Black-White Differences in Self-Reported Disability Outcomes in the U.S.: Early Childhood to Older Adulthood

AMANI M. NURU-JETER, PhD^a
ROLAND J. THORPE, JR., PhD^b
ESME FULLER-THOMSON, PhD^c

ABSTRACT

Objective. We examined black-white differences in activities of daily living (ADLs), functional limitations (FLs), vision/hearing/sensory impairment, and memory/learning problems in a large, nationally representative sample of community-dwelling and institutionalized people across the lifespan.

Methods. Data are from the 2006 American Community Survey ($n=2,288,800$). We included data on non-Hispanic black respondents (125,985 males and 145,780 females) and non-Hispanic white respondents (977,792 males and 1,039,243 females) ≥ 5 years of age. We used logistic regression to examine the black-white odds for each disability outcome. The overall response rate was 97.5%.

Results. For FLs, ADL limitations, and memory/learning problems, black people experienced higher odds of disability across the adult lifespan compared with white people. Black-white differences narrowed in older age. For vision/hearing problems, a black-white crossover was found in older age (≥ 85 years), where odds of vision/hearing problems were lower among black people than among white people. For all disability outcomes, black-white differences peaked in midlife (50–69 years of age), with black people having approximately 1.5 to two times the odds of disabilities as their white peers.

Conclusions. The study findings suggest the need to address black-white disparities across a range of disability outcomes throughout the lifespan. Future work identifying the factors accounting for this pattern of disparities will help inform the development of appropriate prevention strategies.

^aUniversity of California, Berkeley, School of Public Health, Berkeley, CA

^bJohns Hopkins University, Bloomberg School of Public Health, Baltimore, MD

^cUniversity of Toronto, Factor-Inwentash Faculty of Social Work, Toronto, ON, Canada

Address correspondence to: Amani M. Nuru-Jeter, PhD, University of California, Berkeley, School of Public Health, 50 University Hall MC7360, Berkeley, CA 94720; tel. 510-643-1999; fax 510-643-6426; e-mail <anjeter@berkeley.edu>.

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“The future health of the nation will be determined to a large extent by how effectively we work with communities to reduce and eliminate health disparities between non-minority and minority populations experiencing disproportionate burdens of disease, disability, and premature death.”

—Guiding principle for improving minority health,
U.S. Centers for Disease Control and Prevention¹

At every stage of the disablement process, from chronic conditions to disability,² black people fare worse than white people.^{3–7} Disability is a significant contributor to the number of work days lost and the number of years of potential life lost, and is a good predictor of medical and social service utilization.^{8,9} Much is known about black-white disparities in disability in mid- to later life (≥ 50 years of age). Less is known about whether and to what extent black-white disparities in disability exist earlier in life.^{10–21} Furthermore, it is not well understood how patterns of black-white differences in disability vary across life stages.^{6,10–17}

Most previous investigations of black-white differences in disability outcomes have focused on disability after 50 years of age.^{3,6,10,11,15–27} These studies show mixed results. Whereas some studies suggest that black-white disparities accumulate with increasing age,^{6,14,17,19} others show a persistent disadvantage for black people, with rates neither increasing nor decreasing among the oldest age groups.^{3,19,28} Other studies show a narrowing or levelling of black-white differences, with black people still having significantly elevated rates of disability compared with white people.^{13,23,29} Still other studies show a black-white crossover, where the disadvantage in disability outcomes observed among black people during most of the lifespan is reversed, with black people having lower disability rates compared with white people among the oldest old.^{15,18,30,31}

Despite the presence of black-white differences in the prevalence of disability in older age, the lack of significant heterogeneity in the rate of functional decline between black and white people in older age groups suggests that prevalence in later life may reflect onset much earlier.^{23,32} However, given the preponderance of studies among people ≥ 50 years of age,^{10–20} the extent of black-white differences earlier in life is unknown. A condensing (or compression) of disabled or inactive life into later life stages has been shown among white people,¹³ particularly white women, suggesting that black people are more likely to experience disabilities during their lifespan. However, few studies have examined the entire lifespan, making estimates speculative. Further, studies have primarily assessed functional limitations (FLs) and limitations in activities of daily living (ADLs), leaving black-white differences in other

disability outcomes largely unknown.^{3,6,7,11–13,16–19,21,29,33–36} and, perhaps, leaving our understanding of disparities in the maintenance of physical function incomplete.

We examined non-Hispanic black-white (hereafter, black-white) differences in four disability indicators—ADLs, FLs, vision/hearing/sensory impairment, and memory/learning problems—in a large, nationally representative sample of Americans aged 5 to ≥ 90 years. In addition to examining primarily older age groups, the majority of studies have included small, geographically defined samples and primarily community-dwelling residents.^{6,16–19,23} This article builds on previous evidence by using a large, nationally representative sample of both community-dwelling and institutionalized people to attain estimates generalizable to the U.S. population and avoid the bias associated with examining a healthier sample of community dwellers only, which may underestimate the true prevalence of disability in the population. Unlike previous studies, the present study also distinguishes between black and white people with and without Hispanic heritage for more detailed comparisons. Finally, this article examines black-white differences by gender, an important predictor of age-related differences in disability and a confounder of black-white differentials.^{11,13,23}

METHODS

Data source

Data are from the 2006 American Community Survey (ACS). The ACS is a nationally representative survey conducted by the U.S. Census Bureau that is designed to capture housing and population characteristics of representative samples of the U.S. population using random sampling procedures.³⁷ The 2006 ACS included people in urban and rural areas in housing units and institutions sampled from the U.S. Census Bureau Master Address File. The overall response rate was 97.5%. Data collection included mail survey, computer-assisted telephone follow-up for mail nonrespondents, and computer-assisted personal interview (i.e., personal visits) for mail and telephone nonrespondents. Our analysis included data on non-Hispanic black respondents (125,985 males and 145,780 females) and non-Hispanic white respondents (977,792 males and 1,039,243 females) ≥ 5 years of age (the earliest age for which disability status is asked on the ACS).

Measures

We assessed four self-reported disability outcomes: vision/hearing limitations, FLs, memory loss and learning difficulties, and ADL limitations. Respondents were asked if they had any of the following long-lasting

conditions: (1) “blindness, deafness, or a severe vision or hearing impairment” (vision/hearing limitations); (2) “a condition that substantially limits one or more basic physical activities, such as walking, climbing stairs, reaching, lifting, or carrying” (FLs). They were also asked whether, “because of a physical, mental, or emotional condition lasting six months or more,” they had difficulty: (1) “learning, remembering, or concentrating” (memory loss and learning difficulties); and/or (2) “dressing, bathing, or getting around inside the home” (ADL limitations). Each item included a dichotomous yes/no response option.

Race, gender, and age were the measured independent variables. Race was self-reported and measured as a binary variable categorized as non-Hispanic black/African American and non-Hispanic white. Individuals who reported Hispanic ethnicity and/or a race other than black or white were excluded from the analysis. Gender was also a binary variable, indicating male or female. To account for the nonlinear relationship between age and disability outcomes,²¹ we measured age in single years and assessed it as a categorical variable, ranging from 5 to ≥ 90 years of age: 5–9, 10–19, 20–29, 30–39, 40–49, 50–59, 60–69, 70–79, 80–84, 85–89, and ≥ 90 . Finer groupings for people aged ≥ 80 years were also constructed to allow a closer examination of changes among the old old, where age-related differences in disability may be more variable.^{15,18}

Data analysis

We stratified the data into four race-gender groups: black males, black females, white males, and white females. Data are presented for each race-gender group across the 11 age categories described previously. We conducted Chi-square tests to examine the distribution of disability outcomes for each race-gender group in each age category (data not shown). We used logistic regression to examine odds ratios (ORs) and 95% confidence intervals (CIs) of black-white differences for each disability outcome by gender and age.

We conducted two sets of parallel analyses (data not shown). The first excluded respondents in institutions. The second included people in institutions and respondents reporting Hispanic ethnicity. Data were weighted to adjust for selection and nonresponse. Analyses were conducted using SPSS® version 17.0.³⁸

RESULTS

The Table presents the distribution of disability by age, race, and gender. The sample was 88% white and 48% male. Across all age groups, FLs were the most

common of all disability outcomes for both black and white people.

Findings are presented for analyses including community-dwelling and institutionalized people self-identifying as non-Hispanic white or non-Hispanic black. Results of the two parallel analyses (data not shown) were very similar to the analysis of non-Hispanic black and white people, which included those who were community-dwelling or institutionalized. For the purpose of parsimony, we only reported the latter in this article.

Figure 1 shows ORs and 95% CIs for black vs. white males for each disability outcome. For FLs, ADL limitations, and memory/learning problems, black males were at a persistent disadvantage, starting early in life (5–9 years of age) and continuing throughout the lifespan. Black-white differences peaked in midlife (50–69 years of age), where black males had approximately twice the risk of these three impairments compared with their white peers, narrowing after 69 years of age. A similar peak for vision/hearing impairment was found among men in midlife, after which there was a narrowing of black-white differences, followed by a crossover at ages 85–89 years, where black men had 26% lower odds of impairment relative to white men (OR=0.74, 95% CI 0.62, 0.89). Findings for females followed the same pattern as for males (Figure 2).

The age groupings for vision/hearing impairments were further refined into five-year age groups starting at 65 years of age to more closely examine the crossover among males and females. The results did not change (Figure 3). For males, there was a convergence throughout the 70s and early 80s and a crossover at 85–89 years of age. Among females, there were 72% higher odds of impairment for black compared with white women at 65–69 years of age, reduced differences throughout the 70s (OR=1.40, 95% CI 1.28, 1.54) and early 80s (OR=1.17, 95% CI 1.07, 1.28), and a convergence in the late 80s, followed by a crossover at ≥ 90 years of age.

DISCUSSION

This study examined black-white differences in ADLs, FLs, vision/hearing/sensory impairments, and memory/learning problems using data from the 2006 ACS among participants aged ≥ 5 years. We observed three key findings. First, racial differences persisted across all age groups, with black people exhibiting worse functional status compared with white people. Second, black-white differences for all disability outcomes were greatest in midlife (50–69 years of age). Finally,

Table. Distribution of disabilities by age, race, and gender (n=2,288,800): American Community Survey, 2006

<i>Males</i>										
<i>Age (in years)</i>	<i>Total respondents</i>		<i>Percent with disability</i>							
	<i>Black N</i>	<i>White N</i>	<i>Functional limitations</i>		<i>ADL limitations</i>		<i>Vision/hearing/ sensory</i>		<i>Memory/ learning</i>	
			<i>Black</i>	<i>White</i>	<i>Black</i>	<i>White</i>	<i>Black</i>	<i>White</i>	<i>Black</i>	<i>White</i>
5–9	10,860	61,259	1.8	1.0	1.6	1.2	1.3	1.1	7.0	6.1
10–19	25,392	138,055	2.1	1.3	1.2	0.8	1.4	1.3	8.2	7.3
20–29	17,910	107,298	4.0	2.6	1.7	0.9	1.8	1.8	6.1	4.6
30–39	17,082	121,951	6.2	4.1	2.3	1.3	2.3	2.1	5.2	3.9
40–49	20,111	164,005	11.6	7.2	3.8	2.1	4.3	3.3	8.0	4.8
50–59	17,065	163,225	20.4	12.1	6.6	3.5	7.2	5.4	10.2	6.0
60–69	9,650	110,719	28.4	18.6	9.2	4.6	11.1	9.1	12.3	6.6
70–79	5,498	71,371	34.7	26.2	14.0	7.8	16.1	16.5	16.6	10.1
80–84	1,451	23,357	47.5	37.2	23.4	14.1	26.2	26.2	26.7	17.3
85–89	655	11,715	54.6	47.3	30.9	21.2	28.3	34.5	30.5	24.7
≥90	311	4,837	65.1	60.0	41.6	33.7	44.0	47.0	42.7	33.8
Total	125,985	977,792								
<i>Females</i>										
<i>Age (in years)</i>	<i>Total respondents</i>		<i>Percent with disability</i>							
	<i>Black N</i>	<i>White N</i>	<i>Functional limitations</i>		<i>ADL limitations</i>		<i>Vision/hearing/ sensory</i>		<i>Memory/ learning</i>	
			<i>Black</i>	<i>White</i>	<i>Black</i>	<i>White</i>	<i>Black</i>	<i>White</i>	<i>Black</i>	<i>White</i>
5–9	10,322	58,080	1.4	0.7	0.9	0.7	0.8	0.9	3.3	3.0
10–19	24,521	130,548	1.9	1.2	0.9	0.6	1.3	1.0	4.3	4.2
20–29	18,770	108,687	3.1	2.4	1.2	0.7	1.3	1.3	3.4	3.6
30–39	19,774	124,680	5.8	4.5	2.1	1.4	1.9	1.6	4.4	3.8
40–49	23,846	170,163	12.0	7.9	4.1	2.4	3.1	2.3	7.4	5.0
50–59	21,233	170,617	22.6	13.3	7.6	4.0	5.5	3.3	9.9	6.0
60–69	13,051	118,930	32.6	20.1	10.8	5.4	9.0	5.4	12.0	6.2
70–79	8,686	88,695	43.1	30.0	17.4	9.7	14.6	11.8	18.1	10.0
80–84	2,862	35,032	55.9	43.8	31.3	18.9	24.1	21.5	32.0	19.1
85–89	1,540	20,854	66.2	56.3	39.2	29.9	30.8	32.2	41.0	29.5
≥90	1,175	12,957	76.3	72.3	57.5	49.1	39.2	46.7	55.1	44.7
Total	145,780	1,039,243								

ADL = activity of daily living

there was a black-white crossover in vision and hearing impairments for adults ≥85 years of age.

The finding that race differences in disability outcomes were evident across all age groups beginning early in life and persisting through older adulthood is consistent with previous work demonstrating that disability occurs at earlier ages for black people than for white people.³⁹ This finding may be partially due to the earlier onset of chronic conditions and the underutilization of preventive health services among black people, given the large number of black people who develop chronic conditions much earlier than white people.⁴⁰ Further, the sources of disability are likely

to vary at different life stages. Other factors, such as birth outcomes and injury, likely play a role in disability during early developmental periods.

For all disability outcomes, black-white differences peak in midlife, with black people having approximately 1.5 to two times the odds of disability as their white peers. This age group (50–69 years of age) is when socioeconomic disparities in health are at their peak.^{34,41} House et al. found this pattern of greater socioeconomic differences during midlife for chronic conditions, FLs, and ADL limitations.⁴¹ These findings may partially reflect racial differences in socioeconomic position, given previous studies showing that

Figure 1. Odds ratios and 95% confidence intervals by age for black vs. white males, by disability type: American Community Survey, 2006

Figure 1a.
Functional
limitations

Figure 1b.
Activities of daily
living limitations

Figure 1c.
Vision/hearing
impairment

Figure 1d.
Memory loss
and learning
difficulties

Figure 2. Odds ratios and 95% confidence intervals by age for black vs. white females, by disability type: American Community Survey, 2006

Figure 2a.
Functional
limitations

Figure 2b.
Activities of daily
living limitations

Figure 2c.
Vision/hearing
impairment

Figure 2d.
Memory loss
and learning
difficulties

Figure 3. Odds ratios and 95% confidence intervals for vision/hearing impairment for black vs. white people aged 65 to ≥ 90 years: American Community Survey, 2006

socioeconomic position explains a majority of black-white differences in disability.^{33,42}

A black-white crossover was found for vision/hearing impairment for males ≥ 85 years of age and for females ≥ 90 years of age. The lack of a black-white crossover for FLs, ADL limitations, and memory/learning problems suggests that the crossover documented in earlier decades by previous studies may have been a cohort effect. Black people born in the first few decades of the 20th century had healthier lifestyles, such as a lower prevalence of smoking and better nutrition, than their white peers.^{43,44} Based on prospective data from 1986 to 1994, Corti et al. hypothesized that the black-white mortality crossover was primarily due to this healthier black cohort.⁴⁵ Corti and colleagues projected that the crossover effect would disappear once the majority of this healthier black cohort died. By 2006, few from this cohort were still alive. We speculate that this cohort effect may explain why the black-white crossover was no longer evident for three of the four disabilities in the present study. Further work is needed to examine this hypothesis. These three types of disability are highly correlated with socioeconomic disadvantage, which

may also explain the persisting disadvantage of black people relative to white people for these outcomes.⁴⁶ The crossover observed for vision and hearing problems may be due to racial differences in the incidence of cataracts, the leading cause of vision problems among the elderly, where there is a much higher incidence among white people than black people.^{47,48}

There was also a more general narrowing of black-white differences across disability outcomes in older age. This finding is consistent with previous evidence showing that health inequalities weaken with increasing age, generally after midlife.^{15,34,41,49} It has been suggested that the narrowing of black-white differences in disability later in life may be due to selective survival among black people.^{4,26} Previous findings show two to three times higher odds of mortality among disabled vs. non-disabled people.⁴² In the present study, black-white differences in rates of disability began to narrow in the mid-80s. If there were a strong selective survival effect, black-white differences would start to narrow before 80 years of age, given the convergence of black-white mortality differences in the early 70s and a mortality crossover as early as 75 years of age.⁴²

Additionally, studies show a widening of black-white differences in allostatic load, with increasing age suggesting an increase, not a decrease, in black-white differences in overall physiologic aging.⁵⁰ Allostatic load, the physiologic wear and tear associated with repeated adaptational responses to stress, has been associated with poorer cognitive and physical function.^{51,52} Other work similarly shows that black people have longer unhealthy (i.e., inactive) life expectancy compared with white people.¹¹⁻¹³ Selective survival should also be stronger among males than among females, given the higher life expectancy of black females. This pattern was evident for vision/hearing impairments only. Although we were not able to directly test selective survival in these data, the pattern of association between age and disability for these three disability outcomes is inconsistent with the selective survival argument.

Herd has suggested an alternate explanation for the shrinking health inequalities apparent after 65 years of age. That is, the social safety net provided to older adults may result in a decline in health disparities.³⁴ For older individuals who have been poor throughout their life, older age brings, often for the first time, steady access to medical care and a stable income (Supplemental Security Income and Social Security payments). Retirement from physically demanding blue-collar jobs may also lead to health benefits for the poor. Link and Phelan call income and education “flexible resources” because they can be used to improve living conditions and improve health through such factors as better access to health care, a better living environment, less stress, and more expansive social networks.⁵³ In older age, these resources are less flexible. Although retirement income may be higher for some groups, retired people are more likely to be on Medicare than private insurance, thereby minimizing differences in access to care between income groups. The social stress associated with racial/ethnic minority status may also be less impactful in older age, given competing stressors associated with aging, such as objective and perceived health decline, which may outweigh the stress associated with racial/ethnic minority status.^{4,49,54}

Limitations and strengths

Several limitations of the data should be considered in interpreting these results. This was a cross-sectional analysis. The data did not allow a comparison of rates for the same cohort as they aged. Disability rates were compared across age groups at one point in time, which did not allow a determination of causality or distinguishing between age and cohort effects. Without prospective data, it is impossible to determine the role

played by selective mortality. Because mortality rates are higher in younger and middle-aged black people compared with their white counterparts, black people surviving into older age may be more physically robust relative to their white peers.

Also, the ACS contained only self-reports of disability, which could have resulted in some under- or overreporting.^{35,36,55} Furthermore, if there were racial, age, and/or gender differences in either social desirability bias or in the perception of disability, our findings may reflect a conflation of these differences with true differences in disability in the population. Future research using objective measures of disability could address this limitation. Another limitation was that information was not available about the onset or progression of the four types of disabilities, making it difficult to assess which is more important for the pattern of disparities observed. Finally, information was not available on health behaviors, an important potential confounder of disability outcomes.

Despite these factors, the ACS is the largest nationally representative dataset that includes information on the disability status of the U.S. population. With its large sample and high response rate (97.5%), the data are highly powered. The dataset includes both community dwellers and people in institutions. Previous work examining age-related changes in disability has used community-dwelling samples only, likely resulting in a downward bias in disability estimates. Further, we examined four types of disability outcomes, thereby expanding previous assessments of black-white differences.

CONCLUSIONS

Taken together, the study findings indicate a need to address black-white disparities across a range of disablement outcomes throughout life. Essential planning for public health services and health-care spending will require accurate assessments of disability across the lifespan. Estimates focused solely on older age groups may significantly underestimate the impact of disability both on population health and on health-care expenditures. Further, estimating black-white differences in disability at different life stages will help target planning for the most at-risk groups.

Black people are a vulnerable group for three of the four disabilities addressed, starting early in life and extending throughout older age. This finding indicates a need to examine why black people are particularly vulnerable and whether the factors associated with self-reported disability vary at different life stages.

Childhood health has been shown to have a

significant impact on the trajectories of functional limitation in the U.S.^{32,56,57} The peak in odds of disability for both groups in midlife begs the question of whether this peak reflects disease onset, disease progression, and/or issues related to disease management. Longitudinal studies will be helpful in this regard. Understanding factors related to the patterns observed will help identify the stage of prevention most likely to have the greatest benefit at different life stages.

Revisiting Fries' "compression of morbidity hypothesis," preventive efforts early in the lifespan focused on delaying the onset of morbidity may be the most impactful, especially given the relation of childhood morbidity to health status later in life.^{58,59} Improving vitality for more of life and reducing years of unhealthy or disabled life by compressing morbidity into the later years via delayed onset of illness may have a significant impact on both the individual and society through longer years of productive and active life and reduced health-care expenditures. Further, identifying factors contributing to black-white disparities early in life may inform the types of preventive efforts likely to reduce and potentially eliminate the gap observed during midlife and later in life. As the proportion of racial/ethnic minority groups in the U.S. continues to grow, the elimination of disparities by race becomes increasingly important for indices of overall population health.

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