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Aging Well: Observations From the Women's Health Initiative Study

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Abstract

Background. As the proportion of the population aged 80 and over accelerates, so does the value of understanding the processes of aging well. The purposes of this article are to: (a) review contemporary theoretical and conceptual perspectives on aging well, (b) describe indicators of aging well that reflect key concepts and perspectives as assessed in the Women's Health Initiative (WHI) and (c) characterize the status of aging among women aged 80 and older using data obtained from WHI participants at the WHI Extension 2 follow-up.

Methods. Data from the Lifestyle Questionnaire, which was administered from 2011 to 2012 during the WHI Follow-up Study (Extension 2), were analyzed to provide a profile of the WHI cohort with respect to aging well.

Results. Data revealed substantial diversity in the cohort with respect to the various measures of aging well. Although many reported physical functioning levels consistent with disability, most rated their health as good or better. Most reported moderately high levels of resilience, self-control, and self-mastery but lower levels of environmental mastery. Finally, the cohort reported high levels of optimal aging as reflected by their high levels of emotional well-being and moderately high levels of life satisfaction and social support, but more modest levels of personal growth and purpose in life.

Conclusions. The wide range of some dimensions of aging well suggest that further examination of predictors of positive coping and resilience in the face of aging-related disability could identify opportunities to support and facilitate aging well among U.S. women.

Key Words: Well-being—Positive aging—Resilience—Optimism—Optimal aging—Effective aging—Successful aging

The proportion of Americans aged 80 and over is accelerating more rapidly than any other age group, and women account for the majority of the oldest old (1). However, not all women in this age cohort will age in the same way (2). Understanding differences

in health and well-being among the oldest old is foundational to design health promotion interventions for this growing population. Thus, we reviewed current conceptions of aging well as a basis for clinical practice and research about this oldest age group of women.

Interest in learning more both about and from individuals who enjoy exceptionally good health trajectories as they age has increased in the milieu of global aging (3). As the social cost of "unhealthy" aging rises, care for ill older adults who constitute a growing proportion of the world's population threatens to overwhelm economies supporting elder care through either public or private support (4). At the same time, the growing population of Baby Boomers reaching traditional retirement ages is compelling motivation for an increased interest in aging well and remaining healthy. The demographic patterns of U.S. society have become dramatically more diverse with Latinas, Asian Americans, and African Americans accounting for increasing proportions of the population, prompting consideration of implications of ethnic as well as economic changes for health disparities in patterns of aging (5). Thus, understanding the diversity in how older women age merits examination based on the intersection of multiple aspects of women's lives, for example, race, class, socioeconomic status, living situation, sexual orientation, and other dimensions.

Currently, the Women's Health Initiative (WHI) cohort includes over 25,000 women over 80 years of age for whom extensive measures of health obtained over two decades are available, thus affording a unique opportunity to learn about the multiple factors that contribute to aging well. In this article, we:

1. Review contemporary theoretical and conceptual perspectives on aging well;
2. Describe indicators of aging well that reflect these differing concepts and perspectives as they were assessed in the WHI; and
3. Characterize the status of aging among women aged 80 and older using data from these indicators, which were obtained from WHI participants at the WHI Extension 2 follow-up.

Contemporary Theoretical and Conceptual Perspectives on Aging Well

Over the past half-century, a number of conceptual orientations have shaped the study of aging well. Researchers have studied "productive aging" (6), "successful aging" (7), "effective aging" (8), "healthy aging" (9), "thriving" (10), "positive aging" (11) and "optimal aging" (12), among others. Indeed, a recent conversation among a large group of WHI investigators interested in the topic revealed nearly as many labels for aging well as there were investigators! Although one could resolve issues of nomenclature by making an arbitrary choice of descriptors, these constructs are rooted in traditions of theory and empirical work and reflect sociocultural values about aging. In this article, we define aging well as a multidimensional experience including successful aging, effective aging, and optimal aging. We ground our analyses in reviews of literature about these three concepts that are rooted in theory about aging and that have been integrated into sustained research programs illuminating meanings of aging well.

Successful Aging

Among the most commonly used constructs, "successful aging" was defined by Rowe and Kahn (7) as freedom from disease or disease-related disability, high cognitive and physical functioning, and active engagement with life. Depp and colleagues (13) traced the roots of contemporary discourse about "successful aging" to Havighurst's description of getting maximum satisfaction from life (14) and early work on lifespan developmental theories of aging, such as disengagement theory (15), continuity theory (16), and selection optimization and compensation theory (17,18).

Recent research about aging also has focused on learning about exceptional longevity from the experiences of centenarians (3). Although this body of research has provided important understanding of the experiences of centenarians and promises to enlighten us about those who attain advanced old age, longevity is but one component of successful aging. In other words, we are interested in the quality as well as quantity of life. Another area of study has examined clinical indicators of healthy aging, emphasizing independent functional performance and the absence of disease. As an example, Kaplan and *associates* (10) classified older adults by trajectories of health using a Health Utilities Index of vision, hearing, speech, ambulation, dexterity, emotion, cognition, and pain/disability attributes. Thrivers (8%) maintained exceptional health with no or mild disability, nonthrivers (47%) experienced moderate or severe disability, 36% died during followup, and 9% were institutionalized. Although this approach to understanding the trajectory of healthy aging is useful, the definition of thriving rests on the absence of disability instead of criteria that identify robust positive aging. While valuable in understanding those who age well without disability, we are also interested in those who age well in the face of new or long-standing disability.

A phenotype of positive aging, emphasizing capacity for integrative human functioning, has identified physical–social and emotional functioning dimensions, both of which have predicted years to mortality, years of healthy living, and years of independent living, suggesting their utility in clinical as well as research applications (11). Although these indicators reflect some dimensions of Rowe and Kahn's construct of successful aging, none completely measures the construct. Indicators of cognitive functioning are frequently absent from this body of literature often due to the absence of measurement of the construct. Moreover, we are interested in the physical emotional and social functioning of those with and without disability; in this case the thrivers and nonthrivers.

Despite a growing body of work that is often linked to the concept of successful aging, there is little consensus about the indicators of successful aging. In a review of 28 published studies of successful aging, Depp and Jeste (19) found that physical function was the only indicator included in over half of the reports. Cognitive ability, life satisfaction, social function, and absence of disease were infrequently mentioned despite the importance of these concepts to older adults' own definitions of successful aging.

These conceptions of successful aging inform researchers seeking to understand how to extend the human lifespan as well as clinicians anticipating the care needs of older adults. Nonetheless, older adults themselves indicate that they value different aspects of successful aging. Strawbridge and associates (20) found that when older adults used their own definitions a higher proportion than those studied by Rowe and Kahn rated themselves as aging successfully. Phelan and associates (21) found that over 90% of older Japanese-Americans and whites participating in longitudinal studies believe the following dimensions were most important: remaining in good health until close to death, being able to take care of oneself until close to the time of death, and remaining free of chronic disease. In addition, over 75% of each cohort

nominated other dimensions of great import, such as life satisfaction, friendship and family support, involvement with the world, ability to make choices about things such as diet, not feeling lonely or isolated, adjusting to aging-related changes, having a sense of peace when thinking about one's mortality, capacity to meet all of one's needs and some wants, ability to cope with everyday challenges, being able to act according to one's own inner standards and values, feeling good about oneself and continuing to learn new things. Exceptional longevity was not a high priority for these older adults: fewer than 30% indicated that living a very long time was important to them. Similarly, Reichstadt's focus group participants (22) suggested four psychological constructs to be associated with successful aging: (a) positive attitude/adaptation; (b) emotional security/stability; (c) health/wellness; and (d) engagement/stimulation. On the basis of their extensive literature review, Depp and colleagues (13) concluded that successful aging is a multidimensional construct that includes physical functioning, adaptation, and subjective well-being. Longevity is necessary, but not sufficient to denote it.

Effective Aging

Taken together, the dimensions of successful aging identified by Phelan and associates (21), Reichstadt and colleagues (22) and Depp and Jeste (19) encompass the experiences of older adults who are not necessarily free of disease but are able to adapt to related challenges and sometimes transcend them. This orientation was termed "effective aging" by Curb and colleagues (8), who emphasized the adaptation and rehabilitation that can occur as older adults develop disease. Effective or compensatory aging allows for the possibility of relatively high levels of functioning in the face of health problems common among older adults. The concept also acknowledges that aging well is possible for those who have lived many decades or even the majority of their lives with some form of chronic disease or disability. The notion of effective aging is consistent with the selection optimization and compensation model of aging advanced by Baltes and Smith (18). Depp and Jeste (19) pointed out that understanding perspectives of older adults whose health status is comparable to that of younger people or functionally ideal (eg, those who escaped chronic disease or disability) might be less useful than perspectives of people who experience disability or chronic illness but maintain cognitive functioning, life satisfaction, and social engagement. In fact, Depp and Jeste advised that "understanding adaptive processes by which older adults preserve well-being amid physical functional losses would inform preventative interventions for survivors of illnesses." (p. 18).

Effective aging requires ongoing adaptation to challenges that originate in health-related problems as well as life in general, and research about effective aging has emphasized the concept of resilience. Resilience has been defined as the ability to bounce back from stressful situations (23) and in biological studies as the ability to adapt, withstanding challenges to stability or homeostatis (24,25). Resilience has been posited to be directly related to survival as well as to coping with stressful situations. The recently proposed concept of allostatic load denotes the cumulative effects of challenges to allostasis, defined as maintaining stability in response to multiple changes (25). Use of the concepts of resilience and allostatic load in studies of aging has shifted researchers' attention from dysfunction and disease toward adaptation to functional changes and chronic disease (26). Efforts to understand mechanisms underlying resilience and adaptation in the face of increasing allostatic load have prompted researchers to examine its links to plasticity of the central

nervous system, which allows continuing development and personal growth throughout the lifespan as well as the capacity to adapt and to recover from serious health problems experienced with aging (27). Thus, the study of aging well includes those who have experienced health problems and disability as a critical population for understanding resilience.

Optimal Aging and Well-being

A third conceptual and theoretical orientation to aging well is found in literature on optimal aging, exemplified in Carol Ryff's work (12). Motivated by the goal of understanding optimal aging from a multidisciplinary perspective, Ryff originally explored the concept of well-being and its indicators, focusing on the eudaemonic dimension of well-being. Earlier work on well-being included studies of "hedonic" indicators, such as happiness, life satisfaction, and positive affect. In contrast, the definition of "eudaemonic" well-being is grounded in existential, humanistic, and development psychology as well as philosophy and refers to human flourishing, self-development, personal growth, and purposeful engagement.

Ryff identified six dimensions of well-being: autonomy, environmental mastery, personal growth, positive relations with others, purpose in life, and self-acceptance. A set of scales measuring these dimensions of well-being has been used widely in research on aging, including the Midlife in the United States (MIDUS) study (28). In Ryff's theoretical orientation, positive health refers to the "neurophysiological substrates of flourishing," and well-being is linked to biology and health outcomes (29). Ryff's theory also integrates the concept of resilience in her definition of well-being which she uses to denote the maintenance of or recovery of health and well-being in the face of adversity. Thus a conception of positive aging emphasizes sustaining a positive outlook and functional capacity in the face of life challenges.

Lifespan Change and Aging Well

Developmental aspects of aging well are currently under investigation, with increasing emphasis on understanding lifespan trajectories (2). Although integration of lifespan research methods with studies of optimal aging is relatively recent (eg, the MIDUS study, MacArthur Study of Aging), the WHI Study provides a unique opportunity to examine a large geographically diverse aging cohort of women from midlife to old age. Initial investigations of positive aging in the WHI have revealed multiple trajectories of both physical–social and emotional functioning as well as the relative stability of emotional functioning across the lifespan and its stability independent of limits in physical–social functioning (2).

Cohort studies supporting the study of change over the lifespan, such as changes in personality, may be informative about the developmental course of optimal aging. For example, optimism, the expectation of positive future events, has been associated with both morbidity and mortality in other studies (30–32) but has not yet been studied over an extended period linked to indicators of aging well. Optimism and related character traits are promising predictors of aging well because over the life course they precede and predict the development of health behaviors, health risk factors, and preclinical disease, as well as frank chronic illness and death (33). Also optimism has been linked to a number of important psychosocial factors, such as adaptive coping with stress, strong primary relationships, and greater social support. Generativity, the concerns and activities dedicated to contributing to well-being of others, has not been studied in relation to aging

well, but has been linked to less disability in activities of daily living and lower likelihood of dying among midlife study participants as they aged over a decade (34). In contrast, becoming less conscientious and more neurotic was associated negatively with indicators of optimal aging: personality change preceded development of worse perceived health and well-being (35). Moreover, health care providers commonly recommend volunteering and other generative activities to older adults to reduce isolation and increase psychosocial well-being. Thus, quantifying the impact of generative activities can provide an evidence basis to support recommendations for aging well.

Investigations from the MIDUS study revealed that women in the 60–74 years age group had lower purpose in life scores than young adult or middle-aged women. Moreover, as women aged, their level of purpose in life resembled those of similar-aged men more than during their younger years. Personal growth also decreased with age, but no gender differences were noted (28).

The literature on aging well encompasses a variety of constructs and indicators that can be viewed from multiple frameworks. Differentiation of these with respect to theoretical origins, methodological perspectives for studying optimal aging, and contributions to understanding women's experiences with aging is needed for a full appreciation of what we know and don't know about women 80 years of age and older. In the next section, we provide an overview of the indicators of aging well, including those reflecting "successful aging," "effective aging", and "optimal aging."

Indicators of Aging Well Included in the Women's Health Initiative Study

Multiple indicators of aging well have been incorporated in the WHI since its inception which relate to the three concepts: "successful aging," "effective aging," and "optimal aging." Furthermore, as follow-up of the WHI continued past its twentieth year, new well-being indicators have been collected among the cohort. Using the Aging Well framework to identify indicators, one could define successful aging using data about the absence of various diseases, symptoms or risk factors, and functional/role performance perspectives by focusing on integrated human functioning, indicated by activities of daily living and physical, social, and emotional functioning. Effective aging could be denoted by the capacity to manage life challenges associated with aging, resilience, and perceived capacity to manage stress. Finally, optimal aging could be denoted by indicators of well-being or high levels of wellness including measures of eudaemonistic, evaluative, and hedonistic dimensions. Table 1 summarizes the indicators that are available from the WHI, organized by the three aging well constructs: successful aging, effective aging, and optimal aging.

A Profile of the Status of Aging Well among WHI Participants 80 Years and Older

A final contribution from the WHI is a profile of the status of aging well among participants 80 years and older. Table 2 describes characteristics of 26,704 women who were at least 80 years of age during 2011 to 2012 when they completed a lifestyle questionnaire administered at the WHI Extension 2. Many of the demographic characteristics were collected at baseline, which occurred from 1993 to 1998, while the behavioral characteristics were evaluated during their WHI Extension 2 visit in 2011–2012.

At this visit, among women aged 80 and older, women's average age was 84.0 years (SD = 3.3 years). All were born prior to 1932, nearly all during the first and second decades of the last century, prior to the Great Depression of the 1930s. Women participating in the WHI Extension 2 follow-up represented all areas of the United States and included women from America's major ethnic groups. Although the majority were white (91.5%), 1,041 (3.9%) were African American, 416 (1.6%) were Latina/Hispanic, 476 (1.8%) were Asian Pacific Islander, and 652 (<1%) were American Indian/Alaska Native. Women in this age group were less likely to reside in the South at baseline than in other regions of the United States. Over 40% were college graduates and an additional 37% had completed some college, indicating that this was a well-educated cohort. For half of the women (53%), the baseline family income ranged between $20,000 and $50,000, while 32% of women had a baseline family income of over $50,000. In addition, most women were partnered at baseline: 64.6% were married, while 23.6% were widowed and 11% were divorced. Currently, 55% were living alone. Of those who did not live alone, 65% live with a husband or partner, 15% with children, 3% with other relatives, and 1% with friends. A total of 23% of women were residing in a place with special services for older people and 4.5% had stayed in a nursing home in the past year. Only 1% of women were current smokers and only 3% were smokers at baseline. At the second extension, 32% reported currently drinking at least one alcoholic beverage per week but 75% reported doing so at baseline.

Successful Aging

Many WHI participants aged 80 and older who provided these data in 2011–2012 were generally aging well, using indicators of successful aging. Nearly half (49%) had no major disease or mobility disability (See Table 3). Over 86% rated their health as at least good, very good, or excellent. Women's physical functioning scores revealed limitations: their mean overall score was 56.7 (SD = 27.2) consistent with that seen in the Australian Longitudinal Study of Women's Health, a population-based cohort including women studied at the age of 82 years (46). Compared to WHI participants younger than 80 years of age, women aged 80 and older were less likely to perceive their health as good, more likely to reside in a place offering special services and to have lower physical functioning. Despite their poorer health and physical functioning limitations, only 24% of the WHI cohort over ages 80 years were living in a place with special services for older adults or in a nursing home.

Effective Aging

Effective aging indicators included the adapted Brief Resilience Scale score and indicators of self control, self mastery, and environmental mastery from the Perceived Stress Scale (PSS). On average, women had a Brief Resilience Scale (BRS) score of nearly 4, relatively high on a scale where theoretical scores could range from 1 to 5. These scores are comparable (mean 3.98, SD = 0.68) to those from a small sample of men participating in a BRS validation study with a mean age of 63 (38) and similar to scores for WHI participants younger than 80 years of age. WHI participants who had higher baseline family income or who currently drink at least 1 alcoholic drink per week had the highest BRS scores, while women with lower education levels had the lowest score. Fifty-four percent of women reported good environmental mastery (eg, things were not piling up and things going your way), with current smokers

Table 1. Constructs related to Optimal Aging, Dimensions, and Indicators and/Scales and Sources Included in the WHI Study.

Construct	Dimensions	WHI Indicator/Scale	Source/Reference
Successful aging	Absence of disease, mobility disability	Activities of Daily Living Scale, major causes of morbidity	Rillamas-Sun et al. (36)
	Perceived health	Perceived Health—single item, ranking health from poor (5) to excellent (1)	Ware and Sherbourne (37) (SF-36)
	Functional performance	Independent living—residing in place with special services or nursing home	Woods et al. (11)
		Physical functioning—10-item scale, scores ranging from 0 to 100 (highest)	Ware and Sherbourne (37) (SF-36)
Effective aging	Resilience	Modified Brief Resilience Scale (BRS) (adapted scoring of three items, 3–18 [higher resilience])	Smith et al. (38)
		Self-Mastery Confident about ability to handle personal problems (0–4 [very often])	Cohen et al. (39) (PSS)
		Environmental Mastery 2 items -Difficulties piling up could not overcome them; things going your way (0–8 [positive])	Cohen et al. (39) (PSS)
		Self-control unable to control important things in life (0–4 [very often])	Cohen et al. (39) (PSS)
Optimal aging	Experienced well-being: hedonic	Emotional Well-being Scale—5 items (0–100; 100 highest)	Ware and Sherbourne (37) (SF-36)
		Have you been happy? 1 item scored 1–6 (all of the time)	
		You enjoyed life 1 item (0–3) most of the time	Burman et al. (40) (CES-D)
	Evaluative well-being	Satisfaction with Life Scale—5-item scale scored 5–35 (higher satisfaction with life)	Pavot and Diener (41)
		Positive Relations (MOS Social Support Scale) 9-item scale scored 9 to 45 (highest support)	Sherbourne and Stewart (42)
		Satisfaction with Current quality of life (QOL)— single item scored 0–10 (highest satisfaction with QOL)	Hadorn and Hays (43,44)
	Eudaemonic well-being	Personal Growth Subscale—7-item scale scored 0–28 (highest personal growth)	Ryff et al. (45)
		Purpose in Life Subscale—8-item scale scored 0–32 (highest purpose in life)	

indicating the lowest percent and women whose baseline income was at least $50,000 reporting the highest percent. A small percent of women in the 80+ years age group reported good environmental mastery than WHI participants younger than 80 years of age. In addition, over 70% in each group indicated they had good self-control. In contrast, 57% indicated they had good self-mastery, for example, were confident that they could handle problems and scores were similar to those younger than 80 years of age. Smokers and women with less than high school education reported the lowest level of self mastery. Scores of the women 80 and older were lower than those for WHI participants younger than 80 years of age.

Optimal Aging

Multiple measures of optimal aging were available, and these reached overall high levels in this sample. Indicators of hedonic well-being included the Emotional Well-being Scale, and a single item each reflecting enjoyment of life and rating of happiness. Women's average scores on the Emotional Well-being Scale (SF-36) were 79 and mean scores ranged from 77 to 80 regardless of race/ethnicity, baseline education level, baseline family income, baseline marital status, and current smoking status and alcohol use. Their scores were comparable to those on the SF-36 Mental Health scale of the SF-36 for the Australian cohort at age 82 who scored a mean of 79.5 (*SD* = 15.7) (46) and for the WHI participants younger than 80 years of age.

Enjoyment of life at least most of the time was endorsed by 69% of the WHI participants 80 and older, similar to those for WHI participants younger than 80 years, and was high across the various groups in Table 3. A slightly smaller percent (65%) endorsed having been happy at least most of the time, smaller than for WHI participants younger than 80. Smokers reported the lowest percent happy at least most of the time (Table 3).

Evaluative well-being was assessed with the Satisfaction with Life Scale, Positive Relations Scale (MOS Social Support Scale), and the Satisfaction with Current Quality of Life item. The average Satisfaction with Life Scale score was 26 of a possible score of 35 and mean scores ranged from 25 to 27 across the groups included in Table 3, indicating women were moderately satisfied with life. These scores were comparable to those from a study of Australian women and men (*n* = 109 women, 115 men) with an average age of 75 (mean = 25.98, *SD* = 6.35) (47), and similar to WHI participants younger than 80 years of age. The average score on the MOS Social Support Scale was 36.6 of a possible 45 and ranged from 35 to 37 across groups in Table 3, indicating that women perceived a moderately high level of social support. Women rated their satisfaction with current quality of life above 7 across the groups, indicating a relatively high level of satisfaction on a scale where the highest rating was 10.

Eudaemonic Well-being was assessed using the Personal Growth and Purpose in Life Subscales from Ryff's Psychological Well-Being Scales. Both of these subscales have scores that can range from 0 to

Table 2. Characteristics of Women ≥80 Years Old at Completion of a Form 155 Questionnaire, *n* = 26,704.

Characteristic	N	% or Mean (SD)
Age at Form 155 visit, years	26,704	84.0 (3.3)
Region at baseline		
Northeast	6,742	25.3
South	5,359	20.1
Midwest	6,141	23.0
West	8,462	31.7
Race/ethnicity		
White	24,377	91.5
Black or African-American	1,041	3.9
Hispanic/Latina	416	1.6
Asian or Pacific Islander	476	1.8
American Indian or AK Native	65	0.2
Education level at baseline		
Less than high school	869	3.3
High School/General Educational Development	4,580	17.2
Some college	9,921	37.3
College graduate	11,213	42.2
Baseline family income		
<$20,000	3,858	15.4
$20,000–<$50,000	13,143	52.5
$50,000 or more	8,042	32.1
Baseline marital status		
Married or living as	16,483	61.9
Widowed	6,272	23.6
Divorced/separated	2,928	11.0
Never married	933	3.5
Current living situation		
Lives alone	13,235	54.6
Lives with husband/partner	7,119	64.6
Lives with children	1,714	15.5
Lives with other relatives	282	2.6
Lives with friends	101	0.9
Resides in place with special services for older persons	5,179	23.0
Stayed in nursing home in past year	1,128	4.5
Current smoking status		
Nonsmoker	25,580	98.6
Smoker	354	1.4
Alcohol use in past 3 months		
Non drinker	9,568	36.9
<1 drink/week	8,040	31.0
≥1 drink/week	8,330	32.1

Note: The percentages for "Current Living Situation" do not sum to near 100% because this question was asked as a 2-part question…..If Lives Alone = NO, then who do you live with? A woman could have checked multiple options. Percents here were calculated by hand using those who answered "No, does not live alone" as the denominator (*n* = 11,027).

28. Among the WHI cohort age 80 years and older, the average score on the Personal Growth Scale was 20 and ranged from 18 to over 20 across groups (Table 3). The average score on the Purpose in Life Scale was 18 and average scores ranged from 17 to 19 across groups in Table 3. Scores on both of these scales were similar to WHI participants younger than 80 and above the midpoint, indicating that although they were more positive than negative, women's reported levels of personal growth and purpose in life were not among the highest range of either scale.

Discussion

In summary, the WHI Study has included multiple indicators that map onto three concepts in the aging well framework: successful aging, effective aging, and optimal aging. A profile of those WHI participants who are now aged 80 and older reflects a group of women who have exhibited the full spectrum of diversity in measures with many having aged well. Overall, these women were poised to benefit from information about health throughout the lifespan. Having survived to age 80 and beyond, they rated their health as good, very good, or excellent despite having physical functioning levels that were lower relative to the possible score on this scale but comparable to women of a similar age from Australia (46). This cohort of women reported moderately high levels of resilience and good levels of self-control that were slightly lower than levels of environmental mastery and self-mastery (47). Finally, this cohort reported high levels of optimal aging, as reflected by their high levels of emotional well-being. About two-thirds reported enjoying life at least most of the time and having been happy at least most of the time. They also reported moderately high levels of life satisfaction, social support, and satisfaction with their current quality of life, but more modest levels of personal growth and purpose in life. Many scores were similar to WHI participants younger than 80 years of age, in particular for effective aging and optimal aging. These two conceptions of aging well did not rely on indicators of physical functioning.

The WHI cohort has provided rich data from which to evaluate women's health as they age. Nonetheless, there are some limitations in these data that investigators should consider as they study aging well. This cohort of women enrolled in a long-term longitudinal study cannot be assumed to be representative of all aging women in the United States. Since about 70% of women had attended college, indicators of aging well are likely to reflect the social advantages associated with access to higher education. Clearly women who participated in the second WHI extension study were survivors who were sufficiently healthy to participate and therefore represent the healthiest subset of women in this age group. Nonetheless, their physical functioning scores indicate that despite advantages, this cohort had experienced decreasing levels of physical functioning but relatively high levels of aging well as measured with other indicators. A second limitation relates to the overlap in dimensions and indicators across the various conceptions of aging well. For example, resilience is included as an indicator of both adaptive aging as defined by Curb and colleagues and of optimal aging as defined by Ryff. A third limitation is related to the lack of comparable data published for women in this age group. To date, the literature on aging well among this age group of women is sparse, making it difficult to compare results of the WHI second extension study to those from other studies of women of similar age. In addition, even when investigators have used the same instruments, they may have used alternate scoring systems or different subsets of items, decreasing the likelihood of comparing data from one study to another. A final limitation is the representation of the multiple American ethnic groups in the United States. Despite the large sample size, relatively small numbers of women of color are represented compared to the larger proportion of white women, limiting the ability to estimate ethnic-specific parameters of aging well. Future ethnic/racial specific studies are needed to fully understand the experience of aging well for all ethnic groups.

Nonetheless, the items and scales included as indicators in the WHI second extension differentiate women who are aging differently according to several demographic characteristics and health

Table 3. Aging Well: Indicator Scores of Women Aged 80+ by Selected Demographic Characteristics (Mean [*SD*] or *N* [%]).

Aging Well Constructs and Indicators	Theoretical Ranges	Sample Aged <80 (*n* = 54,759)	Sample Aged 80+ (*n* = 26,704)	Race/ethnicity		Education Level at Baseline	
				White (*n* = 24,377)	Not White (*n* = 1,998)	≤High School (*n* = 5,449)	>High School (*n* = 21,134)
Successful aging							
% without major disease or mobility disability at age 80[†§,¶]	NA	NA	12,399 (47.4)	11,344 (47.4)	901 (47.1)	2,446 (46.4)	9,881 (47.7)
% responding at least "Good" perceived health*,[†,‡,§,¶]	NA	49,849 (92.7)	22,052 (85.7)	20,238 (86.1)	1,555 (81.0)	4,328 (82.5)	17,620 (86.5)
% residing in place with special services or in nursing home*,[†,‡,¶]	NA	4,778 (9.8)	5,796 (24.6)	5,377 (25.0)	340 (19.5)	1,028 (21.9)	4,742 (25.3)
Physical functioning Score[†,‡,§,¶]	0–100	73.7 (24.2)	56.4 (27.4)	56.2 (27.3)	57.4 (27.8)	53.4 (27.5)	57.1 (27.3)
Effective aging							
Adapted brief resilience Scale Score[†,‡,§,¶]	1–5	4.07 (0.81)	3.95 (0.82)	3.95 (0.82)	3.95 (0.86)	3.85 (0.83)	3.98 (0.81)
% with "good" Self-Mastery*,[†,‡,‖,¶]	NA	35,763 (67.1)	14,507 (57.1)	13,378 (57.6)	950 (50.9)	2,372 (46.1)	12,064 (59.9)
% with "good" Environmental Mastery*,[†,‡,‖,¶]	NA	32,838 (61.3)	13,658 (53.7)	12,592 (54.1)	906 (48.5)	2,364 (45.9)	11,236 (55.7)
% with "good" Self-Control*,[†,‡,§,‖,¶]	NA	41,358 (77.0)	18,900 (73.7)	17,254 (73.6)	1,426 (75.7)	3,842 (73.9)	14,979 (73.7)
Optimal aging							
Emotional well-being Score[†,‡,§,‖,¶]	1–100	80.2 (14.3)	79.3 (14.3)	79.3 (14.4)	79.9 (14.1)	78.1 (14.9)	79.6 (14.2)
% who have been happy at least most of the time[†,‖,¶]	NA	37,355 (69.5)	16,652 (64.8)	15,231 (64.8)	1,220 (64.2)	3,336 (64.0)	13,239 (65.0)
% who enjoyed life at least most of the time[†,‖,¶]	NA	40,098 (75.1)	17,495 (68.8)	15,997 (68.8)	1,291 (68.9)	3,413 (66.4)	14,000 (69.4)
Satisfaction with Life Scale Score*,[†,‡,§,‖,¶]	5–35	26.7 (6.2)	26.2 (6.0)	26.1 (6.0)	26.7 (5.9)	25.8 (6.1)	26.2 (6.0)
MOS Social Support Scale*,[†,‡,§,‖,¶]	9–45	38.3 (7.4)	36.5 (7.9)	36.6 (7.9)	36.0 (8.3)	36.8 (8.1)	36.5 (7.9)
Satisfaction w/Current QOL*,[†,‡,§,‖,¶]	0–10	8.00 (1.55)	7.44 (1.73)	7.44 (1.73)	7.35 (1.73)	7.25 (1.78)	7.48 (1.71)
Personal growth Score[†,‡,‖,¶]	0–28	21.7 (4.9)	19.9 (4.9)	19.9 (4.9)	19.7 (4.7)	18.2 (4.6)	20.4 (4.9)
Purpose in life Score[†,‡,§,‖,¶]	0–28	20.4 (4.7)	18.4 (4.7)	18.4 (4.7)	18.4 (4.7)	17.0 (4.4)	18.7 (4.7)

Table 3. *Continued*

Aging Well Constructs and Indicators	Baseline Family Income		Baseline Marital Status		Current Smoking Status		Current Alcohol Use	
	<$50,000 (*n* = 17,001)	≥$50,000 (*n* = 8,042)	Married (*n* = 16,483)	Not Married (*n* = 10,133)	Non Smoker (*n* = 25,580)	Current Smoker (*n* = 354)	<1 drink per week (*n* = 17,608)	≥1 drink per week (*n* = 8,330)
Successful aging								
% without major disease or mobility disability at age 80[‡,§,¶]	7,653 (46.1)	3,985 (50.2)	7,813 (48.3)	4,542 (46.0)	11,918 (47.6)	154 (45.3)	7,741 (45.1)	4,336 (52.7)
% responding at least "Good" Perceived Health*[,†,‡,§,¶]	13,795 (84.4)	6,879 (88.5)	13,805 (86.8)	8,174 (84.0)	21,672 (85.8)	286 (83.4)	14,432 (83.2)	7,527 (91.3)
% residing in place with special services or in nursing home*[,†,‡,¶]	3,579 (23.8)	1,840 (25.9)	3,507 (24.5)	2,272 (24.9)	5,612 (24.6)	68 (21.2)	3,952 (25.3)	1,731 (23.2)
Physical Functioning Score[†,‡,§,¶]	54.0 (27.3)	61.0 (26.9)	57.7 (27.2)	54.1 (27.5)	56.4 (27.4)	51.8 (26.5)	53.0 (27.9)	63.3 (24.9)
Effective aging								
Adapted Brief Resilience Scale Score[†,‡,§,¶]	3.93 (0.82)	4.01 (0.81)	3.94 (0.81)	3.97 (0.83)	3.95 (0.82)	3.94 (0.83)	3.93 (0.83)	4.00 (0.79)
% with "good" Self-Mastery*[,†,‡,¶]	8,874 (54.9)	4,764 (62.1)	8,958 (57.0)	5,496 (57.1)	14,075 (57.3)	174 (50.7)	9,360 (55.5)	4,895 (60.9)
% with "good" Environmental Mastery*[,†,‡,¶]	8,334 (51.5)	4,530 (58.9)	8,467 (53.8)	5,141 (53.4)	13,275 (54.0)	138 (40.6)	8,691 (51.5)	4,722 (58.7)
% with "good" Self-Control*[,†,‡,§,¶]	11,930 (73.1)	5,802 (75.0)	11,560 (73.0)	7,282 (75.0)	18,295 (73.9)	232 (67.1)	12,393 (72.8)	6,144 (75.9)
Optimal aging								
Emotional well-being Score[†,‡,§,¶]	79.1 (14.4)	79.9 (14.1)	79.0 (14.4)	79.8 (14.3)	79.4 (14.3)	76.3 (15.8)	79.0 (14.7)	80.1 (13.5)
% who have been happy at least most of the time[‡,∥,¶]	10,480 (64.1)	5,144 (66.1)	10,344 (65.1)	6,255 (64.3)	16,123 (64.9)	190 (55.9)	10,826 (63.5)	5,497 (67.8)
% who enjoyed life at least most of the time[†,‡,∥,¶]	11,026 (68.1)	5,418 (70.5)	10,852 (69.1)	6,585 (68.3)	16,966 (69.1)	198 (58.4)	11,344 (67.2)	5,829 (72.5)
Satisfaction with Life Scale Score*[,†,‡,§,∥,¶]	25.8 (6.1)	27.0 (5.8)	26.6 (5.9)	25.4 (6.1)	26.2 (6.0)	24.5 (6.8)	26.0 (6.1)	26.6 (5.8)
MOS Social Support Scale*[,†,‡,§,∥,¶]	36.2 (8.1)	37.3 (7.6)	37.3 (7.6)	35.3 (8.3)	36.6 (7.9)	34.9 (8.4)	36.4 (8.0)	37.0 (7.7)
Satisfaction w/Current QOL*[,†,‡,§,∥,¶]	7.33 (1.73)	7.65 (1.70)	7.50 (1.71)	7.34 (1.75)	7.44 (1.73)	7.06 (1.82)	7.30 (1.77)	7.73 (1.59)
Personal growth Score[†,‡,§,∥,¶]	19.6 (4.9)	20.7 (4.9)	19.9 (4.9)	20.0 (4.9)	20.0 (4.9)	19.2 (5.2)	19.7 (4.9)	20.5 (4.9)
Purpose in Life Score[†,‡,§,∥,¶]	18.0 (4.6)	19.2 (4.7)	18.4 (4.6)	18.3 (4.7)	18.4 (4.7)	17.1 (5.1)	18.2 (4.7)	18.8 (4.6)

Note: Subscripts refer to statistically significant differences ($p < .05$) for *White versus Not White, [†]High school or less versus some college or more, [‡]family income <$50,000 versus ≥$50,000, [§]Married or living as versus not married, [∥]Non smoker versus current smoker, and [¶]Has <1 alcoholic drink per week versus ≥1 alcoholic drink per week.

behaviors. As an example, differences are apparent in how women perceive their health versus their ratings of physical functioning and how they rate their resilience and self control compared to their ratings of environmental and self-mastery. These ratings are also related to several of the characteristics included in Table 3, thus inviting further investigation.

These data also raise multiple questions for future research. One wonders whether the indicators of aging well assessed here are suitable for assessing the general population of older adults, including those with mild cognitive impairment, although the participants' ability to respond to the study questions could imply that they had sufficiently high levels of cognitive function to complete questionnaires or participate in interviews (48). Assessment of these indicators of aging well among populations with mild cognitive impairment may be possible and may be informative of the ranges of cognitive functioning within which older adults may enjoy some aspects of aging well. Opportunities for identification and remediation of cognitive impairments warrant evaluation as an approach to promoting meaningful social interactions and life satisfaction, important elements of aging well.

Understanding the trajectories of aging well should be addressed in future analyses that identify diverse pathways to aging well and examine the influence of factors on these pathways, such as optimism, social factors including opportunities for social engagement and generative activity, environmental housing factors such as housing type and access to support at home, and health-related experiences such as onset of chronic illnesses. For example, we could ask whether women whose health histories include disability would be judged to age well when assessed by measures of adaptive or optimal aging. We could also ask what actionable elements or environmental factors such as supportive housing and social activities, affect aging well. We could also examine the association of optimal aging indicators, such as purpose in life and personal growth, with other dimensions of aging well, Our recent analyses of WHI data indicate that purpose in life and personal growth were associated with patterns of survival among the oldest old. Indeed, we found that even among the oldest old, the experience of purposeful life engagement and continuing personal growth may contribute to patterns of survival as well as quality of life (49).

Additional questions might address whether high scores on measures of optimal aging might indicate a "more positive" end-of-life experience, possibly predicting future health trajectories and quality of life in octogenarians as they age. In addition, these indicators may help account for women's decision-making about advanced directives. Relating these aging well indicators to end of life experiences as well as to health conditions, symptoms, and comorbidities associated with advanced age may help reveal their impact on critical dimensions of aging well.

The relationship between physical functioning capacity and the ability of older adults to engage in valued and enjoyable activities warrants further evaluation. The relative independence of physical functioning and emotional functioning has been noted (2), but the meaning of a modest change in physical functioning for social relationships and emotional well-being aspects of aging well remains to be evaluated in future studies.

Resilience was moderately high in this population and consideration of methods to promote positive adaptation to age-related changes such as in physical functioning challenges warrants further research (50). In addition, purpose in life and personal growth opportunities for older adults, such as through helping others and educating subsequent generations, merits our attention as avenues to aging

well. The relationships between characteristics such as optimism and generativity remain to be evaluated in this and other populations of women as they age into their 80s and 90s. Thus, examination of the predictors and facilitators of aging well can inform the creation of opportunities for future cohorts of women as they age. These may include identification of interventions for younger cohorts of women to improve prospects for aging well and public health interventions to promote successful, effective, and optimal aging among the rapidly aging populations.

A final consideration is the relationships among the various concepts of aging well. Would women who were aging well according to the indicators of successful aging also appear to be aging well according to the indicators of adaptive aging? Optimal aging?

In summary, the WHI second extension has provided rich data to fuel further theory development and research about aging well. This brief summary can serve as a foundation for further investigators who will advance further our understanding of aging well.

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