Aging and Health for Racial Minorities: An Analysis of the Double Jeopardy Hypothesis Using the California Health Interview Survey

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ABSTRACT

Theoretical approaches to understanding minority aging, such as the double jeopardy hypothesis, have been inadequately studied and must be reconsidered given California's aging and diversifying population structure. The hypothesis posits that minority elderly suffer a double disadvantage to health due to the interactive effects of age and race. Using data from the 2003 and 2005 waves of the California Health Interview Survey, we examine differences in the number of poor physical health days among five major racial and ethnic groups: African-Americans, Asian and Pacific Islanders, American Indians and Alaskan Natives, the Hispanic origin population, and non-Hispanic whites. Negative binomial regression analyses show that the number of unhealthy days increases more steeply for aging African-Americans and Hispanics compared to whites. Contrary to other studies testing for double jeopardy, we found support for the hypothesis using a quantifiable indicator for health-related quality of life.

INTRODUCTION

Racial-ethnic health disparities are well documented in the literature. Blacks have been found to have higher mortality than whites at most causes of death, including heart disease and stroke, cancer, diabetes, homicide, accidents, and drug abuse (Rogers, 1992), and there are few signs of impending convergence (Hummer, 1996; Read & Emerson, 2005). Studies on the Hispanic and Asian and Pacific Islander (API) populations suggest equal to or better health than whites, although research has shown that while Hispanics have lower death rates for the two leading causes of death (i.e., heart disease and cancer) than do whites, they have higher mortality than whites for other causes, such as tuberculosis, diabetes, homicide, and chronic liver disease (Williams & Collins, 1995). Survey-based health data for American Indian and Alaskan Natives (AIAN) continue to be limited.

Far less is known about racial-ethnic differences in older adult health compared to younger populations. Although it is well established that the aging process is accompanied by a steady and progressive deterioration in physical health, the effects of racial-ethnic minority group status on the health of the elderly are less agreed upon. Comparative studies incorporating Hispanic, API, and AIAN elderly are particularly limited. A recent report commissioned by the National Institute on Aging documented that morbidity and mortality are worse for elderly blacks, AIAN, and to a lesser degree, Hispanics, while white and API elders display more favorable patterns (Hummer, et al., 2004). The report also stated that socio-demographic and economic differences, such as sex, nativity, education, and income continue play an important part in racial-ethnic health disparities for the aged (Hummer, et al., 2004).

The aging of the U.S. population, as well its growing cultural diversity highlights the importance of reexamining racially and ethnically sensitive theories in the area of gerontology. California, in particular, currently has the largest number of elderly in the nation and has one of the fastest growing Asian and Latino immigrant populations (U.S. Census, 2000). This study uses data from the California Health Interview Survey (CHIS) to investigate the double jeopardy hypothesis, one of the more well-known theories in minority aging. The hypothesis posits the minority aged suffer a double disadvantage to health due to the interactive effects of age and race (Dowd & Bengston, 1978). Minority elderly may suffer not only from prejudices, stereotypes, and discrimination associated with old age, but are burdened by their racial minority group status (Markides, 1983). Thus, racial-ethnic minority elderly may disproportionately bear more health problems than their non-Hispanic white counterparts. This study extends existing research on the double jeopardy theory by focusing on five major racial-ethnic groups: African-Americans, Asian and Pacific Islanders, American Indians and Alaskan Natives, the Hispanic origin population, and non-Hispanic whites. Additionally, I use a measure of health-related quality of

life which has not been systematically studied in previous double jeopardy analyses. Health-related quality of life is especially relevant when investigating racial-ethnic health disparities among the elderly population because it indicates unmet health needs and assesses a person's well-being, not merely the absence of disease (Chowdhury, et al., 2008; Skarupski, et al., 2007). More specifically, the outcome used here: number of days in poor physical health is shown to be significantly related to life satisfaction and self-reported health (Zullig, et al., 2004).

LITERATURE REVIEW

The double jeopardy hypothesis initially grew out of concerns regarding the disadvantage of older black-Americans (Dowd & Bengston, 1978). Some researchers argue that the combined effects of old age and minority group membership, that is, occupying two or more stigmatized states, brings with it greater negative consequences than occupying one status alone. Indeed, there is little disagreement that disadvantaged racial minority groups have poorer health relative to advantaged white groups, which is often explained by differences in socioeconomic status (SES). SES differences across racial and ethnic groups account for much of the observed racial-health disparities, although not entirely (Read & Gorman, 2006; House & Williams, 2000). Health status is not only a function of current levels of socioeconomic status but of the several other conditions experienced throughout the life course (Williams & Collins, 1995). Over the life course, individuals acquire varying levels of resources (i.e., education, income, health insurance) that allow them to achieve health (House & Williams, 2000). Therefore, it is reasonable to conclude that any disadvantages accrued throughout life may amplify in old age, when one faces chronic conditions, disability, and other limitations.

While the double jeopardy hypothesis seems conceptually sound, empirical evidence for it has been mixed (Markides, et al., 1984; Markides, 1983). Dowd and Bengston (1978) provided one of the first empirical tests for double jeopardy to health using cross-sectional data. They compared mean scores for self-rated health status based on a 5-point likert scale among blacks, whites, and Mexican-Americans age 45-74 years living in Los Angeles. Jackson, Kolody, and Wood (1982), also using cross-sectional data compared whether or not health was perceived as a serious problem for blacks and whites. Both studies can only claim partial support for double jeopardy hypothesis because a race-by-age interaction was not explicitly tested for in their analyses (Ferraro, 1989). However, Ward (1983) and Ferraro (1989) performed race-age interaction tests using cross-sectional data and similar subjective health outcomes and found no support for double jeopardy.

Since the double jeopardy perspective is contingent on time and the aging process, longitudinal data may appear to provide a more appropriate analytical approach. However, longitudinal data

on minority elderly, particularly immigrant elderly groups are virtually non-existent. Further, panel data is particularly subject to attrition. The loss of subjects becomes even more relevant in a health study, as those who suffer a health decline during the study or die are ultimately not included in the analysis. For example, a double jeopardy study by Markides and colleagues (1984) on Mexican-Americans and whites had a substantial loss in subjects. They utilized longitudinal data collected during 1976 to 1980 on Mexican-Americans and whites living in San Antonio, Texas. Out of a total of 510 participants, 172 subjects were not followed-up due to death, illness, refusal or relocation. Interestingly, it was only after they included subjects who died during the study by assigning them the lowest score on health, that their analysis supported the double jeopardy hypothesis. Conversely, leaving out the deceased subjects showed a negative relationship between age and poor health for Mexican-Americans. Ferraro and Farmer (1996) also examined the double disadvantage to health among blacks and whites using subjects age 25-74 at baseline from a 15-year panel study of the National Health and Nutrition Examination Survey. However, instead of finding double jeopardy, their results showed that health inequality for blacks exists throughout adulthood and does not necessarily amplify in later life (Ferraro & Farmer, 1996).

Contrary to double jeopardy, some researchers assert that age acts as a leveler of racial differences in health (Markides, et al., 1984; Ferraro & Farmer, 1996). The age-as-a-leveler hypothesis can be explained by selective mortality, which implies that disadvantaged people who "survive" have made it through significant barriers over their life course and will consequently show less health problems in their later life compared to their white counterparts. In other words, these persons may be "biologically more robust" than others who did not survive to advanced ages. Leveling may also occur because biological, psychological, and social factors that pose a challenge to health are present in all old persons, and are no longer unequally distributed according to race. Another counterpart to the double jeopardy hypothesis is the idea that health problems are present at all ages, not just among older adults. This is often referred to as persistent health inequality, which states that the health disparity exists throughout adulthood and does not amplify in later life (Ferraro & Farmer, 1996).

In sum, previous findings for tests of the double jeopardy hypothesis are not uniform warranting further examination. Past studies on the double jeopardy hypothesis also do not compare across more than three racial-ethnic groups. In addition, this study uses a much broader age range (18-85 years) than used in the earlier studies. Finally and perhaps most salient, missing from this literature is a focus on incidence of experiencing poor health. Past research has examined self-rated health, which typically asks respondents to rate their general health on a five-point scale (excellent to poor). Although this is a powerful measure of health, studies have found it to be too subjective (Markides, et al., 1984). Further, global assessments of health based on a likert-scale have been shown to be a biased measure of health for the elderly population (Markides, et al.,

1984). In other words, the elderly tend to assess their health based on other people of similar age so global self-ratings do not decline as much as objective measures (Markides, et al., 1984). Other studies have used presence of disability, functional limitations, chronic, or terminal illness, and were often dichotomized or trichotomized. In contrast, this study employs a quantifiable measure of health status by asking for counts of how many physically unhealthy days the respondents experienced during the past month. Past studies have failed to use "unhealthy days" questions when examining age and racial-ethnic disparities.

Suggestions for how to methodologically test for a double disadvantage are found in the literature (Ferraro & Farmer, 1996). Both a main effect of race and a race-by-age interaction must be found significant to conclude that a double jeopardy is operant when using cross-sectional data. In other words, significant differences in health must exist between the racial minority group and their white counterparts that favor the whites. Subsequently, there must be greater declines in health with aging for racial minority groups compared to whites thereby conjecturing that racism and ageism interact to make the health status of elderly minority more problematic than that of either the aged or racial minorities considered separately (Dowd & Bengston, 1978). Given this line of reasoning, two hypotheses were generated:

(1) Racial minority groups, namely blacks, Hispanics, and AIANs will experience more poor physical health days compared to whites and APIs of comparable age groups; and

(2) Racial and ethnic minorities will have substantially more declines in physical health with increasing age relative to white groups.

In other words, health differences will exist between young minority groups and their white counterparts that favor whites, but are not larger than the differences observed in the elderly strata.

METHODS

Data

Data for this study are from the 2003 and 2005 waves of California Health Interview Survey (CHIS), a collaborative project of the UCLA Center for Health Policy Research, the California Department of Health Services and the Public Health Institute. It is conducted every other year and is the largest state health survey in the United States. CHIS is a population-based random-digit dial telephone survey and is an especially appropriate data source for the study because the data collection methods and sample were designed to produce results representative of California's ethnically diverse population, as well as reliable estimates of various health

parameters for all California counties. Additionally, to capture California's diversity, interviews were conducted in five languages: English, Spanish, Chinese, Vietnamese, and Korean. Detailed methods appear elsewhere (CHIS, 2005). The sample included adult respondents age 18-85 years (n=82,856).

Dependent Measure

The outcome variable measuring health status is self-reported number of days in poor health during the past month. This measure asks respondents to think about their physical health, including physical illness and injury, and provide the number of days during the past 30 days their physical health was not good. The poor health days question was found to be useful for identifying health disparities among different subgroups (Chowdhury, et al., 2008).

Independent Measures

The independent variables were entered in three stages. Since the main variables of interest are race-ethnicity and age, the baseline model allowed for comparison between 4 racial categories: African-American, Latino, API, AIAN, and Whites (referent category), and also includes linear effects of age (range: 18-85 years). Following the baseline model, a series of interaction terms measuring the combined effects of race-ethnicity and age were added. Since the study hypothesizes that the effect of age on health is different for certain racial-ethnic groups, testing for race-by-age interactions is appropriate.

Next, I introduce different sets of control measures designed to examine whether any of the observed race-by-age interactions can be attributed to gender, socioeconomic status, health characteristics, and or immigration status. Sex of the respondent (0=male, 1=female) is an important control given that women report poorer health than men on a variety of outcomes (Gorman & Read, 2006; Chappell & Havens, 1980). Past research has shown that having high income, high educational attainment, health care utilization, and being married are beneficial to health (Link & Phelan, 1995). Income is a continuous variable (range: $0 to $300,000). Educational attainment is a categorical variable measuring highest grade completed, ranging from less than high school (1) to post-baccalaureate education (4). Health care use was measured by presence of a usual source and was trichotomized in doctor office/ HMO care (1), community/ government clinic or hospital (2), and no usual source (3). Marital status is a dichotomous variable, comparing married (0) to not married (1) individuals. (The not married category includes those who are divorced, separated, widowed, living with a partner, and have never been married.). Three covariates for health characteristics are included: smoking status, consumption

of alcohol, obesity. Prior research has shown that smoking, heavy alcohol consumption, and being overweight are health risks (Williams & Collins, 1995). Smoking is a categorical variable, comparing those who currently smoke, have quit smoking, and never smoked. Alcohol consumption is a binary variable (0=had no alcohol in the past month,1= had at least one drink of alcohol in the past month). Similarly, obesity is a dichotomous variable (0=no, 1=yes). Additionally, I examine variables representing immigration status: English language proficiency (1= speaks only English, 2=speaks English very well or well, 3=speaks English not well or not at all) and duration of residence in the U.S. (1=native born, 2=less than 5 years, 3=5-9 years, 4=10-14 years, 5=15+ years). Immigration differences are important in explaining racial and ethnic differences in health, with immigrants experiencing lower mortality than their U.S.-born counterparts (Singh & Siahpush, 2002).

Analysis

CHIS employs a two-stage geographically stratified sample design. In order to ensure that estimates from the sample are unbiased and representative of the California population, application of weights was necessary before any calculations are performed (Lee, 2007). The CHIS Public Use Files provide a weight variable which accounts for sample selection probabilities and corrects for undercoverage and nonresponse biases (UCLA Center for Health Policy Research, 2007).

For regression models, relative rate ratios (IRR) were calculated using negative binomial models. The mean (SD) number of days in poor health for the entire sample was 4.30 (8.48). Most observations are on zero days (58.82% of respondents reported no days in poor physical health during the past month). The count data are right skewed and the variance (71.92) is much larger than the mean. Thus, the negative binomial model, over the Poisson regression model, provides an improved fit to the data accounting for the overdispersion. All analyses were conducted using STATA survey jackknife procedures, developed to analyze complex survey data (STATA, 2009).

FINDINGS

Descriptive Analyses

Table 1 presents weighted means for the number of days in poor health during the past month by race-ethnicity and age. Looking strictly down the columns, we see that not surprisingly, the aging process is accompanied by worsening health for all racial-ethnic groups. However, when we start to compare across the groups and at different age categories, a more complicated picture emerges. Blacks age 18-29 years have significantly lower days than their white counterparts

(1.90 and 2.80 days, respectively). In contrast, older blacks, ages 30-64 years and 65 years and older, have significantly higher days in comparison to whites. Thus, the data reveal that blacks become more disadvantaged in health with age relative to whites.

A similar pattern is observed for Hispanics. Hispanics age 18-29 years have significantly less days of poor health than their white counterparts (2.44 and 2.80 days, respectively). However, Hispanics age 30 years and older have significantly more unhealthy physical days compared to whites. Therefore, health differences between blacks and Hispanics compared to whites are larger among the older strata than for the younger age categories, which argues against the leveling hypothesis.

For AIANs and APIs, the mean number of days for all age groups is either consistently higher or lower than whites, suggesting no double jeopardy but rather persistent health disparities. In sum, this table illustrates two findings: (1) some racial-ethnic groups, specifically blacks and AIANs experience more days in poor health compared to their white counterparts; and (2) race and age appear to be interacting to produce larger health disadvantages for older blacks and Hispanics in comparison to whites.

Table 1. Weighted means for number of days in poor physical health during the past month, by race and age

	Whites	Blacks	APIs	Hispanics	AIANs
18-29 years old (*N*)	2.80	1.90***	2.25**	2.44*	3.38
	(5008)	(736)	(1312)	(3711)	(180)
30-64 years old (*N*)	3.84	4.83***	3.03***	4.11*	6.45***
	(35566)	(3102)	(5541)	(8810)	(760)
65+ years and older (*N*)	5.79	6.98*	4.89*	7.34***	8.42
	(14911)	(807)	(1235)	(983)	(194)
Full sample (*N*)	4.05	4.38*	3.10***	3.73***	5.94***
	(55485)	(4645)	(8088)	(13504)	(1134)

* p≤0.05, **p≤0.01, ***p≤0.001
Significance tests are based on two-tailed *t*-tests comparing whites with each of the other racial/ethnic groups in the same age category.

Multivariate Analyses

Table 2 shows the results of regressing number of days in poor health on various predictors tested in conceptually cohesive blocks. The estimated rate ratios (RR) from Model 1 indicate that for a one unit increase in age, assuming linearity, we expect to see an increase of poor health days per month by a factor of 1.02. Blacks, Hispanics, and AIANs, when compared to whites, are predicted to have 12%, 9%, and 61% more physically unhealthy days per month, respectively. On the contrary, APIs are expected to have 16% less days in poor health per month, in comparison to whites. Therefore, the baseline model (Model 1) reveals that all minority groups,

with the exception of Asian/PIs, experience more days in poor health compared to whites. Thus, hypothesis 1 is supported in that racial minority groups (i.e. blacks, Hispanics, and AIANs) experience more frequent poor physical days compared to whites and APIs.

Model 2 adds several race-by-age interactions terms, which will allow the slopes describing age on number of days to be different (or non-parallel) for the different ethnic groups. Significant interaction terms for blacks and Latinos reveals that the number of poor health days increases much steeper for aging blacks and Latinos compared to whites – in support of the double jeopardy hypothesis. Thus, the magnitude of health differences for blacks and Latinos compared to their white counterparts is much larger in the elderly strata than observed between younger groups.

Interpreting interaction terms in a negative binomial regression often involves the examination of predicted outcomes at specific values of the independent variables. In Figure 1, I graph the race-by-age interaction from Model 2. The negative binomial coefficients allow me to calculate predicted probabilities for each of the 5 racial-ethnic groups. The graph shows that the effect of race-ethnicity on number of days in poor health is modified by age, such that the association is stronger for blacks and Latinos. At younger adult ages, blacks and Hispanics have lower unhealthy days than all other groups, except APIs. However, as they age, the predicted values for blacks and Hispanics increase much steeper relative to whites or Asian/PIs. Therefore, race-ethnicity and age are interacting on health, affirmatively arguing for the double jeopardy hypothesis.

Figure 1. Predicted values of number of days in poor physical health during the past month
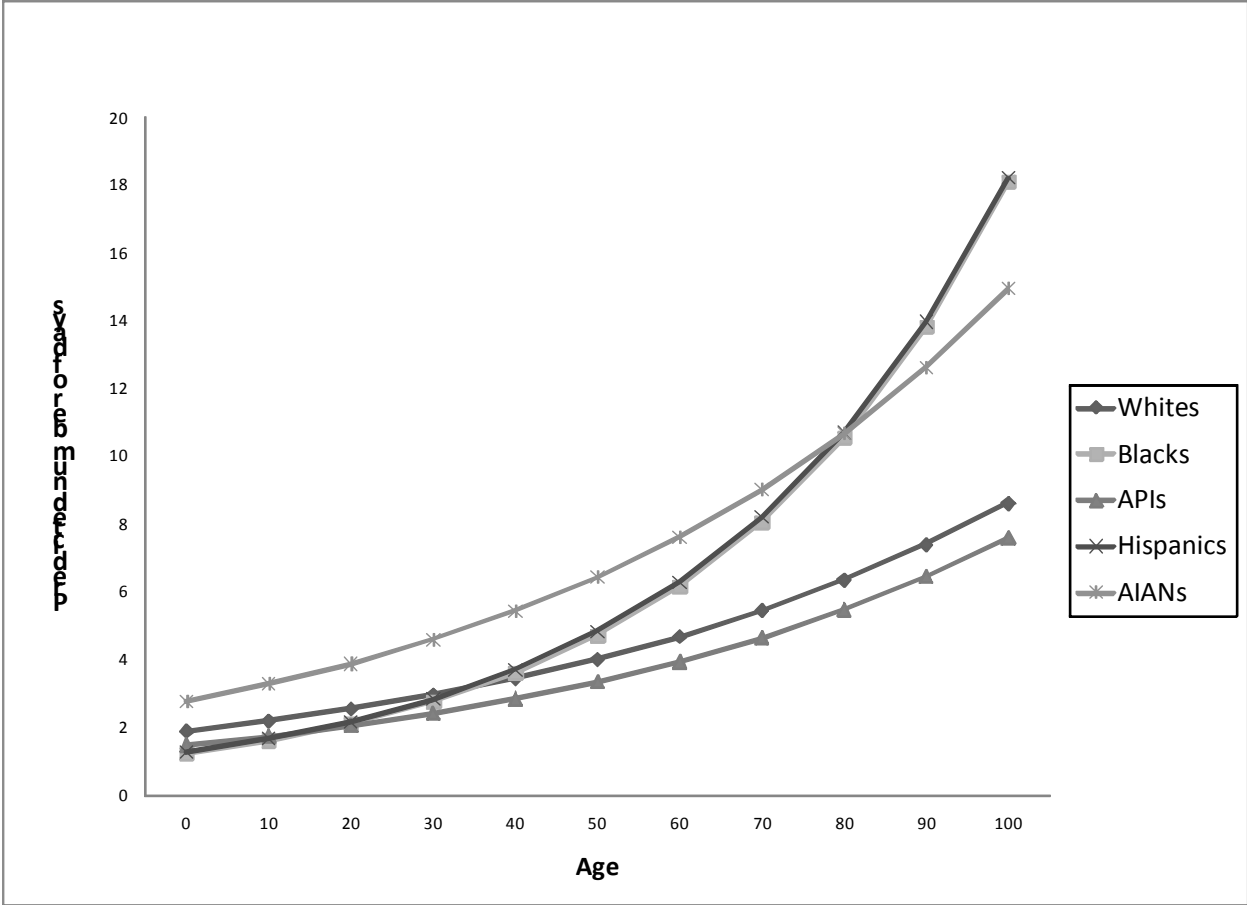
Table 2. Negative binomial regression models for number of days in poor physical health during the past month

	Model 1	Model 2	Model 3
	RR†	RR†	RR†
Independent Variables			
Age	1.02***	1.02***	1.01***
Race-ethnicity			
Whites (ref)			
Blacks	1.12**	.65**	.60***
Asian/PIs	.84***	.79*	.93
Latinos	1.09**	.68***	.60***
AIANs	1.61***	1.48	1.19***
Race X Age			
White X Age (ref)		---	---
Black X Age		1.01***	1.01***
API X Age		1.00	1.00
Latino X Age		1.01***	1.01***
AIAN X Age		1.00	1.00
Female			1.35***
Not married			1.14***
Household's total annual income			1.00***
Educational Attainment			
Less than H.S. (ref)			---
H.S. degree			.88**
Some college-College grad			.87***
Post-baccalaureate			.76***
English Language Proficiency			
Speaks only English (ref)			---
Very well/ well			1.10**
Not well/ not at all			1.27***
Duration of Residence in U.S.			
Native born (ref)			---
15 years or more			.84***
10-14 years			.76***
5-9 years			.80**
Less than 5 years			.59***
Usual source of health care			
Doctor office or HMO hospital (ref)			---
Community clinic or government hosptial			1.11***
No usual source			.98
Smoking status			
Never smoked (ref)			---
Current smoker			1.44***
Former Smoker			1.24***
Consumed alcohol in past month			.81***
Overweight/ obese			1.20***

† RR is the rate ratio defined as e^β, where β is the coefficient estimate.
* $p \leq 0.05$, ** $p \leq 0.01$, *** $p \leq 0.001$
A dummy variable representing year of survey was tested with the first model and omitted in subsequent models because of non-significance (p=0.09).

Next, I examine whether demographic, socioeconomic, and health characteristics can explain the observed differences. Females compared to males, holding other demographic characteristics constant, are predicted to have a rate of 1.35 times greater days. Most of the explanatory measures have a significant effect on the number of unhealthy days reported, and at expected directions. However, none of our control variables reduces the interaction effect between race and age to non-significance.

DISCUSSION

Given the diverse backgrounds and cultural characteristics of California's elderly population, a reexamination of the double jeopardy theory is an important research initiative. Theoretical approaches to understanding minority aging have largely ignored health-related quality of life measures; especially measures which rely on rates or count data. Count data reflects frequency of negative health experiences that are overlooked by global assessments of health status. Using cross-sectional data, I examined the double jeopardy hypothesis by testing for both a main effect of race and a race-by-age interaction (Ferraro & Farmer, 1996). Since both these conditions were found significant, we are able to conclude that double jeopardy is operant, but only for blacks and Hispanics. Negative binomial regression showed that blacks and Hispanics were significantly more likely to report greater physically unhealthy days in comparison to whites. Additionally, the magnitude of the health difference is larger in the elderly strata than observed between younger groups. As shown by significant interaction terms, the number of poor health days increases more steeply for aging blacks and Hispanics compared to their white counterparts.

To the author's knowledge, the outcome variable used in this study has not been used in prior double jeopardy analyses. I feel that self-reported counts of poor physical health days during the past month most closely examine a person's day-to-day well being. Furthermore, past studies that found no support for double jeopardy by using dichotomized or trichotomized versions of health status may have downplayed the race-by-age inequality. Past studies have relied on either self-rated global assessments of health based on a likert-scale, prior medical diagnosis of chronic or serious condition, hospitalization, or mortality. Although these outcomes are commonly used when studying health differences, they may not capture perceptions of unmet health needs, dysfunction, and disability. Furthermore, racial-ethnic minorities are more likely to get sick at a higher rate than whites across the life course but are also less likely to miss a work or school due to illness and utilize healthcare.

Since CHIS is a cross-sectional survey, the findings presented here may reflect cohort differences. Some researchers have suggested that double jeopardy must be studied with longitudinal data (Ferraro & Farmer, 1996). Longitudinal data, however, are not without their

own problems. Utilizing panel data, Markides, Timbers, and Osberg (1984) and Ferraro and Farmer (1996) found little support for the double disadvantage to health but instead, showed persistent health disparities. They found that health problems are suffered by racial minorities of all ages, not just the elderly. However, the unhealthiest people due to illness or prior mortality are typically left out of longitudinal survey and so the analyses do not include subjects who declined in health with aging, concealing inequalities in health that may really exist among elderly subgroups. Longitudinal data are needed that contain information of health-related quality of life measures, specifically those that rely on count data, to adequately assess the influence of age and race-ethnicity on health.

The U.S. Department of Health and Human Services and other federal agencies have provided decades of funding and support for public health and social programs designed to eliminate health disparities among different segments of the population. For example, The *Healthy People 2010*, a set of national health objectives, challenges and enables individuals, communities, and professionals to eliminate health disparities (DHHS, 2005). Racial-ethnic differences in health remain, however, and may actually be widening. Reconsidering theoretical approaches, such as the double jeopardy, holds promise in understanding how the varying demographic, socioeconomic, and social experiences of today's growing racial-ethnic elderly can impact health.

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