

A Longitudinal Examination of the Effects of Early Influences and Midlife Characteristics on Successful Aging

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Objectives. Previous research revealed that successful aging includes both objective and subjective dimensions. This longitudinal analysis examines how early life influences and midlife characteristics predict stability and change in successful aging over a 4-year period.

Method. Data from 3,379 people living in New Jersey who completed baseline telephone interviews between 2006 and 2008 and follow-up mail surveys in 2011 were analyzed. Latent profile analysis identified people who aged successfully according to both objective and subjective criteria, neither criteria, and one, but not the other criteria. Multinomial logistic regressions analyses focused on the 2,614 people who were successful according to both objective and subjective criteria at baseline.

Results. At follow-up, 18.1% people successful at baseline had transitioned out of that status. Characteristics identifiable early in life (gender, race, education, never marrying, incarceration) as well as midlife status (currently married, working), health behaviors (smoking, drinking, body mass index, exercise), and social support distinguished people who continued to age successfully 4 years later from those who did not.

Discussion. Findings suggest that successful aging is a fluid construct and that although some characteristics identifiable early in life predict successful aging, others are dampened by midlife statuses.

Key Words: Latent profile analysis—Longitudinal analysis—Multinomial logistic regression—Objective success—Subjective success—Successful aging.

OVER the past several decades, the quest to understand successful aging has yielded an exponential growth in the number of publications defining the construct and empirical studies examining its predictors. Although it is generally agreed that aging is a process that evolves over time, understanding the fluidity of successful aging has been hindered by an almost exclusive reliance on cross-sectional designs. Fraught with concerns about causal attributions and survivor effects (Jeste et al., 2013; Pruchno, Wilson-Genderson, Rose, & Cartwright, 2010), the discussion sections of these studies have stressed the need for longitudinal designs. Although a number of recent longitudinal studies have examined health, well-being, and life satisfaction (Berg, Hassing, Thorvaldsson, & Johansson, 2011; Fiori & Jager, 2012; Gerstorf et al., 2010; Schilling, Wahl, & Wiegner, 2013; Wickrama, Mancini, Kwag, & Kwon, 2013), few longitudinal studies have examined predictors of successful aging.

The analyses that follow build on a conceptual framework positing that successful aging includes both objective and subjective dimensions (Pruchno, Wilson-Genderson, & Cartwright, 2010) and cross-sectional analyses revealing that although characteristics observable early in life predict successful aging, their influence is less important

than current health behaviors and social support. Focusing on people who were successful according to both objective and subjective criteria at baseline, we examine predictors of stability and change in successful aging status over a 4-year period.

Defining Successful Aging

Rowe and Kahn's (1987) groundbreaking work conceptualized successful aging as an objective construct in which a person arrived at old age with few or no age-related declines. Subsequent work (Rowe & Kahn, 1998) contended that successful aging was the combination of low risk of disease and disease-related disability, high levels of cognitive and physical functioning, and active engagement with life, all characteristics that could be measured external to the individual.

Successful aging as an objective construct dominated the field for years (Baltes & Carstensen, 1996; Guralnik & Kaplan, 1989; Roos & Havens, 1991; Schmidt, 1994; Seeman, Rodin, & Albert, 1993). More recently, attention has turned to the subjective perceptions or evaluations that older people themselves make of their aging experiences (Montross et al., 2006; Phelan & Larson, 2002; Strawbridge, Wallhagen, & Cohen, 2002; von Faber et al.,

2001). However, the subjective component of successful aging has received less attention from researchers than the objective. Studies that have contrasted objective and subjective approaches to defining successful aging find that the majority of older people view themselves as aging successfully, although few meet the objective criteria used by clinicians and researchers. Moreover, Strawbridge and Wallhagen (2003) found that although one third of people with chronic conditions rated themselves as aging successfully, an equal proportion of those without chronic conditions did not believe they had aged successfully.

These studies raise questions about what successful aging is and whether people with chronic disease can age successfully (Bowling, 2007; Bowling & Dieppe, 2005; Young, Frick, & Phelan, 2009). We contend that they can. In earlier work, we defined successful aging as having both an objective and a subjective component (Pruchno, Wilson-Genderson, & Cartwright 2010). The objective component includes having few chronic diseases, ample functional ability, and little or no pain. The subjective component is an evaluation that individuals make of their own aging experience at a given point in time. Our definition was built on conceptualizations of successful aging described by Baltes and Baltes (1990), Rowe and Kahn (1998), and Young and coworkers (2009), yet differs from them in several significant ways. First, it integrates objective and subjective considerations. Second, it distinguishes chronological age from successful aging, and 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.

The conceptual model we proposed was defined by two independent, yet related dimensions—objective success and subjective success. Confirmatory analyses found support for a two-factor model of successful aging (Pruchno, Wilson-Genderson, & Cartwright 2010). The magnitude of association between objective and subjective success suggested that it is possible to identify typologies of successful aging whereby people are successful according to both definitions, neither definition, and only one definition. Moreover, our finding that age was associated with objective success but not subjective success helps distinguish the passage of time from successful aging. Using data from the Women's Health Initiative, Woods and colleagues (2012) identified a similar multidimensional phenotype of positive aging.

In subsequent cross-sectional analyses, we examined how early influences and contemporary characteristics defined people who aged successfully according to both definitions, neither definition, and one, but not the other definition (Pruchno, Wilson-Genderson, Rose, & Cartwright, 2010). We found that characteristics identifiable early in life (gender, race, education, never having married, incarceration, and being childless) were associated with successful aging, but that their influence was less important than midlife characteristics, including role status (being married, working,

and volunteering), health behaviors (cigarette smoking, alcohol consumption, body mass index [BMI], and cardiovascular exercise), social support, and religiosity. However, because these analyses describe people at a single point in time, they neither address the extent to which successful aging is a stable characteristic nor whether people who continue to age successfully differ from those who do not.

Longitudinal Studies of Successful Aging

Longitudinal studies examining predictors of successful aging remain rare. Morack, Ram, Fauth, and Gerstorf (2013) suggested that studies using a variable-oriented perspective (those focused on changes in a single variable over time or those examining how changes in one variable relate to changes in another variable) provide different information than studies using a person-oriented perspective (those examining characteristics of persons in subgroups). Studies using a variable-oriented perspective show evidence of relatively high levels of stability regarding well-being across most of adulthood and old age, with decrements associated with major social or health-related losses (Gerstorf et al., 2010; Lucas, 2007). Using a person-oriented approach, Morack and coworkers (2013) identified four subgroups. Those characterized by preserved system integrity (successful agers) were relatively younger, more educated, more likely to be men, married, and living alone. Similarly, Hsu and Jones (2012) using a person-oriented approach found that people aging successfully were better educated, younger, more likely to be men, living in rural residences, and married than people who were not categorized as successful.

Conceptual Model and Hypotheses

People who function well at one point in their lives may not necessarily function well at other times. We suggest that because aging is a process that evolves over time, so too is it likely that the extent to which a person is characterized as aging successfully will vary over time. Moreover, we posit that predictors of successful aging are likely to vary over time. Focusing on people who were successful according to both objective and subjective definitions at baseline provides the opportunity to understand the characteristics associated with stability as well as change over time. Based on the work of Vaillant and his colleagues (DiRago & Vaillant, 2007; Vaillant, 2002, 2007; Vaillant & Mukamal, 2001) and Westermeyer (2013) as well as on our cross-sectional analyses (Pruchno Wilson-Genderson, Rose, & Cartwright, 2010), we posit that characteristics identifiable early in life (gender, race, education, never married, incarceration, and being childless) will distinguish people who continue to age successfully from those who do not (Hypothesis 1).

Although cross-sectional studies have identified a host of variables associated with successful aging, the extent to which these variables can predict successful aging has been

limited by the lack of longitudinal studies. Although there is evidence that being married (Bowling & Iliffe, 2006), working for pay (Ross & Mirowsky, 1995), volunteering (Borgonovi, 2008), practicing healthy behaviors such drinking moderately (Maraldi et al., 2009), maintaining low BMI (Leveille, Guralnik, Ferrucci, & Langlois, 1999), engaging in exercise (Britton, Shipley, Singh-Manoux, & Marmot, 2008), and not smoking cigarettes (Depp & Jeste, 2006), having adequate social supports (Montross et al., 2006), and maintaining strong religious beliefs (Crowther, Parker, Achenbaum, Larimore, & Koenig, 2002) are associated with successful aging, it is unclear whether they predict successful aging or are characteristics associated with successful aging at a particular point in time.

Informed by cross-sectional analyses, we posit that midlife characteristics (being married, working, and volunteering), health behaviors (cigarette smoking, alcohol consumption, BMI, and cardiovascular exercise), social support, and religiosity will distinguish people who continue to age successfully from those who do not (Hypothesis 2). Finally, we predict that the influence of characteristics identifiable early in life will be less important than characteristics describing midlife role status, health behaviors, and social support (Hypothesis 3).

METHOD

Participants

Data from 5,688 people participating in the ORANJ BOWL panel ("Ongoing Research on Aging in New Jersey: Bettering Opportunities for Wellness in Life") were collected using telephone interviews between 2006 and 2008. Study eligibility included being between the ages of 50 and 74, living in New Jersey, and having the ability to participate in a 1-hr English-language telephone interview.

Panel members were recruited by telephone cold calling using list-assisted random-digit-dialing (RDD) procedures. Demographics of the targeted sample make coverage loss due to cell phone-only households very small (Blumberg & Luke, 2007). Details regarding sample development are provided in Pruchno, Wilson-Genderson, and Cartwright (2010). Using standard American Association for Public Opinion Research calculations, ORANJ BOWL achieved a response rate of 58.73% and a Cooperation Rate of 72.88%, consistent with or better than average RDD response rates.

Approximately 4 years later, in 2011, a follow-up questionnaire was mailed to all ORANJ BOWL respondents. A total of 3,392 people (59.6%) completed and returned the questionnaire, 184 people died (3.2%), and 2,112 (37.1%) could not be located (noncompleters). People completing the questionnaire were: older than noncompleters and younger than those who died ($F = 42.2$, $df = 2$, 5,685), more likely to be women than those who died ($F = 5.05$, $df = 2$, 5,685), less likely to be African American ($F = 42.38$,

$df = 2$, 5,685), better educated ($F = 70.20$, $df = 2$, 5,672), have higher incomes ($F = 72.13$, $df = 2$, 5,019), and were more likely to have been married at baseline ($F = 23.40$, $df = 2$, 5,678) than those who died or did not complete the follow-up. The latent profile analysis (LPA) analysis used data from all people who completed the follow-up questionnaire and had no missing data ($N = 3,379$).

The multinomial analyses described below are based on data from the 2,614 people who were successful according to both objective and subjective definitions at baseline and who completed the follow-up questionnaire. That sample included 1,634 women and 980 men. People had a mean age of 60.53 ($SD = 7.0$) at baseline (range of 50–74); 7% was African American, 93% was White. Education levels ranged from not having graduated high school (2.3%) to professional degree (5.9%), with 74.5% having at least some college education. Income levels ranged from less than \$15K (2.5%) to more than \$150K (20.1%), with 54.7% of the sample reporting incomes between \$50K and \$150K. A minority (7.4%) of the sample had never married, 2.0% had spent more than one night in prison, and 16.6% were childless.

Measures

Objective success.—The objective components of success were operationalized as having few chronic conditions, maintaining functional ability, and experiencing little pain. We posited these characteristics as part of our objective component because: (a) they are characteristics that are clearly desirable, and not subject to value judgments; (b) there was good evidence 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 varied within the population we sought to understand.

Respondents were asked 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 eight conditions because they are chronic and are typically associated with age. The measure used in the analyses was the count of these conditions.

Respondents reported the amount of difficulty they had with four functional abilities involving lower body strength (walking for a quarter of a mile, walking up 10 steps, standing for 2 hr, stooping) using a 5-point Likert scale ranging from 1 (*can't do it at all*) to 5 (*not at all difficult*). The four individual items were used as indicators in the LPA.

Pain was measured with the following three questions: "How often are you troubled with pain?" "How bad is the pain most of the time?" and "How often does the pain make it difficult for you to do your usual activities such as

household chores or work?” Each question used a 4-point Likert response scale ranging from 0 (low) to 3 (high). The three individual items were used as indicators in the LPA.

Subjective success.—Subjective successful aging was assessed with three questions, each of which asked respondents to evaluate themselves using a scale from 0 to 10. Respondents were asked what number best: (a) “describes how successfully you have aged,” (b) “describes how well you are aging,” and (c) “represents how you would rate your life these days.” The three individual items were used as indicators in the LPA.

Four groups defined.—Using baseline data, separate latent profile analyses (LPA) were developed, one for objective success, the other for subjective success (Pruchno, Wilson-Genderson, & Cartwright 2010).

LPA establishes latent variables representing subgroups where membership is inferred from the data. It decomposes the covariances in the observed continuous indicators with the goal of sorting individuals into groups comprised of persons with similar attributes (Lubke & Muthen, 2005; Muthen, 2001; B. Muthen & L. Muthen, 2000); we specify no class membership a priori. LPA is appropriate in this instance as it is model-based and generate probabilities for group membership should unobservable subgroups of individuals exist.

The first LPA used the eight indicators of objective success (four functional abilities, three indicators of pain, and number of chronic diseases) as dependent variables, specifying a mixture model in Mplus version 5.2 (Lubke & Muthen, 2007; Muthen, 2001; B. Muthen & L. Muthen, 2000; Pastor, Barron, Miller, & Davis, 2007) and allowing the means of indicator variables to freely vary across the latent classes. The second LPA used the three observed indicators of subjective successful aging (age successfully,

age well, and rate life these days). Models were developed using maximum likelihood estimation with robust standard errors. The solutions from these analyses were used to create the following four groups of people: (a) those successful according to neither definition (*Unsuccessful*), (b) those successful according to only the subjective definition (*Subjective Only*), (c) those successful according to only the objective definition (*Objective Only*), and (d) those successful according to both objective and subjective definitions (*Successful*).

We repeated these LPA analyses using the data from the sample who completed the follow-up questionnaire ($N = 3,379$). At follow-up, the two-group solution for objective success characterized 81.6% of the sample as Successful and 18.4% as Unsuccessful. The entropy statistic was 0.969, with 99.5% of the successful sample correctly classified, and 97.7% of the unsuccessful group correctly classified. Subjective success also produced a viable two-group solution, with 83.1% of the sample classified as Successful and 16.9% as Unsuccessful. The entropy statistic was 0.890, with 97.2% of the successful group correctly classified, and 91.3% of the unsuccessful group correctly classified. Descriptive statistics for the indicators of objective and subjective success at baseline and follow-up for those characterized as either Successful or Unsuccessful on each dimension are presented in Table 1.

As with the baseline data, the latent class grouping variables from the final solutions at follow-up were saved and used to identify four groups of people: (a) those who became unsuccessful according to both definitions (Unsuccessful; $N = 442$; 13.1%), (b) those who became successful according to only the subjective definition (Subjective Only; 364; 10.8%), (c) those who became successful according to only the objective definition (Objective Only; $N = 276$; 8.2%), and (d) those who remained successful according to both definitions (Successful; $N = 2,297$; 68.0%).

Table 1. Latent Profile Analysis Solution Means and SEs for Class Indicators at Baseline and Follow-up

	Baseline ($N = 5,688$)		Follow-up ($N = 3,388$)	
	Unsuccessful ($N = 961$) M (SE)	Successful ($N = 4,727$) M (SE)	Unsuccessful ($N = 807$) M (SE)	Successful ($N = 2,581$) M (SE)
Objective success				
Difficulty walking for a quarter of a mile	2.5 (0.07)	4.8 (0.01)	2.6 (0.04)	4.8 (0.01)
Difficulty walking up 10 steps	3.1 (0.06)	4.9 (0.01)	3.4 (0.04)	4.9 (0.01)
Difficulty standing for 2 hr	2.4 (0.04)	4.6 (0.01)	2.3 (0.04)	4.5 (0.02)
Difficulty stooping	2.4 (0.04)	4.3 (0.01)	2.4 (0.03)	4.2 (0.02)
How often troubled with pain	2.2 (0.03)	0.78 (0.01)	2.1 (0.03)	0.90 (0.02)
How bad is the pain	2.0 (0.03)	0.79 (0.01)	1.8 (0.03)	0.81 (0.02)
Pain makes it difficult to do usual activities	1.8 (0.04)	0.28 (0.01)	1.5 (0.03)	0.25 (0.01)
# of chronic illnesses	3.0 (0.05)	1.5 (0.02)	3.1 (0.05)	1.7 (0.02)
Subjective success				
How well you are aging	4.7 (0.06)	7.6 (0.02)	4.8 (0.06)	8.4 (0.02)
How successfully you have aged	4.9 (0.11)	8.4 (0.03)	4.8 (0.06)	8.3 (0.02)
Rate your life these days	5.3 (0.10)	8.3 (0.03)	5.1 (0.07)	8.2 (0.02)

Independent variables.—Influences identifiable early in life include gender (1 = female), race (dichotomous, 1 = African American), education (9-point scale, 1 = not high school graduate, 9 = professional degree), never-married status (dichotomous, 1 = never married), incarceration (dichotomous, 1 = yes), and childlessness (dichotomous, 1 = yes). Midlife statuses assessed at baseline (2006–2008) were married, working, and volunteering. Each was coded as a dichotomous variable, with 1 indicating the individual was married, working, or volunteering. Respondents indicated whether they currently smoke cigarettes (0 = no; 1 = yes). Alcohol consumption was assessed by asking “During a typical week on how many days do you have at least one drink of alcohol?” Responses ranged from 0 to 7 days. Cardiovascular exercise was the number of minutes per week people spent doing vigorous exercise, moderate exercise, and walking. BMI was calculated based on height and weight. Social support was measured with four questions (“How often do you feel: there is someone you can count on to listen to you when you need to talk, that someone is available to give you good advice about a problem, that someone shows you love and affection, and that there is someone you can count on to provide you with emotional support?”). A 5-point Likert response scale was used for each (1 = none of the time; 5 = all of the time). Mean score was used in the analysis. Religiosity was assessed with six questions (“To what extent do you consider yourself a spiritual person?,” “How often do you attend religious services?,” “How often do you read the bible or other religious literature?,” “How often do you watch or listen to religious programs on TV or radio?,” “How often do you pray privately in places other than a church, mosque, or synagogue?,” and “To what extent do you consider yourself a religious person?”). Likert response scales were used for each, with higher scores indicating participation in more religious behaviors. Mean score was used.

Statistical Analyses

Preliminary analyses examined the distribution, skew, and kurtosis of all variables. A large kurtosis for exercise minutes led to creation of a logged exercise minutes variable that was used in subsequent analyses.

Multinomial logistic regression was used to assess the independent effects of each variable’s ability to distinguish the group of people who continue to be successful according to both objective and subjective criteria (Successful) from those who shifted to successful according to only objective criteria (Objective Only), those who shifted to successful according to only subjective criteria (Subjective Only), and those who shifted to unsuccessful according to both the objective and subjective criteria (Unsuccessful). In all analyses, the Successful group was the referent group. Model 1 included only the early life influences; Model 2 added characteristics representing status at baseline (2006–2008).

RESULTS

At baseline, 64.7% of the sample included in the multinomial logistic regression analyses was married, 65.6% was working, and 51.8% were volunteers. The majority of the sample (88.5%) did not smoke. The sample reported drinking alcohol on a mean of 1.8 days ($SD = 2.4$; range = 0–7). Mean exercise minutes (log) was 5.1 ($SD = 1.5$; range = 0–7.4); mean exercise minutes in original units was 281.1 ($SD = 305.1$, median = 180.0). BMI ranged from 15.9 to 53.2 ($M = 27.3$; $SD = 5.1$). Social support scores ranged from 4 to 20 ($M = 17.3$; $SD = 2.9$). Religiosity scores ranged from 6 to 30 ($M = 18.1$, $SD = 6.2$).

Rates of completion of the follow-up questionnaire varied with baseline status, as indicated in Table 2. People Successful at baseline had the highest rate of completion (62.6%); those Unsuccessful at baseline had the lowest rate of follow-up completion (46.4%). Patterns of change also varied across the four groups. People Successful at baseline as well as those Unsuccessful at baseline were most likely to remain stable, while sizable numbers of Subjective Only and Objective Only at baseline became either Unsuccessful or Successful at follow-up. Among people Successful at baseline who participated in the follow-up, 81.9% were also Successful at follow-up, but 6.8% transitioned to Objective Only, 6.6% to Subjective Only, and 4.7% to Unsuccessful.

Results from the multinomial logistic regression analysis are reported in Tables 3 and 4. Model 1 (Table 3), testing the effects of early influences only (Hypothesis 1), revealed that compared with people who remain Successful, people who become Unsuccessful had less education and were more likely to have been in prison. Compared with people who remain Successful, people who become Subjective Only were older, more likely to be women, had less education, and were more likely to have never married. Finally,

Table 2. Baseline and Follow-up Successful Aging Status

Baseline	Follow-up
Unsuccessful ($N = 474$)	Unsuccessful ($N = 160$) Objective Only ($N = 3$) Subjective Only ($N = 41$) Successful ($N = 16$) Missing ($N = 254$)
Objective Only ($N = 485$)	Unsuccessful ($N = 81$) Objective Only ($N = 88$) Subjective Only ($N = 20$) Successful ($N = 81$) Missing ($N = 215$)
Subjective Only ($N = 570$)	Unsuccessful ($N = 79$) Objective Only ($N = 7$) Subjective Only ($N = 131$) Successful ($N = 69$) Missing ($N = 284$)
Successful ($N = 4,159$)	Unsuccessful ($N = 122$) Objective Only ($N = 178$) Subjective Only ($N = 172$) Successful ($N = 2,131$) Missing ($N = 1,556$)

Table 3. Results of Multinomial Logistic Regression Analyses (Early Influences)

	Unsuccessful			Subjective Only			Objective Only		
	β (SE)	95% CI	Exp. (β)	β (SE)	95% CI	Exp. (β)	β (SE)	95% CI	Exp. (β)
Age	0.021 (0.01)	0.99–1.0	1.02	0.08 (0.01)***	1.05–1.10	1.08	–0.05 (0.01)***	0.92–0.97	0.95
Gender	0.19 (0.20)	0.81–1.8	1.21	0.67 (0.19)***	1.33–2.85	1.95	–0.18 (0.16)	0.61–1.14	0.83
African American	–0.29 (0.39)	0.35–1.60	0.75	0.47 (0.26)	0.96–2.64	1.60	–0.97 (0.47)*	0.15–0.95	0.38
Education	–0.12 (0.05)**	0.81–0.97	0.89	–0.12 (0.04)**	0.82–0.96	0.89	–0.12 (0.04)***	0.82–0.95	0.88
Never married	0.37 (0.38)	0.68–3.06	1.45	1.07 (0.33)***	1.51–5.58	2.90	0.28 (0.32)	0.70–2.46	1.32
Incarceration	1.1 (0.47)*	1.2–7.69	3.06	0.63 (0.51)	0.69–5.14	1.89	–0.12 (0.62)	0.27–2.98	0.89
Childless	0.23 (0.28)	0.73–2.17	1.26	–0.49 (0.29)	0.35–1.08	0.61	0.32 (0.23)	0.87–2.18	1.37

Note. * $p < .05$, ** $p < .01$, *** $p < .001$.

Table 4. Results of Multinomial Logistic Regression Analyses (Early Influences and Baseline Characteristics)

	Unsuccessful			Subjective Only			Objective Only		
	β (SE)	95% CI	Exp. (β)	β (SE)	95% CI	Exp. (β)	β (SE)	95% CI	Exp. (β)
Early influences									
Age	0.02 (0.02)	0.99–1.05	1.02	0.07 (0.02)***	1.04–1.10	1.07	–0.06 (0.01)***	0.920–0.97	0.94
Gender	0.23 (0.22)	0.82–1.95	1.26	0.50 (0.21)*	1.09–2.50	1.65	–0.21 (0.18)	0.57–1.15	0.81
African American	–0.69 (0.41)	0.22–1.1	0.50	–0.06 (0.29)	0.54–1.66	0.94	–1.12 (0.49)*	0.13–0.84	0.33
Education	–0.06 (0.05)	0.86–1.04	0.94	–0.07 (0.05)	0.85–1.01	0.93	–0.09 (0.041)*	0.84–0.99	0.91
Never married	0.15 (0.41)	0.52–2.63	1.17	0.55 (0.36)	0.86–3.49	1.73	–0.10 (0.35)	0.46–1.80	0.91
Incarceration	1.12 (0.50)*	1.15–8.11	3.06	0.70 (0.53)	0.71–5.74	2.01	–0.36 (0.64)	0.20–2.43	0.70
Childless	0.29 (0.28)	0.77–2.31	1.33	–0.29 (0.29)	0.42–1.31	0.75	0.31 (0.24)	0.85–2.19	1.37
Midlife characteristics									
Married	–0.01 (0.23)	0.64–1.54	0.99	–0.39 (0.19)*	0.47–0.99	0.68	–0.42 (0.19)*	0.45–0.95	0.66
Working	–0.36 (0.22)	0.45–1.08	0.70	–0.46 (0.20)*	0.43–0.92	0.63	–0.05 (0.20)	0.64–1.41	0.95
Volunteer	–0.09 (0.21)	0.61–1.36	0.91	–0.11 (0.18)	0.62–1.27	0.89	–0.10 (0.17)	0.64–1.28	0.91
Smoke	0.55 (0.26)*	1.03–2.93	1.74	0.32 (0.25)	0.83–2.27	1.38	0.24 (0.23)	0.81–1.99	1.27
Alcohol consumption	–0.09 (0.05)*	0.83–1.00	0.91	–0.02 (0.04)	0.90–1.06	0.98	0.01 (0.03)	0.94–1.08	1.01
BMI	0.10 (0.02)***	1.07–1.14	1.10	0.13 (0.01)***	1.11–1.17	1.14	0.01 (0.02)	0.97–1.04	1.01
Cardiovascular exercise (log)	–0.08 (0.06)	0.83–1.03	0.92	–0.07 (0.05)	0.84–1.04	0.94	–0.10 (0.05)*	0.82–0.99	0.90
Social support	–0.13 (0.03)***	0.83–.92	0.87	0.01 (0.03)	0.95–1.08	1.01	–0.12 (0.02)***	0.84–0.93	0.89
Religiosity	0.01 (0.02)	0.98–1.05	1.01	0.02 (0.02)	0.99–1.06	1.03	–0.00 (0.01)	0.97–1.03	1.00

Note. * $p < .05$; *** $p < .001$.

compared with those who remain Successful, people who become Objective Only were younger, less likely to be African American, and had less education. Goodness of fit indicators for Model 1 are Pearson $\chi^2 = 2748.06$ ($df = 2,538$, $p < .002$), deviance $\chi^2 = 1608.1$ ($df = 2,538$, $p = 1.0$), Cox and Snell = 0.06 and Nagelkerke = 0.08.

Testing Hypothesis 2, by adding characteristics representing status at midlife to the effects of these early influences (Model 2, Table 4) revealed that, compared with those who remain Successful, people who become Unsuccessful were more likely to smoke cigarettes, less likely to drink alcohol, had higher BMI levels, and had less social support. Testing Hypothesis 3, the effect of imprisonment remained significant; the effect of education lost significance once information about midlife status was added.

Compared with people who remain Successful, people who become Subjective Only were less likely to have been married and working for pay when interviewed initially and had higher BMI at baseline (Hypothesis 2). Testing Hypothesis 3, the effects of age and gender, significant in Model 1, remained significant, whereas the effects

of education and imprisonment, significant in Model 1, reduced to nonsignificance.

Finally, compared with people who remain Successful, people who become Objective Only were less likely to be married, spent less time exercising, and had poorer social support (Hypothesis 2) when interviewed initially. Testing Hypothesis 3, the effects of age (younger), race (less likely to be African American), and education (less), significant in Model 1, maintained their significance in Model 2.

Goodness of fit indicators for Model 2 are Pearson $\chi^2 = 7444.55$ ($df = 7,611$, $p = .91$), deviance $\chi^2 = 3072.6$ ($df = 7,611$, $p = 1.0$), Cox and Snell = 0.125, and Nagelkerke = 0.17.

DISCUSSION

By following people known to be aging successfully at baseline, these longitudinal analyses provide important new information about successful aging that could not be understood from studies using cross-sectional designs. The movement of people across the four groups over a relatively

short period of time suggests that successful aging is somewhat fluid and that both early- and midlife characteristics can predict change in status.

Our analyses provide support for Hypothesis 1, as age, gender, race, education, never marrying, and spending time in prison distinguished people who continued to age successfully over a 4-year period from those who did not. Only being childless failed to distinguish those who continued to age successfully from those who did not.

Hypothesis 2 was also supported, as being married, working, smoking cigarettes, drinking alcohol, BMI, cardiovascular exercise, and social support in midlife distinguished people who continued to age successfully 4 years later from those who did not. Volunteering and religiosity did not distinguish those continuing to age successfully from those who did not.

Hypothesis 3 was partially supported, as the effects of some of the early influences were dampened by midlife characteristics, whereas others were not. Most salient was that the power of education to discriminate those who remain Successful from both those who become Unsuccessful and those who become Subjective Only in Model 1 was reduced with the addition of midlife characteristics. Similarly, never marrying (which distinguished those who remain Successful from those who become Subjective Only in Model 1) and race (which distinguished those who remain Successful from those who become Objective Only in Model 1) lost their significance when midlife characteristics were added to the analysis. On the other hand, the effects of age, gender, and incarceration remained significant when midlife characteristics were included.

The importance of using longitudinal designs to study successful aging becomes clear when results from our earlier cross-sectional analyses (Pruchno, Wilson-Genderson, Rose, & Cartwright, 2010) are contrasted with these longitudinal findings. Not surprisingly, the cross-sectional analyses revealed many more significant predictors than did the longitudinal analyses. Although the cross-sectional analyses found that age, gender, race, education, being married, working, volunteering, and exercising distinguished the Successful from the Unsuccessful group, none of these variables distinguished these two groups in the longitudinal analyses. These disparate findings help distinguish correlates of successful aging from its predictors. Our finding that the predictive ability of characteristics identifiable before midlife diminishes over time is consistent with those reported by others (DiRago & Vaillant, 2007; Vaillant, 2002; Westermeyer, 2013).

On the other hand, incarceration, smoking, drinking, BMI, and social support distinguished the Successful from the Unsuccessful in both the cross-sectional and longitudinal analyses. Similarly, the power of age (older), gender (women), BMI, being married and working in midlife to discriminate the Successful from the Subjective Only, while age (younger), race (less likely to be African American),

education, being married in midlife, exercise, and social support discriminate the Successful from the Objective Only.

These longitudinal analyses provide support that successful aging is a complex construct. Because the characteristics distinguishing those who continue to be Successful, those who become Objective Only and those who become Subjective Only differ from one another, these findings also support the distinction between objective and subjective successful aging. The pattern of findings regarding age is especially important. Because age does not distinguish those who continue to be Successful and those who become Unsuccessful, but differentially distinguishes those who become Subjective Only and those who become Objective Only, with the former being older and the latter being younger than the Successful, suggests that successful aging is not linearly associated with age. As we move toward understanding the mechanisms underlying successful aging, it will be productive to question why being female, not working, and having higher BMI discriminates those who continue to be Successful from those who become Subjective Only while those who continue to be Successful are distinguished from those who become Objective Only by race, education, exercise, and social support.

This study, like all, has its limitations. First, our criteria for objective success, although well justified, were somewhat arbitrary, and some may take issue with its exclusive reliance on indicators of health. Moreover, exclusive reliance on self-report data raises questions about the extent to which these objective success indicators are valid. Future studies adding performance-based measures will add valuable information to our understanding of successful aging. Similarly, while our measure of subjective success is consistent with that used by others, its brevity makes scale development a priority. Second, although we attempted to examine characteristics that would distinguish people in a comprehensive manner, there were some aspects that we did not assess. The lack of a cognitive screening measure, for example, may have resulted in inclusion of some people with mild cognitive impairment and the inability to examine whether and how mild cognitive impairment affects successful aging. We also do not address the influence of other salient factors on salient aging. Given research by McCrae (2002), revealing that personality characteristics evident early in life predicts well-being in later years, future research should examine how characteristics such as personality, meaning of life, generativity, and environmental characteristics affect successful aging. Third, limited funding for the follow-up study resulted in a high rate of non-completion; hence generalization of findings is cautioned. People completing the follow-up were older, less likely to be African American, better educated, had higher incomes, and were more likely to be married at baseline.

While the preponderance of people who were Successful at baseline enabled us to examine predictors of change in status over time using multivariate analyses, people who were

Objective Only or Subjective Only at baseline show interesting patterns of change that, because of their high rates of nonresponse at follow-up, we were able to examine in only a perfunctory fashion. Both groups include similar numbers of people who become Unsuccessful and Successful. T-tests contrasting people who were Objective Only at baseline and became either Unsuccessful or Successful at follow-up revealed that those who became Successful were more likely to be men, working, married, and have better social relationships at baseline than those who became Unsuccessful. T-tests contrasting people who were Subjective Only at baseline and became either Unsuccessful or Successful at follow-up revealed that those who became Successful were more likely to be working and less likely to smoke cigarettes at baseline than those who became Unsuccessful.

These analyses suggest that people who will continue to age successfully over a four year period can be distinguished from people who will not. For the most extreme group (those who become unsuccessful according to both objective and subjective criteria), the power of health behaviors (smoking, moderate alcohol, and BMI) and social support in midlife is clear. Interventions directed to improving health behaviors and bolstering social support could have important implications for these people. The pattern of characteristics distinguishing people who continue to be successful according to both definitions and those who become successful according to only the subjective criteria is very different, and implications for interventions here suggest the importance of targeting older people, women, people who are not married, and those who are not working. How they can be helped to continue to age successfully according to objective criteria is less clear, as the sole health behavior discriminating these groups is BMI, which has a strong genetic component. It is possible that health behaviors not assessed in this study (e.g., eating patterns), and characteristics of the environments in which people live are responsible for change in successful aging. Finally, the pattern of characteristics discriminating people who continue to age successfully from those who become successful according to only the objective criteria suggests the importance of both demographic characteristics to identify them and the potential to intervene by bolstering their social support.

In conclusion, these findings provide support for successful aging as a construct having both objective and subjective components. Change in successful aging status in as brief a period as four years is predictable, hence potentially alterable. As such, research focusing on the mechanisms underlying change is needed. What patterns of change will look like at more advanced age awaits further study, and it remains to be seen how successful aging trajectories will predict morbidity and mortality over time.

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