

# A Two-Factor Model of Successful Aging

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**Objectives.** To propose and test a conceptual two-factor model of successful aging that includes objective and subjective components.

**Methods.** Data were derived from 5,688 persons aged 50–74 years living in New Jersey who participated in the ORANJ BOWL panel. Participants were recruited using random digit dial procedures and interviewed by telephone. A measurement model was developed and tested using data from two independent samples (each  $n = 1,000$ ); a structural model examining the effects of age and gender was tested using data from another 3,688 people.

**Results.** Confirmatory factor analyses provided support for a multidimensional model incorporating objective criteria and subjective perceptions. Age and gender were associated with objective but not subjective success.

**Discussion.** Results add rigor to the measurement of a construct that has intrigued philosophers and scientists for hundreds of years, providing the empirical foundation on which to build research about successful aging.

**Key Words:** Confirmatory factor analysis—Measurement model—Structural modeling—Successful aging.

PERHAPS the greatest shortcomings of the burgeoning successful aging literature are its almost exclusive focus on very old people, lack of clarity regarding what defines success, and lack of attention to measurement issues. Definitions of success include those that are investigator initiated and those derived from reports from older people. Measures of successful aging are diverse, including some that are single item and others that are multi-item and some that use objective indicators and others that rely on subjective assessments. None have been subjected to rigorous measurement analysis. As a result, there is no universally accepted standard for measuring successful aging (Depp & Jeste, 2006; Strawbridge, Cohen, Shema, & Kaplan, 1996; Tate, Lah, & Cuddy, 2003). In this article, we review existing definitions of successful aging, examine the roles of age and gender vis-à-vis successful aging, present a life-span model of successful aging that includes both objective and subjective aspects, and empirically test the structure of a two-factor model of successful aging.

## Defining Successful

The dictionary defines “successful” as *having a favorable outcome and obtaining something desired or intended*, with synonyms including *accomplished, flourishing, prosperous, and thriving*. Successful aging is not a new concept, as Cicero, in his ancient treatise *De Senectute* grappled with the extent to which later life could be a time of vitality and activity. Nor is the concept new to gerontologists, as Cumming and Henry (1961), Havighurst (1963), and Palmore (1979) debated whether it was beneficial for older people to engage or disengage with society. What remains unclear, however, is who should define successful aging and what constitutes it (Bowling & Dieppe, 2005).

The definition offered by Rowe and Kahn (1987, 1998) represented an important paradigm shift, positing that in old age, there were alternatives to deterioration. They proposed that many of the effects of aging were, in fact, effects of disease, suggesting that people aging successfully would show little or no age-related decrements in physiologic function, whereas those aging usually would show disease-associated decrements. Rowe and Kahn’s model stimulated significant research, yet they neither provided a precise definition of successful aging nor proposed specific ways of measuring it (Kahn, 2003). As a result, the conceptual definitions and measures of success have varied widely across studies. Some researchers modified the definition, including as successful those who exhibited minimal rather than no disease and disability or those who exhibited very high levels of physical functioning (Guralnik & Kaplan, 1989; Roos & Havens, 1991; Seeman, Rodin, & Albert, 1993). Others, such as Baltes and Carstensen (1996), defined successful in relative terms as “the attainment of goals which can differ widely among people and can be measured against diverse standards and norms” (p. 399).

Not only have definitions varied across studies, so too has the adjective used to describe the construct. Concerned that the term “successful” implied a contest where there are winners and losers, some began to suggest alternative terms, including *healthy aging, aging well, effective aging, and productive aging* (Baltes, 1994; Butler, Oberlink, & Schechter, 1990; Curb et al., 1990; LaCroix, Newton, Leveille, & Wallace, 1997; Morrow-Howell, Hinterlong, & Sherraden, 2001; Strawbridge, Wallhagen, & Cohen, 2002). Yet, “successful aging” has remained the umbrella term (Kahn, 2003).

Lack of clarity regarding what successful aging is continues to characterize the literature, as evidenced by meta-analysis

of Depp and Jeste (2006). In their examination of 28 empirical studies of successful aging published between 1978 and 2005, they found 29 definitions of successful aging and an equal number of measures that operationalized them. Success has been defined as survival, lack of disability, life satisfaction, social engagement, productivity, quality of life, and the absence of disease (Bowling, 2007; Depp & Jeste).

A fundamental issue underlying the debate about how successful aging should be defined has been whether it can be defined by objective criteria or is a subjective value judgment. Rowe and Kahn's (1998) perspective highlighted three objective criteria: (a) the ability to maintain low risk of disease and disease-related disability, (b) high levels of mental and physical health, and (c) active engagement with life. Most common operationalizations of successful aging have characteristics indicative of functional ability or disability. These typically have been measured with self-reports of activities of daily living, instrumental activities of daily living, or functional abilities, depending on the age composition of the sample (Andrews, Clark, & Luszcz, 2002; Garfein & Herzog, 1995; Roos & Havens, 1991; Strawbridge et al., 2002). Glatt, Chayavichitsilp, Depp, Schork, and Jeste (2007) noted that no single factor other than functional ability appeared in more than half of the definitions of successful aging. Evidence of the lack of agreement among scholars regarding which objective criteria to include in the definition of successful aging was apparent in meta-analysis by Depp and Jeste (2006), where cognitive functioning, life satisfaction, social engagement, illnesses, longevity, self-rated health, and personality were all conceptualized as components of successful aging.

Although few studies have examined the extent to which older adults perceive their own aging experience as successful (Montross et al., 2006; Phelan & Larson, 2002; Strawbridge et al., 2002; von Faber et al., 2001), tension is growing in the successful aging literature due to the marked discrepancy between the objective definitions used by clinicians and researchers and the subjective evaluations made by older people themselves. Not surprisingly, studies that have compared subjective and objective definitions of successful aging have found significant differences in the proportion of people meeting criteria for success with more people categorizing themselves as successful according to their subjective perceptions than would be classified as such according to the objective definitions (Montross et al., 2006; Strawbridge et al., 2002; von Faber et al., 2001).

### *The Role of Age*

Research about successful aging has relied almost exclusively on samples of old and very old people. MacArthur Study by Rowe and Kahn (1998), for example, included people with a mean age of 74 years; sample by Strawbridge et al. (2002) had a mean age of 75 years; sample by Phelan, Anderson, LaCroix, and Larson (2004) had a mean age of

80 years; and 66% of sample by Bowling and Iliffe (2006) was over the age of 70 years. As such, much of what we know about successful aging is biased toward those who survive to reach advanced ages.

Equally problematic are findings regarding the role of age vis-à-vis successful aging. Although there has been little consistency regarding the correlates of successful aging, meta-analysis by Depp and Jeste (2006) found that the most consistent predictor of successful aging was younger age, where 86.7% of the studies reported a significant relationship between age and successful aging. In their recent analysis of the Health and Retirement Study, McLaughlin, Connell, Heeringa, Li, and Roberts (2010) found that compared with the young-old, persons aged 75 years and older were 70% less likely to experience successful aging.

### *Does Gender Make a Difference?*

In 50% of the longitudinal studies reviewed in meta-analysis by Depp and Jeste (2006), women experienced higher levels of successful aging than men, whereas only one longitudinal study found that men had higher levels of successful aging (Ford et al., 2000). Bowling and Iliffe (2006) reported that men had higher mean scores than women when successful aging was defined according to biological models and a lay model, but there were no gender effects when successful aging was defined according to either a social or psychological model. Building on this work, we examine the relationship between gender and successful aging.

### *A Life-Span Perspective*

Ryff (1982) and Schulz and Heckhausen (1996) suggested the value of examining successful aging within a life-span developmental approach, yet empirical research has been slow to embrace it. The parameters of life course development described by Schulz and Heckhausen, which offer an ideal context for understanding successful aging, are: (a) life is finite, (b) biological development follows a sequential pattern, (c) societies impose age-graded socio-structural constraints on development, and (d) genetic potential is a factor limiting functional development. Moreover, according to the life-span perspective, age is considered an index variable rather than a causal variable (Baltes, Reese, & Nesselroade, 1977). In seeking to explain behavior, the life-span perspective focuses on characteristics that are correlated with age, such as maturation (heredity variables), learning (environmental variables, including past and present environments), and the interaction between heredity and environment. This perspective invites disentangling the association between age and successful aging.

Building on a life-span perspective, we sought to study successful aging among midlife people for three reasons. First, doing so minimizes the survivor effects that have dominated current understanding of successful aging, providing the opportunity to understand how those who do age

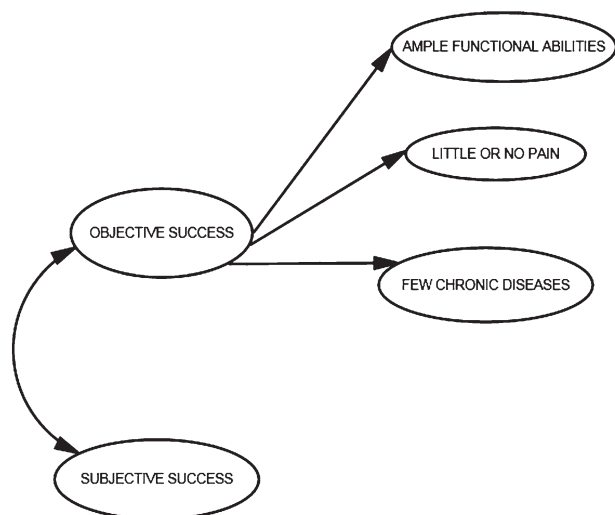


Figure 1. Two-factor model of successful aging.

successfully differ from those who do not, and increasing the extent to which findings can be generalized. Second, the mean age of onset of chronic diseases such as arthritis (55 years; MacGregor & Silman, 2000), diabetes (51.1 years; Centers for Disease Control and Prevention, National Center for Health Statistics, 2009), emphysema or chronic bronchitis (60 years; Mannino, Homa, Akinbami, Ford, & Redd, 2002), and cancers (colon and rectum, 71 years; esophagus, 68 years; prostate, 68 years; skin, 60 years; and breast, 61 years; Horner et al., 2009) make these years important turning points in the lives of individuals. Third, midlife is a time when there are still meaningful opportunities for intervention, as subpopulations of people who are at risk can be identified before insurmountable damage has been done.

#### *Our Definition and Conceptual Model of Successful Aging*

The critical question at hand is whether people can experience chronic disease and functional disability and still feel that they are aging successfully. We contend that they can. Furthermore, we suggest that because midlife is a critical time of development, it sets the stage for how individuals will fare in later life.

As illustrated in Figure 1, we define successful aging as having both an objective and a subjective component. The objective component includes having few chronic diseases, ample functional ability, and little or no pain. We posit these characteristics as part of our objective component for the following reasons: (a) they are characteristics that most would identify as desirable; (b) good evidence indicates that individuals can provide valid reliable reports of them (Kivinen, Sulkava, Halonen, & Nissinen, 1998; Simpson et al., 2004), suggesting that an indicator need not be observed by an external agent for it to be objective; and (c) they vary within the population we seek to understand. The subjective component is an evaluation that individuals make of their

own aging experience at one point in time. It includes how well they are aging, how successful their aging experience is, and the extent to which they rate their current life as positive. These elements are important as they identify how people feel about the totality of their aging experience at the current point in time.

Our definition builds on earlier conceptualizations of successful aging (Baltes & Baltes, 1990; Rowe & Kahn, 1987, 1998; Young, Frick, & Phelan, 2009), yet differs from them in several significant ways. First, it includes and integrates objective and subjective considerations. By combining characteristics that are objectively desirable with individual perceptions, we acknowledge the complexities underlying successful aging. Moreover, our definition derives from empirical literature suggesting that people can feel successful even though they have significant health problems (Strawbridge et al., 2002). Second, our definition helps to distinguish chronological age from successful aging. We contend that successful aging is a characteristic that should not be delimited by age. Our definition is cognizant of research from centenarian studies demonstrating that it is inherently difficult, if not impossible, to reach advanced age and remain free of comorbidities and disability (Foster, 1997; Ivan, 1990; Terry, Sebastiani, Andersen, & Perls, 2008). We suggest that for successful aging to be a useful construct, it should pertain to young-old and old-old persons as well as centenarians. Third, by sharply focusing on these objective and subjective criteria, we clarify what successful aging is and what it is not, thereby distinguishing the outcome from its correlates and predictors (Glatt et al., 2007).

In the analyses that follow, we use multiple indicators of objective and subjective successful aging to determine how these aspects of successful aging relate to one another. We posit that objective success will be based on functional ability, pain, and chronic disease and subjective success will be a function of perceptions regarding aging successfully, aging well, and an overall evaluation of the current state of one's life. We hypothesize that the objective and subjective aspects of successful aging will be correlated with one another, yet each will provide unique information. Finally, we predict that age and gender will be correlated with objective success but not with subjective success.

## METHODS

### *Participants and Procedure*

We analyzed data collected from 5,688 people participating in the ORANJ BOWL panel ("Ongoing Research on Aging in New Jersey: Bettering Opportunities for Wellness in Life") between November 2006 and April 2008. The ORANJ BOWL panel, developed as a data repository, includes a representative sample of adults aged 50–74 years living in New Jersey. We identified participants using random digit dial (RDD) procedures and limited participation to persons with the ability to participate in a 1-hr English

Table 1. Descriptive Statistics for Model Variables ( $N = 5,688$ )

	$M$ ( $SD$ )	Skew ( $SE$ )	Kurtosis ( $SE$ )	Range
Objective success				
Functional ability				
Walk ¼ mile	4.41 (1.12)	-1.84 (0.03)	2.20 (0.06)	4.0
Walk up steps	4.57 (.93)	-2.28 (0.03)	4.37 (0.06)	4.0
Stand	4.16 (1.20)	-1.28 (0.03)	0.48 (0.06)	4.0
Stoop	3.93 (1.16)	-0.83 (0.03)	-0.33 (0.06)	4.0
Pain				
Frequency	1.04 (1.05)	0.69 (0.03)	-0.73 (0.06)	3.0
Intensity	1.01 (.94)	0.43 (0.03)	-0.94 (0.06)	3.0
Interference	0.55 (.89)	1.57 (0.03)	1.46 (0.06)	3.0
Diseases				
Number	1.75 (1.40)	0.71 (0.03)	0.17 (0.06)	8.0
Subjective success				
Age well	7.8 (1.80)	-1.26 (0.03)	2.28 (0.06)	10.0
Successful aging	7.82 (1.82)	-1.23 (0.03)	2.29 (0.06)	10.0
Life rating	7.80 (1.65)	-1.22 (0.03)	2.45 (0.06)	10.0

language telephone interview. New Jersey's demographic characteristics are highly diverse, mirroring those of the general U.S. population.

We recruited panel members using list-assisted RDD procedures and telephone cold calling. The demographics of the targeted sample made coverage loss due to cell phone-only households very small (Blumberg & Luke, 2007). Screening interviews determined whether any eligible persons lived in the household. Of the 151,246 phone numbers in the population, 32,678 completed the screen. In order to complete the sample, we made 1,060,838 calls, averaging 7.01 calls to each case. Using standard American Association for Public Opinion Research calculations, ORANJ BOWL achieved a response rate (RR5) of 58.73% and a cooperation rate (COOP3) of 72.88%; these rates compared favorably with the 2006 Behavioral Risk Factor Surveillance System response rate of 51.4% and cooperation rate of 74.5%.

A comparison of characteristics of ORANJ BOWL respondents with those of all persons aged 50–74 years living in New Jersey revealed that they have similar racial composition, similar rates of being born in the state, and similar distributions of marital status. Although the ORANJ BOWL sample had a slightly higher proportion of females (63.7%–53.3%) and a slightly higher percentage of individuals with advanced secondary degrees (18.5%–14.8%), it served as an adequate representation of the population.

The ORANJ BOWL sample included 2,067 men and 3,621 women, who had a mean age of 60.7 ( $SD = 7.1$ ). The average participant had a 2-year college degree, with education achievement ranging from those who had not completed high school (5.4%) to those with a doctoral degree (4.2%). The modal education level among participants was high school graduate (28.3%), with 19.5% completing a 4-year college degree. A majority of respondents were White (83.8%); 11.8% were African American. The majority of respondents were currently married (56.7%); 17.3% were divorced, 14.2% were widowed, 2.6% were separated at the

time of the interview, and 9.2% of respondents had never been married. Respondents had a mean of 2.1 children ( $SD = 1.60$ ). The mean household income was between \$30,000 and \$80,000 (29.8%), with 19.1% reporting less than \$30,000 and 41.1% reporting more than \$80,000.

### Measures

We asked respondents whether they had ever been told by a doctor or health professional that they had: arthritis, hypertension, a heart condition, cancer, diabetes, osteoporosis, stroke, and lung conditions. We focused on these conditions because they are chronic and are typically associated with age. The measure used in the analyses was the count of these conditions. Descriptive statistics for all model variables are reported in Table 1.

Respondents reported the amount of difficulty they had performing four functional abilities focusing on lower body strength (walking ¼ of a mile, walking up 10 steps, standing for 2 hr, and stooping) using a 5-point Likert scale (1 = *can't do it at all* and 5 = *not at all difficult*).

We measured pain with the following questions: "How often are you troubled with pain?" (0 = *almost never*, 1 = *sometimes*, 2 = *often*, and 3 = *almost always*), "How bad is the pain most of the time?" (0 = *not at all*, 1 = *mild*, 2 = *moderate*, and 3 = *severe*), and "How often does the pain make it difficult for you to do your usual activities such as household chores or work?" (0 = *almost never*, 1 = *sometimes*, 2 = *often*, and 3 = *almost always*).

We assessed subjective successful aging using three questions that invited respondents to evaluate themselves using a scale from 0 to 10. We asked respondents what number best (a) describes how successfully they have aged (0 = *not successful at all* and 10 = *completely successful*), (b) describes how well they are aging (0 = *not well at all* and 10 = *extremely well*), and (c) represents how they rate their life these days (0 = *the worst possible life* and 10 = *the best possible life*).

An examination of the skew and kurtosis of model variables indicated that the largest skew was -2.28 and the largest kurtosis was 4.37. According to Kline (2004), these values fall within ranges unlikely to violate the multivariate normality assumptions of structural equation models.

### Data Analysis

The analyses that follow are based on three independent random samples from the ORANJ BOWL panel. Sample 1 was used to test the hypothesized model, make adjustments to it, and reestimate it. Sample 2 was used to independently confirm the stability of the structure of the model. Each of these samples included 1,000 people, a sample size consistent with guidelines suggested by Gagne and Hancock (2006), ensuring model convergence and accuracy of parameter estimates. Data from the remaining 3,688 people enabled examination of the effects of age and gender on the

Table 2. Bivariate Correlations for Sample 1 ( $n = 1,000$ , lower diagonal) and Sample 2 ( $n = 1,000$ , upper diagonal)

	1	2	3	4	5	6	7	8	9	10	11
1. Walk ¼ mile		.72	.68	.62	-.43	-.40	-.52	-.43	.25	.35	.44
2. Walk 10 steps	.73		.57	.60	-.42	-.39	-.47	-.40	.24	.32	.43
3. Stand	.68	.62		.62	-.46	-.41	-.52	-.42	.28	.37	.45
4. Stoop	.61	.57	.62		-.50	-.48	-.53	-.43	.25	.38	.46
5. Pain frequency	-.46	-.43	-.51	-.50		.80	.57	.39	-.26	-.33	-.38
6. Pain intensity	-.44	-.41	-.48	-.50	.82		.65	.38	-.26	-.32	-.35
7. Pain interferes	-.61	-.55	-.59	-.54	.70	.67		.39	-.28	-.36	-.42
8. Health conditions	-.44	-.42	-.38	-.42	.43	.42	.43		-.17	-.28	-.35
9. Life rating	.24	.25	.24	.23	-.24	-.23	-.28	-.17		.50	.50
10. Successful aging	.32	.33	.34	.29	-.33	-.30	-.38	-.23	.52		.65
11. Aging well	.34	.36	.36	.33	-.33	-.30	-.37	-.33	.56	.65	

Note: Correlations greater than .16 are significant at the .01 level.

model. Descriptive data regarding the measures and sample are presented for the whole ORANJ BOWL sample, as preliminary analyses of variance revealed that there were no statistically significant mean differences on any demographic characteristic or any model variable among respondents selected for the subsamples.

We input raw data from SPSS (Version 18.0) and conducted confirmatory factor analyses (CFA) with maximum likelihood estimation using AMOS 18.0 (Arbuckle, 2009). We evaluated fit of the models using the normed fit index (NFI); the Tucker–Lewis coefficient, otherwise known as the Bentler–Bonett nonnormed fit index; and the comparative fit index (CFI). These indices each range from 0 to 1, with higher scores indicating better fit. We used the chi-square difference test to compare the nested models with one another in our exploratory phase (Byrne, 2001). We used the root mean square error of approximation (RMSEA), the Akaike’s information criterion (AIC), and the Browne–Cudeck criterion (BCC) as indicators of the final model’s likelihood of being replicated in additional samples of the same size drawn from the same population (Byrne; Hu & Bentler, 1999). An RMSEA value less than .05 indicates a close fit of the model in relation to the degrees of freedom, although this figure is based on subjective judgment. Browne and Cudeck (1992) suggested that a value less than .08 indicates a reasonable error of approximation. Models with the lowest values of AIC and BCC are most likely to be good fits in other samples. Using Sample 1, we modified the baseline model, making one change at a time. Inspection of a combination of modification indices and factor loadings guided our efforts.

A multiple-group CFA, simultaneously tested the final model with data from Samples 1 and 2, sequentially imposing more stringent constraints on the equality of the model fit. Following the procedures suggested by Brown (2006), we tested nested models that included (a) an unconstrained model (two groups fitted separately, no equality constraints imposed), (b) a measurement weights model (measurement weights, regression weights, factor loadings constrained to be equal), (c) a measurement intercept model (measurement intercepts or means constrained to be equal), (d) a structural

weight model, (e) a structural covariance model (covariances between latent constructs constrained to be equal), (f) a structural residual model (latent construct error variances constrained to be equal), and (g) a measurement residual model (remaining error variances constrained to be equal).

Lastly, we examined the effects of age and gender on the final model using structural equation modeling. We estimated paths between age and gender and functional abilities, pain, diagnosed conditions, and subjective success. Nonsignificant paths were removed one at a time, and the model was reestimated until only significant paths remained.

### Sensitivity Analyses

In order to assess whether and how relationships between objective and subjective success were influenced by cognitive ability, parallel analyses examined the effects of including indicators of cognitive ability (self-rated memory, memory compared with the average person, and concern about memory) in the definition of objective successful aging. We also examined the effects of age and gender on the model using this alternative definition of successful aging.

## RESULTS

The lower diagonal of Table 2 presents bivariate correlations among all model variables for Sample 1 and the upper diagonal for Sample 2. The correlations of variables within factors were consistently higher than those between factors, as expected.

The baseline model yielded a less than optimal fit. Fit statistics of the baseline model and subsequent models are presented in Table 3. Based on the Lagrange Multiplier Tests for the residual covariances (Bollen, 1989), we added the following covarying error variances to the model in sequential order: “walk ¼ mile” and “pain interference” (Model 1), “walk ¼ mile” and “walk up steps” (Model 2), “walk up steps” and “pain interference” (Model 3), “stand” and “pain interference” (Model 4), and “stoop” and “pain interference” (Model 5). The final model yielded a more acceptable fit than the baseline model. Unstandardized and

Table 3. Comparisons of Alternative Models: Exploratory Phase Results ( $n = 1,000$ , Sample 1)

Model	$\chi^2$	$df$	NFI	TLI	CFI	RMSEA (90% CI)	$\chi^2$ Difference	$df$ Difference	AIC	BCC
Baseline	306.23	41	.95	.94	.96	.08 (0.07–0.09)			378.23	379.11
Model 1	265.66	40	.96	.95	.96	.07 (0.07–0.08)	40.57	1	339.66	340.56
Model 2	218.11	39	.97	.96	.97	.07 (0.06–0.08)	47.55	1	294.11	295.03
Model 3	183.57	38	.97	.97	.98	.06 (0.05–0.07)	34.53	1	261.57	262.52
Model 4	146.48	37	.98	.97	.98	.05 (0.04–0.06)	37.09	1	226.48	227.45
Model 5	115.18	36	.98	.98	.99	.05 (0.04–0.06)	31.29	1	197.18	198.18

Note: Model 1 adds correlated error variances between “walk ¼ mile” and “pain interference,” Model 2 adds correlated error variances between “walk ¼ mile” and “walk up steps,” Model 3 adds correlated error variances between “walk up steps” and “pain interference,” Model 4 adds correlated errors between “stand” and “pain interference,” and Model 5 adds correlated errors between “stoop” and “pain interference.” AIC = Akaike’s information criterion; BCC = Browne–Cudeck criterion; CFI = comparative fit index; NFI = normed fit index; RMSEA = root mean square error of approximation; TLI = Tucker Lewis Index.

standardized parameter estimates from Model 5 are presented in Table 4.

Results from the multigroup CFA analyses indicated that assuming an unconstrained model to be correct, the measurement weights for the two samples did not statistically differ from one another ( $\chi^2 = 2.99$ ,  $df = 7$ ,  $p = .88$ ). Assuming the measurement weights to be correct, the measurement intercepts did not statistically differ from one another ( $\chi^2 = 14.18$ ,  $df = 11$ ,  $p = .22$ ). Assuming the measurement intercepts to be correct, the structural weights did not statistically differ from one another ( $\chi^2 = 8.14$ ,  $df = 2$ ,  $p = .02$ ). As such, we did no further nested comparisons (for structural covariances, structural residuals, and measurement residuals).

The hypothesized model testing the effects of age and gender revealed that the model fit the data very well ( $\chi^2 = 417.59$ ,  $df = 51$ ,  $p = .000$ ; NFI = .98; Tucker Lewis Index (TLI) = .98; CFI = .98; RMSEA = .04; AIC = 523.59; BCC = 523.99). Paths between age and subjective success ( $b = .04$ ), between gender and subjective success ( $b = .02$ ), and between age and pain ( $b = .01$ ) were not significant. They were removed one at a time and the model reestimated. The final model yielded the following fit statistics:  $\chi^2 = 428.90$  [ $df = 54$ ,  $p = .000$ ]; NFI = .98; TLI = .98; CFI = .98; RMSEA = .04; AIC = 528.90; BCC = 529.28). As age increased, people experienced more chronic health conditions and lower levels of functional ability. Women had more chronic health conditions than did men; they experienced lower levels of functional ability and greater pain.

#### Sensitivity Analysis

The sensitivity analysis revealed a poorer fit of the data to the model ( $\chi^2 = 440.73$ ,  $df = 73$ , NFI = .94, TLI = .94, CFI = .95, RMSEA = .07, AIC = 532.73, BCC = 534.13) when cognitive functioning was included. The beta weight of the cognitive measure was only .39, whereas those of the other indicators of objective success ranged from .80 to .86. The magnitude of the correlation between objective success and subjective success was .60, similar to the original. The relationships of age and gender to objective and subjective success were similar to those reported above, although there were slight differences in the magnitude of the beta weights. Neither age nor gender was associated with cognitive functioning.

#### DISCUSSION

Conceptually, our work builds on that of Rowe and Kahn (1987, 1998), Baltes and Baltes (1990), Strawbridge et al. (2002), and Phelan and Larson (2002), yet it presents a unique contribution to the successful aging literature by positing and testing a two-factor model. Our analyses indicate support for a multidimensional model that includes both objective and subjective criteria, adding rigor to the measurement of a construct that has intrigued philosophers and scientists alike for hundreds of years. These analyses provide the foundation for companion efforts to identify the predictors of a successful aging typology (Pruchno, Wilson-Genderson, Rose, & Cartwright, 2010) as well as for future research that will identify the antecedents, correlates, and consequences of objective and subjective successful aging.

Although our definition of objective success focuses on functional abilities, pain, and diagnosed health conditions, other characteristics may meet the criteria we put forth for defining the construct. We suggest the importance of examining these core characteristics in hopes of distinguishing the construct of successful aging from its predictors (Phelan & Larson, 2002). Our sensitivity analyses, for example, suggest that cognitive functioning, at least as defined in our analyses, may better be conceptualized as a predictor than as a component of successful aging. This finding is consistent with the sensitivity analysis by Britton, Shipley, Singh-Manoux, and Marmot (2008) where removing cognition from the definition of successful aging resulted in minor changes to the magnitude of effects but did not substantially change their conclusions. It is also consistent with Depp and Jeste’s (2006) finding that only 44.8% of the studies defining successful aging included a cognitive component. The cognitive functioning measures available in our data are clearly limited. Future studies including more sophisticated measures of cognitive functioning, especially those that are sensitive to age-related decline (Bugg, Zook, DeLosh, Davalos, & Davis, 2006), may yield differences regarding the role of cognitive functioning in successful aging. Nonetheless, we believe that including cognitive functioning as a component of the successful aging construct would perpetuate confusion regarding interpretation of the meaning of successful aging and limit understanding of its predictors.

Table 4. Parameter Estimates from the Final Model  
(*n* = 1,000, Sample 1)

	Estimates	SE	Critical ratio	Standardized estimates
<b>Functional ability</b>				
Walk ¼ mile	1.000			.80
Walk up steps	0.77	0.03	29.70	.74
Stand	1.06	0.04	26.02	.82
Stoop	1.01	0.04	24.47	.76
<b>Pain</b>				
Frequency	1.00			.92
Intensity	0.85	0.02	38.26	.89
Interference	0.69	0.02	30.73	.77
<b>Diseases</b>				
Number	1.00			.70
<b>Objective success</b>				
Functional ability	1.00			.84
Pain	-1.07	0.06	-17.69	-.81
Disease	-1.11	0.07	-15.31	-.85
<b>Subjective success</b>				
Age well	1.00			.84
Successful aging	0.93	0.04	22.35	.78
Life rating	0.70	0.04	19.81	.66
<b>Covariances</b>				
Objective success and subjective success	0.65	0.06	11.53	.56
<b>Error covariances</b>				
Walk ¼ mile and pain interference	-0.18	0.02	-9.78	-.48
Walk ¼ mile and walk up steps	0.13	0.02	6.72	.33
Walk up steps and pain interference	-0.13	0.02	-8.38	-.37
Stand and pain interference	-0.14	0.02	-7.56	-.38
Stoop and pain interference	-0.11	0.02	-5.58	-.25
<b>Variances</b>				
Objective success	0.56	0.05	10.95	
Subjective success	2.47	0.17	14.45	
<b>Residual variances</b>				
Walk ¼ mile	0.44	0.03	15.48	
Walk up steps	0.38	0.02	17.17	
Stand	0.44	0.03	15.20	
Stoop	0.57	0.03	17.39	
Pain frequency	0.18	0.02	10.10	
Pain intensity	0.19	0.01	12.95	
Pain interference	0.32	0.02	19.21	
Diseases (number)	1.00	0.00	0.00	
Age well	0.99	0.09	10.38	
Successful aging	1.39	0.10	14.25	
Life rating	1.59	0.08	18.71	
<b>Observed variable</b>				
	<i>R</i> <sup>2</sup>			
Walk ¼ mile	.64			
Walk up steps	.55			
Stand	.67			
Stoop	.59			
Pain frequency	.84			
Pain intensity	.79			
Pain interference	.59			
Diseases (number)	.49			
Age well	.71			
Successful aging	.61			
Life rating	.44			

Similarly, although social engagement and psychological well-being have been viewed by others as part of the definition of successful aging (Rowe & Kahn, 1998), we posit these characteristics instead as antecedents of successful aging. This distinction is consistent with findings from

Depp and Jeste's (2006) and Bowling's (2007) meta-analyses where between 13% (Bowling) and 27.5% (Depp & Jeste) of the literature included a social component and only 10.6% included a psychological component (Bowling).

That women experience more chronic conditions, greater pain, and poorer functional ability than men highlights the importance of including gender in future conceptual and empirical research regarding successful aging. The lack of gender effects regarding subjective success is consistent with Montross et al.'s (2006) findings and helps distinguish the two aspects of this construct. Future work seeking to explain these differences is likely to shed important light on the meaning of successful aging.

Our finding that age is associated with two of the three components of objective success (functional abilities and number of chronic condition), but not with subjective success, is important. It gives credence to our contention that successful aging is a construct only partially bound by age and is also consistent with findings by Montross et al. (2006). By distinguishing the passage of time represented by age from successful aging, we set the stage for future work seeking to understand the precursors of successful aging.

Our contention that successful aging should be examined within a life-span perspective invites future research about the experiences of the "baby boom" generation. The sheer magnitude of this cohort makes the quest for understanding successful aging and its precursors critical from economic, social, and policy perspectives. Moreover, the combination of mean age of onset (between age 50 and 65) for chronic conditions, such as heart disease, cancer, and diabetes, and life expectancy (77.7 years), suggests that late-middle age is a watershed. We posit that the way that one arrives at and experiences middle age sets the stage for the years to follow, making it imperative to understand successful aging within a life-span perspective.

Limitations of these analyses must be acknowledged. Our exclusive reliance on self-report data to assess the objective components of successful aging may have inflated the relationship between objective and subjective success. Future studies using performance-based measures of functional abilities would strengthen understanding of the construct. In addition, understanding of the subjective component of successful aging could be strengthened by inclusion of additional indicators. Moreover, the cross-sectional design of our study presents successful aging as it exists at one point in time and does not allow conclusions to be reached regarding intra-individual change. Longitudinal research designs will enable successful aging to be examined from a true life-span perspective.

Finally, it is important to acknowledge that because our analyses focused on persons between the ages of 50 and 74 years, our selection of indicators representing objective success includes characteristics pertinent to this segment of the population. Extrapolating knowledge about successful aging to an older group of people would require selection of

different indicators of these constructs, and perhaps the addition of measures representing supplementary constructs. Nonetheless, the conceptualization of successful aging as a two-factor model including objective and subjective components is one that can be generalized to people of varying ages.

#### FUNDING

This work was supported by the School of Osteopathic Medicine, New Jersey Institute for Successful Aging, University of Medicine and Dentistry of New Jersey, Stratford, New Jersey.

#### ACKNOWLEDGMENTS

The authors thank Jonathan Brill, PhD, Yvonne Shands, Miriam Rose, and the University of Medicine and Dentistry of New Jersey School of Osteopathic Medicine Research Call Center staff whose hard work and perseverance produced a rich data set, and Michael Rovine, PhD, whose thoughtful comments on an earlier draft provided expert guidance.

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