first-order factors directly, differential predictor effects would not be apparent. Further, this model would be theoretically relevant for determining the relative importance of the component dimensions of life satisfaction for various population subgroups.

Paper 2 found the first-order factors from the LSIA model in paper 1 to be quite stable for persons aged 65 to 85 over two points of measurement. The causal effects of typical predictors were also stable for these age groups. Some inconsistencies were found among the respondents between 58 and 64 years of age. The life satisfaction factor loadings for these ages appeared to be slightly different than for older respondents. Additionally, it

appeared that the causal relationships with the predictor variables were different for the 58 to 64 year-olds in 1974 and the same age-group in 1981. Also, as would be supported by the paper 3 results, it was clear that the determinants of life satisfaction affected the individual dimensions in different ways.

In paper 3, the findings in papers 1 and 2 were applied to research on economic stress and its affect on depression, anxiety, and life satisfaction. The regressions on the individual life satisfaction dimensions showed relationships that were not apparent when the dimensions were summed and treated as a unidimensional measure. The age-specific life satisfaction regressions showed a complex pattern of relationships. These relationships would not have been evident if the analyses had only considered a global life satisfaction measure.

Authors such as Passuth and Bengtson (1988) have argued that the focus on finding the determinants of life satisfaction has hindered broader research on the social experiences of aging. The findings from this series of papers do not support that conclusion. Examination of the interactions between age and the component dimensions of life satisfaction should provide direct insights into the aging experience. Clearly, people of different ages are

using different criteria to judge their lives. This is certainly relevant to any investigation into the experience of aging.

It is also relevant that the dimensions of life satisfaction are not related in the same manner to various predictor variables, and that these relationships are not constant across age. In the case of the LSIA, the implications of this finding are particularly interesting. The mood tone, zest for life, and congruence dimensions have differing temporal orientations: the mood tone items are generally related to present happiness, the zest items have more of a future orientation, and the congruence items emphasize the past. Changes in the determinants of these dimensions over the life course would imply that, either through the process of aging or through our interaction with others and our environment, we redefine our goals and expectations. To this end, more longitudinal research is needed to sort out the contributions of life course and historical factors in determining the criteria for life evaluation.

In sum, it must be concluded that the treatment of life satisfaction as a multidimensional construct is important. Those doing substantive research should be heeding the results of the methodological analyses of the life

satisfaction scales. It is apparent that measurement concerns, such as those addressed here, do make a difference when applied to substantive questions. To the extent that research has emphasized global life satisfaction, it has not lived up to its potential for understanding the process and experience of aging. However, multidimensional subjective well-being research has the potential to make substantial contributions to the field.

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