Successful Aging in the United States: Prevalence Estimates From a National Sample of Older Adults

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Objectives. To estimate the prevalence of successful aging in the United States, with the broad aim of contributing to the dialogue on Rowe and Kahn's concept of successful aging.

Methods. Using data from the Health and Retirement Study, the prevalence of successful aging was calculated for adults aged 65 years and older at four time points: 1998, 2000, 2002, and 2004. Successful aging was operationalized in accordance with Rowe and Kahn's definition, which encompasses disease and disability, cognitive and physical functioning, social connections, and productive activities.

Results. No greater than 11.9% of older adults were aging "successfully" in any year. The adjusted odds of successful aging were generally lower for those of advanced age, male gender, and lower socioeconomic status. Between 1998 and 2004, the odds of successful aging declined by 25%, after accounting for demographic changes in the older population.

Discussion. Few older adults meet the criteria put forth in Rowe and Kahn's definition of successful aging, suggesting the need for modification if the concept is to be used for broad public health purposes. Disparities in successful aging were evident for socially defined subgroups, highlighting the importance of structural factors in enabling successful aging.

Key Words: Health disparities—Healthy aging—Prevalence—Successful aging.

IN the coming decades, the percentage of the U.S. population aged 65 years and older will be greater than at any point in our nation's recent history, rising from roughly 4% at the start of the 20th century to approximately 20% by 2050 (He, Sengupta, Velkoff, & DeBarros, 2005). With this "graying of America," issues relevant to older adults will assume greater societal importance.

Health is a particularly salient issue, as older adults shoulder a heavy burden of disease and disability. In the United States, more than three quarters of older adults are reported to have at least one chronic illness (Wolff, Starfield, & Anderson, 2002) and 20% are chronically disabled (Federal Interagency Forum on Aging-Related Statistics, 2006). Despite increased attention to the health problems associated with older adulthood, our understanding of what constitutes optimal health in later life is limited. The lack of uniformity in definitions of "healthy aging" apparent in recent reviews (Depp & Jeste, 2006; Peel, McClure, & Bartlett, 2005) is clear evidence of the ambiguity surrounding the meaning of the concept.

One of the most influential conceptualizations of healthy aging, referred to as "successful aging," was put forth by Rowe and Kahn in the late 1980s. At that time, they broadly defined successful aging as avoiding the physiologic declines frequently associated with growing older (Rowe & Kahn, 1987). A decade later, Rowe and Kahn (1997) more explicitly defined their notion of successful aging as "avoidance of disease and disability, maintenance of high physical and cognitive function, and sustained engagement in social and productive activities" (p. 439).

Over the past two decades, there has been considerable debate and commentary on Rowe and Kahn's conceptualization. Several concerns have been voiced, including the belief that the concept is narrowly conceived (e.g., Scheidt, Humpherys, & Yorgason, 1999) and that too little heed has been paid to the role that broad structural factors (e.g., access to health care) play in successful aging (e.g., Holstein & Minkler, 2003; Riley, 1998). Some have also highlighted the need for greater input from older adults in formulating definitions of successful aging (e.g., Glass, 2003; Phelan & Larson, 2002).

Despite these concerns, an examination of the national prevalence of successful aging as conceptualized by Rowe and Kahn would be informative on several fronts. First, their definition includes several consequential dimensions of health (i.e., disease status as well as cognitive, physical, and social functioning). As such, prevalence estimates would provide a measure of the extent to which older adults are achieving good health across multiple simultaneously assessed dimensions. Second, it provides an opportunity to assess the extent to which successful aging varies within the older population by factors such as age, gender, race-ethnicity, and socioeconomic status (SES). Such an assessment permits evaluation of the degree to which opportunities for successful aging, as argued by scholars such as Holstein and Minkler (2003), may vary across demographic segments of

the older population. Third, examining the prevalence of successful aging at multiple time points, as was done in this study, provides insight into how the prevalence of successful aging may be shifting over time in the context of other reported changes in the health of older adults (e.g., declining rates of disability; Freedman et al., 2004). If the prevalence of successful aging has increased in recent years, it may reflect an overall improving health profile among older adults. Finally, an examination of the occurrence of successful aging may be helpful to efforts aimed at refining Rowe and Kahn's concept. If, for instance, the percentage of older adults who meet Rowe and Kahn's definition is exceedingly small, the appropriateness of the various definitional components would warrant careful reconsideration.

Although Rowe and Kahn's concept has informed numerous studies (e.g., Berkman et al., 1993; Britton, Shipley, Singh-Manoux, & Marmot, 2008), surprisingly few attempts have been made to estimate the prevalence of successful aging in the United States as defined by Rowe and Kahn. Work by Strawbridge, Wallhagen, and Cohen (2002) is a notable exception. Among 867 participants of the Alameda County Study, they found that less than one fifth of older adults met Rowe and Kahn's definition, with higher percentages observed among women, younger older adults, those of White as opposed to Black race, and those with higher education. Because their work was based on a regional and relatively well-educated sample, however, it is unclear how well their findings represent the experience nationwide. Furthermore, to our knowledge, no studies to date have examined whether the national prevalence of successful aging has changed in recent years.

The key objectives of this study are to (a) estimate the overall prevalence of successful aging as defined by Rowe and Kahn among a large national sample of adults aged 65 years and older; (b) measure the extent to which the prevalence varies by age, gender, race-ethnicity, and SES; and (c) examine recent trends in the phenomenon.

METHODS

The Health and Retirement Study (HRS) is a longitudinal study of U.S. adults aged 51 years and older (Leacock, 2006). Study participants are interviewed every 2 years, with age-eligible adults from younger birth cohorts added to the sample at regular intervals to ensure that the study sample remains representative of the target population (Institute for Social Research [ISR], 2008a; Leacock). Depending on factors such as age and health of the respondent, surveys are administered either in person or by telephone (ISR, 2008b; Soldo, Hurd, Rodgers, & Wallace, 1997). Although proxies are utilized when the focal individual is unable or unwilling to be interviewed, we excluded proxy respondents (n = 934–1,121 across waves) from this analysis, as two key components of the outcome (i.e., depressive symptoms and tests of cognitive functioning) were unavail-

able for those with proxy respondents. In addition, we excluded self-respondents of "other" race-ethnicity due to their small subsample size (n = 147–155 across years). Finally, although HRS was initiated in 1992, this investigation is limited to data collected in 1998, 2000, 2002, and 2004 to minimize the number of inconsistencies in data collection over time.

Dependent Variable

Guided by Rowe and Kahn's conceptualization of successful aging and other attempts to examine the phenomenon (i.e., Berkman et al., 1993; Strawbridge et al., 2002), successful aging was defined as having (a) no major disease, (b) no activity of daily living (ADL) disability, (c) no more than one difficulty with seven measures of physical functioning, (d) obtaining a median or higher score on tests of cognitive functioning, and (e) being "actively engaged."

No major disease.—HRS participants are asked if a doctor has told them that they have each of seven chronic diseases. For this analysis, we included only those diseases that are major causes of death among older adults: cancer, chronic lung disease, diabetes, heart disease, and stroke. We also included a measure of mental health: the 8-item Center for Epidemiologic Studies Depression Scale (CES-D). To meet the "no major disease" criterion, respondents could not report any of the five chronic diseases examined and must have obtained a score of less than 4 (out of a possible 8) on the 8-item CES-D (see Steffick, 2000, for discussion of cut point).

Disability.—Consistent with the eligibility criteria for the MacArthur Studies of Successful Aging (Berkman et al., 1993) and the work of Strawbridge and colleagues (2002), we restricted our assessment of disability to ADLs. Respondents who reported no difficulty performing each of six ADLs (i.e., walking across a room, dressing, bathing or showering, eating, getting in or out of bed, and using the toilet) met the criterion for no disability.

Cognitive functioning.—Multiple measures were used to assess participants' cognitive functioning. Based largely on items included in the Telephone Interview for Cognitive Status (Brandt, Spencer, & Folstein, 1988), participants were asked to perform consecutive subtractions, count backwards, provide the date, state the name of two items, and recall a list of words (immediately and following a brief delay; Herzog & Wallace, 1997). With one exception (i.e., items assessing awareness of the president and vice president were excluded a priori), we used the scoring system described by Herzog and Wallace to determine cognitive status. Participants could obtain a maximum score of 33.

Considering the potential for misclassification among those of non-White race and lower educational levels, we

used a score at the median or higher to denote high cognitive functioning. Because variation in sample composition over time could result in different median scores from one year to the next, the median value for 1998 (i.e., 20) was used as the cut point for all waves.

Physical functioning.—Participants were classified as having high physical functioning if they reported no greater than one difficulty with any of seven measures, including walking one block; walking several blocks; climbing one flight of stairs; climbing several flights of stairs; lifting or carrying items weighing more than 10 lbs; stooping, kneeling, or crouching; and pulling or pushing large objects. Although measures are not identical, the definition of "high functioning" in the MacArthur Studies also included those "[reporting] not more than one disability" (p. M108) with a series of activities capturing physical functioning (Seeman et al., 1994).

Active engagement.—Rowe and Kahn's notion of active engagement refers to social connections and engagement in productive activity (Rowe & Kahn, 1997, 1998). Participants were defined as "actively engaged" if they reported (a) "doing any work for pay at the present time," any "volunteer work for religious, educational, health-related or other charitable organizations" in the previous year, or caring for grandchildren at least 100 hr during the prior 2-year period and (b) reporting any one of the following social connections: being married, having "good friends living in [their] neighborhood," and "[getting] together with . . . neighbors just to chat or for a social visit" at least one time per week.

Independent Variables

Age.—For calculation of the prevalence of successful aging, age was categorized as young–old (ages 65–74 years), aged (ages 75–84 years), and oldest–old (85 years and older; U.S. Census Bureau, 1996). Given the low prevalence of successful aging among the aged and particularly the oldest–old in this study, age was dichotomized (65–74 years vs. 75 years and older) for multivariate analyses.

Race-ethnicity.—Race-ethnicity was classified as Hispanic, non-Hispanic Black, and non-Hispanic White for calculation of prevalence estimates. For multivariate analyses, Black and Hispanic adults were combined into a non-White category due to their relatively small subgroup sizes and the low prevalence of successful aging observed in this study.

Socioeconomic status.—Education was categorized as less than high school, high school graduate, some college, and college or higher education. For calculation of prevalence estimates, a four-category household income variable

(i.e., quartiles) and a five-category household wealth variable (the lowest category included those with debt or zero wealth, with the remainder of participants divided into quartiles) were created. Due to the low prevalence of successful aging among those with the least wealth, the two lowest categories of wealth were combined for multivariate analyses.

Data Analysis

Sample design.—Participants were selected for HRS using a complex sample design that involved oversampling of several segments of the U.S. population (i.e., Black and Hispanic adults and those living in Florida; Heeringa & Connor, 1995). To permit inference to the older population in the United States, analyses were weighted to correct for oversampling and nonresponse. Standard errors were adjusted for features of the sample design (i.e., clustering and stratification).

Missing data.—The percentage of missing data varied by year and type of measure. By far, the largest percentage of missing data (roughly one third) was in 1998 and 2000 for two items assessing social connections (i.e., having good friends in the neighborhood and social visits with neighbors). This is largely because data pertaining to these items were gathered from only one member of each household in those years. In later waves, however, the questions were posed to all respondents. To avoid losing participants with missing data, multiple imputation was performed using IVEware (Raghunathan, Solenberger, & Van Hoewyk, 2002). A total of five iterations were performed, resulting in five distinct data sets.

Multiple imputation was not used to impute missing cognitive values, as previous research with HRS data has shown missing status to be related to cognitive functioning (Herzog & Rodgers, 1999; Herzog & Wallace, 1997), which violates the missing at random assumption of multiple imputation. Instead, following Sloan and Wang (2005), we imputed scores of 0 for missing cognitive items. Following imputation, the analytic sample size was 9,236 in 1998; 9,118 in 2000; 9,220 in 2002; and 9,532 in 2004.

Analytic techniques.—The prevalence of successful aging was calculated at each wave for the total sample as well as by age, gender, education, income, wealth, and race-ethnicity. To determine if demographic differences were statistically significant, unadjusted odds ratios (ORs) and 95% confidence intervals (CIs) were calculated. Multivariate logistic regression was then utilized to examine the wave-specific association between each factor and successful aging, after controlling for all other demographic factors.

To examine the odds of aging successfully across time, data from all four waves were pooled. Using Generalized

Estimating Equations to account for the fact that individuals may appear in more than one wave of data collection, successful aging was then regressed on age, education, gender, income, wealth, race-ethnicity, and a categorical year variable (referent = 1998) to determine if the odds of aging successfully had changed over time after accounting for demographic changes in the older population.

RESULTS

Sample Characteristics

Demographic characteristics of the analytic sample are displayed in Table 1 for 1998 through 2004. The young–old, women, and married individuals comprised more than half the sample at all waves. White adults comprised no less than 86.9% of the sample in any year, with the percentage of Black and Hispanic adults ranging from 7.5% to 8.2% and 4.6% to 4.9%, respectively. Over the 6-year period, the percentage of the sample with at least a high school education increased from 69.9% to 76.4%. Median household income (in 1998 dollars) ranged from $24,109 to $25,331 across waves and household wealth ranged from $146,000 to approximately $181,000.

Prevalence of Successful Aging

The prevalence of successful aging was 11.9% in 1998, 11.9% in 2000, 11.0% in 2002, and 10.9% in 2004. As shown in Table 2, more than 80% of older adults met the disability criterion in all waves, but less than half met the disease criterion. By definition, slightly more than half met the cognitive functioning criterion in all years; the percentage with high physical functioning ranged from 49.0% to 53.2%. Less than one half of the sample met the active engagement criterion in any year.

Prevalence of Successful Aging by Demographic Criteria

There was substantial variation across demographic subgroups in the prevalence of successful aging (see Table 3). Whereas no greater than 6.9% of the aged and 2.2% of the oldest–old were classified as aging successfully in any year, the percentage among the young–old ranged from 15.7% to 16.8%. In all years, the prevalence was slightly higher for men (11.5%–12.8%) than women (10.5%–11.4%). A higher percentage of White (11.7%–12.8%) than Black (4.4%–7.1%) or Hispanic (4.9%–5.6%) adults were classified as aging successfully in all waves.

Differences were also evident for the three indicators of SES. As shown, the percentage of adults aging successfully increased markedly with increasing level of education. In 2004, for instance, the prevalence of successful aging was 2.5% for those with less than a high school education, 10.3% for high school graduates, 13.3% for those with some college education, and 20.5% for those with a college or higher education. Differences were also apparent across the gradients of income and wealth. For instance, whereas no greater than 4.0% of those in the lowest income category experienced successful aging in any wave, the prevalence at any point was no less than 7.0%, 11.2%, and 20.2% for those in the second lowest, second highest, and highest income groups, respectively. The pattern was similar for wealth.

Logistic Regression Analyses of Successful Aging by Demographic Subgroup

Unadjusted and adjusted ORs for successful aging by demographic subgroup are displayed in Tables 4 and 5, respectively. In comparison to the young–old, the unadjusted odds of aging successfully were roughly 70% lower in all waves for those aged 75 years and older; odds remained substantially lower even after adjustment for covariates.

In unadjusted analyses, men had slightly greater odds of successful aging than women, but differences failed to reach statistical significance. After adjusting for other demographic factors, however, this trend reversed. Specifically, the adjusted odds of successful aging were lower (14%–21%) among men than women, with differences statistically significant in three of the four waves.

Racial-ethnic differences were evident in the unadjusted analysis, with the odds of aging successfully roughly one half to two thirds lower for non-Whites than their White counterparts. In the adjusted analysis, however, differences were smaller and failed to reach statistical significance in three of the four waves. For the most recent wave of data collection, however, the adjusted odds of aging successfully were nearly a third lower for non-Whites.

Relative to those with a college or higher education, older adults of all educational levels had significantly lower odds of aging successfully (see Table 4). In 1998, for instance, those with less than a high school education, a high school diploma, and some college education had 0.17, 0.46, and 0.60 times the unadjusted odds of successful aging in comparison to those with a college or higher education, respectively. Although smaller, differences by education remained significant after adjusting for covariates (see Table 5).

As compared with those with the highest income, significant differences in the unadjusted odds of successful aging were evident across the income gradient in all years. In 2004, for example, those in the lowest, second lowest, and second highest income categories had 0.14, 0.28, and 0.47 times the odds of aging successfully relative to those with the highest level of income, respectively. Differences by income were attenuated, but remained significantly lower for all income categories after adjusting for other demographic factors (see Table 5).

Table 1. Sample Characteristics

Characteristic	1998		2000		2002		2004	
	n	% or median (range)	n	% or median (range)	n	% or median (range)	n	% or median (range)
Age, years								
65–74	5,177	56.8	5,038	55.2	5,183	53.7	5,414	53.2
75–84	3,192	35.2	3,196	36.0	3,140	36.8	3,154	36.8
≥85	867	8.0	884	8.8	897	9.5	964	10.0
Education								
Less than high school	2,958	30.1	2,698	27.8	2,456	25.1	2,465	23.6
High school	3,215	35.7	3,293	36.8	3,452	37.9	3,615	38.7
Some college	1,655	18.2	1,650	18.5	1,705	18.8	1,793	19.3
College or higher	1,407	15.9	1,476	16.9	1,608	18.3	1,659	18.5
Gender								
Male	3,815	40.4	3,710	40.1	3,756	40.1	3,960	41.4
Female	5,421	59.6	5,408	59.9	5,464	59.9	5,572	58.6
Median household income[a]		24,252.00 (0.00–1,139,600.00)		24,109.23 (0.00–1,242,022.14)		24,827.83 (0.00–1,339,553.60)		25,331.01 (0.00–2,383,007.36)
Median household wealth[a]		146,000.00 (−846,850.00 to 31,258,000.00)		158,077.80 (−151,461.50 to 11,916,890.00)		165,355.80 (−435,692.00 to 38,407,838.00)		181,207.00 (−197,041.00 to 66,636,713.00)
Marital status								
Married/partnered	5,472	55.9	5,345	55.8	5,395	56.2	5,733	57.1
Separated/divorced	656	7.7	680	8.3	752	8.5	802	8.8
Widowed	2,861	33.4	2,856	32.8	2,833	32.4	2,763	31.3
Never married	247	3.0	236	3.1	241	2.9	234	2.8
Race-ethnicity								
Non-Hispanic White	7,578	87.4	7,439	87.0	7,468	86.9	7,617	87.7
Non-Hispanic Black	1,093	8.0	1,091	8.2	1,148	8.2	1,201	7.5
Hispanic	565	4.6	588	4.8	604	4.9	714	4.8

Notes: Percentages and medians are weighted, but sample numbers (*n*) are not weighted. Sample numbers (*n*) may vary slightly due to rounding that occurs when results from each imputed data set are combined. Percentages may not sum exactly to 100 due to rounding.

[a] All income and wealth amounts are in 1998 dollars. The Bureau of Labor Statistics Consumer Price Index was used for all dollar conversions (available at http://www.bls.gov).

Table 2. Percentage of Older Adults Meeting Each Individual Successful Aging Criterion by Year

Criterion	1998 % (n)	2000 % (n)	2002 % (n)	2004 % (n)
Active engagement	47.0 (4,308)	47.2 (4,285)	48.3 (4,459)	49.7 (4,769)
High cognitive functioning	57.1 (5,090)	56.5 (5,003)	58.7 (5,278)	57.8 (5,336)
High physical functioning	53.2 (4,851)	52.7 (4,758)	49.4 (4,542)	49.0 (4,631)
No disability	81.1 (7,446)	81.1 (7,373)	81.6 (7,509)	82.1 (7,812)
No major disease	42.5 (3,887)	41.3 (3,727)	39.1 (3,604)	37.0 (3,554)

Note: Percentages are weighted, but sample numbers (*n*) are not weighted.

Relative to those with the most wealth, the unadjusted odds of successful aging decreased with declining level of wealth (see Table 4). In 2004, for instance, the respective ORs were 0.72, 0.36, and 0.18 for those in the second highest, second lowest, and lowest categories of wealth. In adjusted models, differences were less dramatic, but the odds of successful aging remained significantly lower for those in the two lowest categories of wealth in comparison to those with the most wealth.

Overall Trends in Successful Aging

During the latter half of the 6-year period examined in this study, a roughly 8% decline in the prevalence of successful aging (from 11.9% to 10.9%) was evident. An examination of the percentage meeting each component of successful aging suggests that the decline is due to a drop in the percentage of older adults meeting the disease (from 42.5% to 37.0%) and physical functioning (from 53.2% to 49.0%) criteria (see Table 2). The percentage meeting the other components remained relatively stable or increased slightly over time. After adjusting for demographic factors, the odds of aging successfully were 5% lower in 2000 (OR = 0.95, 95% CI = 0.85–1.05), 20% lower in 2002 (OR = 0.80, 95% CI = 0.73–0.88), and 25% lower in 2004 (OR = 0.75, 95% CI = 0.69–0.82) than in 1998.

DISCUSSION

In the coming decades, the number of older adults in the United States will reach an unparalleled level. Because of the high prevalence of potentially preventable health problems in the older population, efforts to

Table 3. Prevalence of Successful Aging by Demographic Criteria and Year

Demographic criterion	1998 % (n)	2000 % (n)	2002 % (n)	2004 % (n)
Age, years				
65–74	16.6 (850)	16.8 (837)	15.7 (801)	15.7 (808)
75–84	6.9 (202)	6.9 (202)	6.5 (193)	6.5 (204)
≥85	0.4 (4)	2.2 (14)	2.1 (13)	1.7 (14)
Education				
Less than high school	4.6 (121)	4.3 (113)	4.1 (101)	2.5 (68)
High school	11.9 (378)	12.1 (392)	10.6 (374)	10.3 (379)
Some college	14.7 (241)	13.9 (228)	12.9 (224)	13.3 (233)
College or higher	22.5 (316)	22.0 (319)	19.5 (308)	20.5 (346)
Gender				
Male	12.6 (462)	12.8 (455)	11.5 (413)	11.6 (457)
Female	11.4 (594)	11.4 (597)	10.7 (594)	10.5 (568)
Household income category				
0	3.7 (70)	3.6 (71)	4.0 (91)	3.7 (77)
1	8.3 (183)	8.0 (180)	7.5 (179)	7.0 (163)
2	13.8 (312)	13.5 (309)	11.9 (262)	11.2 (271)
3	21.0 (492)	21.7 (492)	20.2 (475)	21.3 (515)
Household wealth category				
0	2.5 (12)	2.5 (9)	2.6 (11)	1.7 (11)
1	4.6 (88)	6.2 (122)	4.8 (107)	4.3 (90)
2	10.0 (212)	8.7 (191)	7.9 (180)	7.5 (178)
3	13.5 (300)	13.1 (295)	13.8 (303)	13.9 (324)
4	20.0 (444)	20.4 (436)	18.2 (406)	18.3 (422)
Race-ethnicity				
Non-Hispanic White	12.7 (963)	12.8 (949)	11.7 (893)	11.8 (931)
Non-Hispanic Black	6.0 (64)	6.6 (71)	7.1 (82)	4.4 (60)
Hispanic	5.6 (29)	5.4 (33)	5.4 (33)	4.9 (35)

Note: Percentages are weighted, but sample numbers (*n*) are not weighted.

Table 4. Unadjusted ORs for Successful Aging by Demographic Criteria and Year

Demographic criterion	1998 OR (95% CI)	*p* Value	2000 OR (95% CI)	*p* Value	2002 OR (95% CI)	*p* Value	2004 OR (95% CI)	*p* Value
Age, years (referent = 65–74)								
≥75	0.31 (0.26–0.36)	.0000	0.31 (0.26–0.38)	.0000	0.32 (0.27–0.38)	.0000	0.31 (0.27–0.36)	.0000
Education (referent = college or more)								
Less than high school	0.17 (0.13–0.22)	.0000	0.16 (0.12–0.21)	.0000	0.17 (0.13–0.23)	.0000	0.10 (0.07–0.14)	.0000
High school	0.46 (0.38–0.56)	.0000	0.49 (0.39–0.61)	.0000	0.49 (0.41–0.58)	.0000	0.45 (0.38–0.53)	.0000
Some college	0.60 (0.49–0.73)	.0000	0.57 (0.46–0.71)	.0000	0.61 (0.49–0.77)	.0000	0.60 (0.48–0.74)	.0000
Gender								
Male	1.12 (0.95–1.32)	.1624	1.14 (0.96–1.36)	.1226	1.08 (0.92–1.27)	.3671	1.11 (0.95–1.30)	.1815
Household income category (referent = 3)								
0	0.14 (0.11–0.19)	.0000	0.13 (0.09–0.20)	.0000	0.16 (0.12–0.22)	.0000	0.14 (0.11–0.19)	.0000
1	0.34 (0.29–0.41)	.0000	0.31 (0.25–0.39)	.0000	0.32 (0.26–0.39)	.0000	0.28 (0.21–0.36)	.0000
2	0.60 (0.51–0.71)	.0000	0.56 (0.46–0.69)	.0000	0.53 (0.44–0.64)	.0000	0.47 (0.39–0.56)	.0000
Household wealth category (referent = 4)								
1	0.18 (0.14–0.22)	.0000	0.23 (0.18–0.29)	.0000	0.21 (0.17–0.26)	.0000	0.18 (0.14–0.24)	.0000
2	0.45 (0.37–0.53)	.0000	0.37 (0.30–0.46)	.0000	0.39 (0.31–0.47)	.0000	0.36 (0.30–0.44)	.0000
3	0.62 (0.53–0.74)	.0000	0.59 (0.49–0.71)	.0000	0.72 (0.60–0.86)	.0002	0.72 (0.61–0.85)	.0001
Race-ethnicity (referent = White)								
Non-White	0.42 (0.32–0.55)	.0000	0.45 (0.34–0.59)	.0000	0.52 (0.41–0.66)	.0000	0.36 (0.28–0.45)	.0000

Note: CI = confidence interval; OR = odds ratio.

promote health among older adults have been encouraged (e.g., Morely & Flaherty, 2002; Rowe, 1999). There is as yet no consensus among researchers in gerontology, however, as to the definition and measurement of "healthy" aging.

In this investigation, we examined one of the most prominent conceptualizations of healthy aging, Rowe and Kahn's concept of successful aging. Results of this study indicate that no greater than 11.9% of older adults experienced successful aging in any year. This estimate is lower than the 18.8% observed by Strawbridge and colleagues (2002) in their examination of Rowe and Kahn's concept among participants of the Alameda County Study. Reasons for the discrepancy likely include differences in sample composition (e.g., the percentage with at least a high school education was higher among the sample of Strawbridge et al.) and variation in the assessment of each of the three main components of Rowe and Kahn's concept (e.g., number of items used to assess physical functioning). Despite these differences, however, both studies suggest that the vast majority

Table 5. Adjusted ORs for Successful Aging by Demographic Criteria and Year

Demographic criterion	1998 OR (95% CI)	*p* Value	2000 OR (95% CI)	*p* Value	2002 OR (95% CI)	*p* Value	2004 OR (95% CI)	*p* Value
Age, years (referent = 65–74)								
≥75	0.35 (0.29–0.42)	.0000	0.37 (0.30–0.45)	.0000	0.37 (0.31–0.44)	.0000	0.36 (0.30–0.44)	.0000
Education (referent = college or more)								
Less than high school	0.35 (0.25–0.49)	.0000	0.35 (0.26–0.46)	.0000	0.38 (0.28–0.51)	.0000	0.23 (0.16–0.32)	.0000
High school	0.64 (0.52–0.78)	.0000	0.70 (0.55–0.89)	.0016	0.69 (0.57–0.83)	.0001	0.65 (0.53–0.78)	.0000
Some college	0.73 (0.59–0.90)	.0019	0.74 (0.59–0.93)	.0068	0.76 (0.59–0.97)	.0231	0.75 (0.59–0.94)	.0085
Gender								
Male	0.84 (0.71–1.00)[a]	.0368	0.86 (0.72–1.03)	.0849	0.79 (0.66–0.95)	.0070	0.83 (0.70–0.99)	.0291
Household income category (referent = 3)								
0	0.38 (0.26–0.55)	.0000	0.31 (0.20–0.47)	.0000	0.43 (0.29–0.63)	.0000	0.42 (0.29–0.60)	.0000
1	0.62 (0.50–0.78)	.0000	0.55 (0.43–0.69)	.0000	0.58 (0.46–0.72)	.0000	0.53 (0.38–0.73)	.0000
2	0.81 (0.68–0.96)	.0128	0.76 (0.60–0.95)	.0101	0.74 (0.60–0.90)	.0016	0.65 (0.53–0.81)	.0001
Household wealth category (referent = 4)								
1	0.46 (0.34–0.63)	.0000	0.63 (0.47–0.85)	.0013	0.46 (0.34–0.62)	.0000	0.48 (0.32–0.72)	.0002
2	0.81 (0.67–0.98)	.0271	0.69 (0.55–0.86)	.0006	0.63 (0.51–0.79)	.0000	0.64 (0.52–0.79)	.0000
3	0.85 (0.71–1.02)	.0634	0.80 (0.65–0.98)	.0202	0.96 (0.77–1.19)	.6850	1.00 (0.83–1.21)	.9977
Race-ethnicity (referent = White)								
Non-White	0.81 (0.61–1.09)	.1454	0.83 (0.60–1.14)	.2119	0.92 (0.70–1.22)	.5574	0.70 (0.52–0.93)	.0094
Wald chi-square[b]	290.64 (*p* < .0001)		313.17 (*p* < .0001)		316.62 (*p* < .0001)		275.24 (*p* < .0001)	

Notes: Adjusted for age, gender, income, wealth, and race-ethnicity. CI = confidence interval; OR = odds ratio.
[a] CI includes 1.00 due to rounding.
[b] Test of the null hypothesis that all beta coefficients (except the intercept) are equal to 0. Reported value is an average of the values obtained from each imputed data set.

of older adults do not meet Rowe and Kahn's definition of successful aging.

The prevalence of successful aging varied by demographic factors, with the unadjusted odds of successful aging lower among those of advanced age, non-White race, and lower SES. In general, these findings correspond with demographic differences reported by Strawbridge and colleagues (2002). One exception is gender. Whereas we observed little gender difference in unadjusted analyses, Strawbridge and colleagues found that a substantially higher percentage of women than men met Rowe and Kahn's definition. As with the overall prevalence, this discrepancy undoubtedly reflects differences in the measurement of successful aging (e.g., house cleaning was incorporated as a productive activity in their study, but not ours) and sample composition. Our results also correspond with a recent British study in which SES was found to play a significant role in successful aging (Britton et al., 2008).

Several findings from our comparison of successful aging across demographic subgroups warrant additional discussion. The first concerns gender differences in successful aging. Although we found no significant gender difference in the unadjusted analysis, men had lower odds of successful aging after controlling for other demographic factors. Given that women typically report more chronic conditions than men, have more functional limitations, and experience more disability (Newman & Brach, 2001), this finding may seem somewhat counterintuitive. At least two factors help explain this finding: gender differences in characteristics such as age and SES and our chronic disease criterion.

As has been discussed widely (e.g., Calasanti & Slevin, 2001), older women are typically more socioeconomically disadvantaged than older men. In addition, women comprise a greater percentage of the oldest age categories (He et al., 2005). Given that lower SES and advanced age increase the risk of poor health, controlling for these factors should reduce gender differentials in health. This is not the whole explanation, however. More specifically, our decision to include only those chronic conditions that are major causes of death, some of which occur more frequently among men than women (e.g., cancer, heart disease; He et al.), influenced the observed relationship between gender and successful aging. Post hoc analyses revealed that if we had included freedom from arthritis and hypertension (two conditions for which the prevalence is greater among women than men; He et al.) in our chronic disease criterion, differences between men and women would not have been statistically significant in any wave. This highlights an important point raised by other scholars (e.g., Phelan & Larson, 2002) that how one defines successful aging affects observed associations.

The second finding of interest pertains to SES. Corresponding with the general finding that those of higher SES experience better health (see, e.g., review by Adler et al., 1994), we found that the odds of aging successfully in-

creased substantially for those with higher levels of education, income, and wealth. Notably, significant differences remained for each indicator after simultaneously controlling for the other measures of SES. This undoubtedly reflects, in part, the unique ways in which each component of SES affects health and opportunities for successful aging. Whereas higher income, for instance, permits greater access to health promoting resources (Galobardes, Shaw, Lawlor, Davey Smith, & Lynch, 2006), the cognitive resources (e.g., knowledge, capacity for problem solving) garnered through higher education may foster a sense of control that results in better health practices (Mirowsky & Ross, 2003). It is also possible, however, that the categorization schemes used for the various SES indicators resulted in imperfect statistical control, leaving all three indicators significant in adjusted analyses. A finer categorization scheme for wealth, for example, may have weakened the association between income and successful aging in this largely retired sample of older adults.

The third finding pertains to the observed racial-ethnic disparities in successful aging. In unadjusted analyses, we found that non-Whites were substantially less likely to be classified as aging successfully than their White counterparts. After adjusting for covariates, however, differences were reduced and were no longer statistically significant for three of the four waves. As has been observed by others (e.g., Hayward, Crimmins, Miles, & Yang, 2000), post hoc analyses revealed that SES played an important role in racial-ethnic differences in successful aging. More specifically, when just age and gender were controlled, the odds of successful aging remained markedly lower for non-Whites in all waves. It was only when SES was controlled that the effect of race diminished. As noted by House and Williams (2000), however, "racial/ethnic status is a major determinant of every indicator of socioeconomic position" (p. 88). Thus, the attenuation of effect that occurs when SES is controlled should not be interpreted to mean that race and ethnicity do not have an impact on successful aging.

Lastly, we observed a decline in the prevalence of successful aging during the 6-year period examined in this study. An examination of the components of successful aging suggests that the decline in prevalence is due to a decrease in the number of older adults meeting the disease and physical functioning criteria. The former finding is consistent with literature documenting a rise in the prevalence of at least some chronic diseases in the older population (e.g., Crimmins, 2004; Freedman & Martin, 2000; Freedman, Schoeni, Martin, & Cornman, 2007). The latter finding, however, is inconsistent with reported declines in functional limitations among older adults (Freedman, Martin, & Schoeni, 2002). This discrepancy may reflect differences in the time periods covered (the 80s to mid-90s vs the 6-year period between 1998 and 2004) or differences in the assessment of physical functioning. Because our focus was on the identification of individuals with "high physical

functioning" as opposed to quantifying population-level changes in functional limitations, we did not include several basic tasks (e.g., "sitting for about two hours") in our operationalized definition.

Limitations

Several study limitations should be noted. To start, the measures of active engagement used in this study only superficially capture this component of Rowe and Kahn's definition. Specifically, our assessment of productive engagement was limited to just three activities: working for pay, formal volunteerism, and caring for grandchildren. Clearly, there are other activities that fall within the realm of productive activity that are not captured here (e.g., helping a homebound friend with errands). The social relations component was also assessed in a less than ideal manner. In this investigation, we considered whether an individual was married, had a good friend nearby, and how frequently he or she visited with neighbors. Although more than 90% of participants met one or more of the three criteria (data not shown), other important relationships (e.g., parent–child) and social activities (e.g., church attendance) were not examined and level of social support was not assessed directly. Given these limitations, our findings with respect to active engagement should be viewed tentatively. It should be noted, however, that even if 100% of participants had met the engagement criterion as fully conceptualized by Rowe and Kahn, less than one fifth of the older population would have been classified as aging successfully in all years. Nevertheless, more precise estimates could be obtained with better measures of social relations and productive engagement.

Second, it is important to reiterate that how one chooses to measure successful aging affects prevalence estimates and observed relationships. In this investigation, for example, the only chronic diseases included were those that are major causes of death among older adults. Had we also included hypertension and arthritis, the estimate of successful aging would have been lower, as these conditions affect roughly half of all older adults (Federal Interagency Forum on Aging-Related Statistics, 2006). Moreover, demographic relationships would likely be different from what was observed here, as disease profiles vary by age, gender, race, and SES.

Third, interactions among demographic factors were not examined in this study. Given that each demographic status is associated with unique advantages and disadvantages over the life course, it is entirely possible that the effect of one status (e.g., gender) on successful aging varies by level of another status (e.g., race-ethnicity). Where possible, interactions among demographic factors should be examined in future studies of successful aging.

Fourth, this investigation does not incorporate those older adults who required proxy respondents and those residing in nursing homes. Had they been included, prevalence estimates would undoubtedly be lower, as these subgroups typically have worse health. Moreover, their inclusion may alter the pattern of successful aging observed over time.

Lastly, although HRS is a longitudinal study, the associations among demographic factors and successful aging examined in this study were cross-sectional in nature. Thus, care must be taken with respect to assumptions about causality, particularly for factors such as income and wealth for which health problems may precipitate declines in financial resources (e.g., Kim & Lee, 2006).

Implications

This investigation has several important implications for those interested in studying healthy aging. First, the small percentage of adults meeting Rowe and Kahn's definition suggests that it is too rigorous for use as a benchmark for measuring and monitoring the health status of our older population. Although it has moved into broader realms, the original intent of Rowe and Kahn's concept was to encourage the recognition and study of those with unusually good health for the purpose of deepening our understanding of age-related changes in health and factors responsible for the maintenance of unusually good health in older adulthood (Rowe & Kahn, 1987). For such purposes, a strict definition of successful aging is understandable. For broader public health purposes, however, this study suggests that a less rigid definition is needed. It is worth noting that if we had operationalized Rowe and Kahn's definition to the fullest extent (e.g., incorporated a larger number of diseases as well as risk factors for disease), the prevalence of successful aging would have been even lower. The problem with too rigid a definition is that individuals with relatively inconsequential disease and/or impairments are likely to be classified as being in an unhealthy state. This is not desirable when attempting to identify individuals who would benefit from public health intervention.

In a discussion of disability, Mehlman and Neuhauser (1999) note that "the best definition of disability may be one that is the best predictor of something important" (p. 386). This is a useful guide for definitions of successful aging as well. For those interested in modifying or refining Rowe and Kahn's definition, a critical next step will be to determine what that "something important" is. This is not an easy task, however, as what is deemed important will depend on who is asked. Strawbridge and colleagues (2002), for instance, examined how well two methods of measuring successful aging related to psychological well-being. Other scholars from other disciplines might be more concerned with how well definitions correlate with outcomes such as active life expectancy or health service utilization. Older adults may utilize yet another benchmark (e.g., the ability to

engage in desired activities). Furthermore, there is likely to be considerable within-group variation in what is felt to be important. With respect to older adults, for example, Phelan and Larson (2002) have noted that factors such as age, birth cohort, and race-ethnicity may influence beliefs about what it means to age successfully. In the end, it may be that a single definition of successful aging is neither practical nor possible, but must vary with the context in which it is used. At a minimum, however, researchers can explain how their definition relates to "something important" and acknowledge the standards or values by which it was deemed "important."

Second, the results of this investigation clearly demonstrate that successful aging varies along socially defined statuses, supporting the calls of scholars such as Riley (1998) for greater recognition of the importance of broad structural factors in successful aging. They also highlight a continued need for public health efforts aimed at the elimination of health inequalities by race-ethnicity and SES.

Finally, the decline in the prevalence of successful aging across time warrants attention. Analyses suggest that it is due largely to a drop in the number of older adults meeting the disease and physical functioning criteria. Given that chronic disease and functional difficulties can negatively affect quality of life, potential reasons for the observed changes should be explored.

Summary

Few older adults meet Rowe and Kahn's definition of successful aging, although the percentage varies by factors such as age, education, and income. Although a rigid definition of successful aging may be appropriate for some purposes (e.g., to study predictors of phenomenal health and functioning), findings suggest that modification of Rowe and Kahn's concept is necessary if it is to be used as a benchmark by which to assess the health and functioning of our older population. In its current form, we are likely to classify many older adults with good health and functioning as being in an unhealthy state for what may be relatively minor reasons. A first step will be to determine exactly what it is that we hope to achieve by promoting successful aging. Only then can we determine how best to define and measure the concept.

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