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Original Article

Race/Ethnic Differentials in the Health Consequences of Caring for Grandchildren for Grandparents

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Abstract

Objectives. The phenomenon of grandparents caring for grandchildren is disproportionately observed among different racial/ethnic groups in the United States. This study examines the influence of childcare provision on older adults' health trajectories in the United States with a particular focus on racial/ethnic differentials.

Method. Analyzing nationally representative, longitudinal data on grandparents over the age of 50 from the Health and Retirement Study (1998–2010), we conduct growth curve analysis to examine the effect of living arrangements and caregiving intensity on older adults' health trajectories, measured by changing Frailty Index (FI) in race/ethnic subsamples. We use propensity score weighting to address the issue of potential nonrandom selection of grandparents into grandchild care.

Results. We find that some amount of caring for grandchildren is associated with a reduction of frailty for older adults, whereas coresidence with grandchildren results in health deterioration. For non-Hispanic black grandparents, living in a skipped generation household appears to be particularly detrimental to health. We also find that Hispanic grandparents fare better than non-Hispanic black grandparents despite a similar level of caregiving and rate of coresidence. Finally, financial and social resources assist in buffering some of the negative effects of coresidence on health (though this effect also differs by race/ethnicity).

Discussion. Our findings suggest that the health consequences of grandchild care are mixed across different racial/ethnic groups and are further shaped by individual characteristics as well as perhaps cultural context.

Key Words: Caregiving—Grandparents—Health disparities—Race/ethnic differences

Child caregiving, although traditionally performed by parents, may also be the responsibility of grandparents. Statistics from the American Community Survey suggest that around 7 million grandparents live with grandchildren under 18 and 39% have primary caregiving responsibilities (US Census Bureau, 2011; National Center for Family & Marriage Research, 2012, 2013). African

Americans and Hispanics are disproportionately more likely to care for grandchildren compared with whites (National Center for Family & Marriage Research, 2012, 2013). However, research has not fully investigated race/ethnic differentials in the health consequences of such caregiving. Results from a limited number of studies are inconsistent and inconclusive, partly due to the use of small, nonrepresentative samples, but also largely due to different complex mechanisms operating in opposing directions for health. For example, do the benefits of grandparenting (e.g., emotional reward and social support) outweigh the negative effects (e.g., stress, physical demand, and financial difficulty) or vice versa? Do minority grandparents' poorer health outcomes reflect initial socioeconomic disadvantage, or does a lack of financial resources compound caregiving stress? Finally, could norms of familism and supportive kinship networks among minority grandparents buffer strain and increase resilience?

In this paper, we address these questions and explore different mechanisms through which grandparents' caregiving influences health by race/ethnicity. Using a longitudinal, nationally representative data set (Health and Retirement Study [HRS]), we investigate the health implications of grandparents caring for grandchildren, with specific attention paid to racial/ethnic differentials in health trajectories (with a composite measure of health, Frailty Index [FI]). Further, we situate the experience of grandparents' caregiving in structural, cultural, and economic contexts that are specific to different race/ethnic groups.

Theoretical Orientation: The Role of Grandparenthood in Different Racial/Ethnic Contexts

Role strain and role enhancement theories, two juxtaposing arguments regarding the social positions individuals occupy over their lifetime, provide helpful insights to understand the health of grandparents caring for grandchildren (Rozario, Morrow-Howell, & Hinterlong, 2004). Role strain theory argues that individuals will experience ill effects from occupying multiple roles, particularly when conflicting role demands induce stress (Goode, 1960; Mirowsky & Ross, 1986; Pearlin, 1989). "Off-time" parenting responsibility can create a great deal of stress and financial burden, leading to deteriorating health conditions. By simultaneously serving as grandparents, parents, and grandparents who parent, in addition to other social roles such as spouse, friend, coworker, etc., they increase their risk of role strain.

Further, hours of care provided by grandparents to grandchildren vary greatly (Goodman & Silverstein, 2006; Pebley & Rudkin, 1999; U.S. Census, 2000) and likely shape role strain. For some, the grandparent role may include occasional babysitting and thus is not source of role overload. For grandparents who coreside with grandchildren or who are solely responsible for parenting grandchildren, however, the expectations and responsibilities associated with that role increase and may interfere with other life activities. Households that include a grandparent, adult child, and grandchild are referred to as "multigenerational households." On the other hand, if the adult parents are not present in the household while grandparents raise grandchildren, then the household is referred to as a "skipped generation household" (Fuller-Thomson, Minkler, & Driver, 1997). Each of these various household residential statuses may potentially represent a unique form of role strain.

In contrast, role enhancement theory argues that engagement in multiple roles is associated with increased well-being as individuals gain satisfaction from their social roles (Moen, Robison, & Dempster-McClain, 1995). The grandparent–grandchild relationship constitutes an important element of older adults' social support networks. Although the added responsibility of grandchild caregiving may increase grandparents' stress, increased interactions with one's social support network may help buffer the negative effects of stress and may increase life satisfaction and well-being (Rozario et al., 2004; Szinovacz & Davey, 2006).

Previous empirical examinations of the effects of role strain and role enhancement on grandparents' health yielded mixed results. Grandparents, especially those who took a hiatus from childcare while their own children were adults, may experience ill effects associated with intensive childcare responsibilities, including emotional stress, physical stress, financial strain, conflict with adult children, and role conflict (Burton, 1992; Szinovacz, DeViney, & Atkinson, 1999). On the other hand, many grandparents report feelings of reward and satisfaction from providing care (Pruchno & McKenney, 2002). Further, caregiving requires grandparents to be physically active, which decreases health risks (King, Rejeski, & Buchner, 1998).

Other than the two theoretically plausible explanations described above, a third explanation is selection. Grandparents who happen to be primary caregivers are disproportionately "selected" into the caregiving experience and thus there may not be any causal linkage between caregiving and health. For example, black and Hispanics who raise grandchildren are more likely to be less educated, impoverished, receive public assistance, and have functional limitations compared with noncaregivers (Luo, LaPierre, Hughes, & Waite, 2012; Minkler & Fuller-Thomson, 2005). It is unclear, however, whether the health deficit experienced by minority grandparents is caused by the caregiving experience or whether it reflects a selection bias due to socioeconomic disadvantage. This selection explanation is consistent with cumulative inequality (CI) theory and the cumulative advantage/disadvantage (CAD) perspective, which are rooted in considerations of unequal social systems, such as the intersections of race/ethnicity, class, and gender. These theoretical perspectives imply strong path dependence in the life course: early disadvantage accumulates and "constrains subsequent economic attainment and health maintenance" (O'Rand, 2006, p. 155; see also Dannefer, 2003; Ferraro, Shippee, & Schafer, 2009). Thus, grandparents may be nonrandomly selected into caregiving by initial health status, socioeconomic status (SES), needs of adult children, and cultural norms, which all vary by race/ethnicity (Luo et al., 2012).

Finally, the role of grandparenthood must be understood within specific cultural contexts and normative family systems. In contrast to the norm of noninterference for white, middle-class families (Cherlin & Furstenberg, 1992), black and Hispanic grandparents traditionally provide more extensive childcare. The "expected" nature of grandparenting could result in differential health effects. Although low SES and exposure to racism create higher stress among minority grandparents, ties to a social support network can protect against the negative psychological and physical consequences (House, Umberson, & Landis, 1988). For example, certain features of Hispanic culture such as familism and religiosity may enhance health resiliency (Gallo, Penedo, Espinosa de los Monteros, & Arguelles, 2009).

Limitations of Empirical Research on Minority Grandparents

Despite the strengths of previous research on the well-being of grandparents who care for grandchildren, there remain significant

limitations in the literature. First, although some empirical studies provide detailed information on the experience and health implications of caregiving for minority grandparents, samples are often selective and include only custodial grandparents (Burnette, 1999; Goodman & Silverstein, 2002; Pruchno, 1999; Ross & Aday, 2006, also see reviews by Grinstead, Leder, Jensen, & Bond, 2003; Hayslip & Kaminski, 2005). It is difficult to generalize from small nonrepresentative samples, which often contain no proper comparison groups. In contrast, studies using nationally representative data consider race/ethnicity only as a control variable and do not examine mechanisms through which grandparent caregiving may influence health differently by race/ethnicity (see Blustein, Chan, & Guanais, 2004; Hughes, Waite, LaPierre, & Luo, 2007). Using a longitudinal, nationally representative data (HRS), we attempt to examine how different mechanisms may intersect with each other and consequently influence race/ethnic disparities in health. In doing so, we address a key methodological disjunction in the literature on grandparents' caregiving with regard to internal and external validity.

Second, most studies of minority grandparents focus on black grandmothers with only a handful of studies offering direct comparisons of Hispanic, white, and black grandparents (Bengtson, 1985; Goodman & Silverstein, 2005, 2006). Considering the growth rate of the Hispanic population in the United States and the pivotal role that Hispanic grandparents play in grandchildren's care, it is important to understand the process and health consequences of grandparent caregiving among Hispanics. Recent studies suggest that Latina grandmothers derive higher life satisfaction from caring for grandchildren than white and black grandmothers (Goodman & Silverstein, 2005, 2006). Although the reasons behind the Hispanic epidemiological paradox (i.e., the U.S. Hispanic population is healthier than the African American population despite similar socioeconomic disadvantages; Franzini, Ribble, & Keddie, 2001; Markides & Eschbach, 2005) are not fully understood beyond migration selection, strong familism/kinship networks are often considered a mechanism for the Hispanic advantage. This hypothesis is worth testing in grandparenting research.

Third, a majority of previous work uses cross-sectional indicators of health (Fuller-Thomson et al., 1997; Pruchno & McKenney, 2002; Sands & Goldberg-Glen, 2000; Szinovacz & Davey, 2006) or explores health change between two time points at best (Bachman & Chase-Lansdale, 2005; Blustein et al., 2004; Hughes et al., 2007; Szinovacz et al., 1999). Nonetheless, health change usually does not take place suddenly, but it is often a gradual, interactive, and cumulative process. This paper is the first to examine the influence of grandparents' caregiving on health trajectories. For example, the amount of caregiving that grandparents provide may vary across time, depending on the needs of children. Grandparents' own life circumstances may change, including transitions in employment and marital status. The synchronization of transitions in multiple roles and the timing of caregiving experience could have strong implications for grandparents' health.

Fourth and finally, existing studies mostly focus on one type of health outcome, such as depressive symptoms or functional limitations (for an exception, see Hughes et al., 2007). We use a composite measure of health, FI, to capture the multidimensional nature of the aging process (Mitnitski, Graham, Mogilner, & Rockwood, 2002; Rockwood, Mitnitski, Song, Steen, & Skoog, 2006). Quantified as the proportion of deficits present, including symptoms, disabilities, and disease classifications for a given person at a given time, the FI was recently conceptualized to capture the biological complexity of the comorbidity process, similar to the notion of "allostatic load" (Mitnitski, Song, & Rockwood, 2004; Rockwood et al., 2006). Rather than being just a count of deficits or a threshold classification of health, FI offers an estimation of the percentage of "frailty" present in any given individual by calculating the proportion of frail symptoms present in that individual. Recent studies consistently support FI as a robust, efficient, and systematic measure of health problems for older adults (Mitnitski et al., 2002). A recent study by Yang and Lee (2010) constructs the FI with 30 questions across waves from the HRS and provides further evidence for the usefulness of the FI as a major health indicator that captures variability in individual rates of biological aging.

Research Hypotheses

The extent of help that grandparents provide for their grandchildren can vary considerably from one to the other, from occasional babysitting to intensive hours helping with childcare. In addition, family structure, such as noncoresident, multigenerational, or skipped generation households, is also associated with different extents of care. In this paper, we examine the effects of two types of grandparenting indicators—amount of hours of caregiving and living arrangements (family structure). Our first hypothesis is that grandparents living in skipped generation households are likely to have the lowest level of health, followed up by multigenerational households, and then noncoresident households.

The effect of caregiving amount on health is harder to predict due in part to opposing theorizations of role strain, which hypothesize potential for "role overload," stress, and health deterioration versus role enhancement, buffering of stress, and improved health. Although limited hours of grandparent caregiving may provide fulfillment and benefit health, caregiving interactions may not be explicitly positive or negative and may create both cost and benefit. Therefore, our second hypothesis is that caregiving amount has a gradient-like effect. We predict that limited hours of caregiving will be associated with better health, whereas no caregiving at all or more intense hours of caregiving will be associated with worse health.

African American and Hispanic grandparents are disproportionately disadvantaged in the socioeconomic ladder and often have poorer health regardless of caregiving status. Heavy childcare involvement may induce additional stress and deplete health. Therefore, our third hypothesis is that SES affects racial/ethnic disparity in grandparents' health in several distinctive pathways. Specifically, the influence may be direct as SES affects one's life style and health behaviors, exposing one to different levels of stress, hazard, and risk, and unequal access to health care. And/or, SES could also reflect selection, as grandparents in the lower socioeconomic strata are more likely to have adult children caught in troubled circumstances (e.g., drug abuse or divorce) and are therefore forced to take over the parenting role. Finally, SES could have a moderating effect on grandparents' health. Financial deficits could compound stress brought by off-time parenting, whereas more economic resources could help grandparents meet the demands of childcare. To address the various pathways of SES in our analysis, we control for the direct effects of socioeconomic resources, use a propensity score weighting method to control for selection into grandparenting, and examine interaction effects with socioeconomic measures.

In addition to SES, cultural differences often exist across racial/ethnic groups in terms of norms and expectations about caring for grandchildren. It is not known whether such racial/ethnic differences in subcultural norms about grandparenting result in differential health effects. For example, the strong tradition of familism

in Hispanic subcultures could mean that caring for grandchildren may induce less stress than in a cultural context where such caregiving is considered off-time and nonnormative. Similarly, the kinship care network of African American families could provide essential social support to grandparents caring for grandchildren and serve as a buffer for adverse socioeconomic conditions. Therefore, our fourth hypothesis is that the health consequences of grandparent caregiving are conditioned by social resources (such as marital status and friend/kin ties). The key support systems for grandparents living with grandchildren may help offset the negative effects of the caregiver burden.

Finally, health change is often not a sudden, but a gradual, interactive, and cumulative process. Further, cumulating disadvantages associated with SES, race/ethnicity, and gender also accumulate over time. CI and CAD perspectives emphasize the importance of considering inequality across the life course and its effect on health, specifically highlighting the risk women, minorities, and those from lower socioeconomic positions face. Using panel data spanning 12 years, we are in an excellent position to capture the immediate and long-term consequences of grandparent caregiving and how it may intersect with SES, race/ethnicity, and gender to influence health trajectories. Our fifth and final hypothesis is that persistent exposure to caregiving, such as in the form of intense caregiving over a longer period of time, may worsen health. We test for this hypothesis only in the non-Hispanic black grandparent sample, given its disproportional overrepresentation in the skipped generation households and its association with the strongest negative health deficit.

Data and Measurement

We test these hypotheses by using the HRS (HRS 1998, 2000, 2002, 2004, 2006, 2008, and 2010), a nationally representative, longitudinal panel study of older adults (aged 50 and older) in the United States. African American and Hispanic populations are oversampled in the HRS. The sample contains 13,283 white (non-Hispanic) respondents, 2,546 black (non-Hispanic) respondents, and 1,649 Hispanic respondents who are grandparents during the period between 1998 and 2010. From this point forward, the term "white" refers to white, non-Hispanics and "black" refers to black, non-Hispanics. We delete grandparents reporting "Other" race/ethnicity (264 in 1998, 257 in 2000, 243 in 2002, 289 in 2004, 271 in 2006, 260 in 2008, and 240 in 2010) from the sample to focus our research on the theorized white, black, and Hispanic comparison. Our overall sample includes 10,312 individuals in 1998, 9,804 in 2000, 10,001 in 2002, 10,741 in 2004, 10,106 in 2006, 10,189 in 2008, and 8,515 in 2010. Altogether, 17,478 noninstitutionalized individuals are included in the sample and each individual is observed 4.0 times on average from 1998 to 2010. Within this sample, 4,615 individuals died between 1998 and 2010, yielding a person-period data set of 69,668 observations (see Table 1). Only 0.07% of the sample is missing on the dependent variable and the rest are missing on various independent variables, ranging from 0.1% to 7.8%. Most of the variables have less than 2% missing, with the exception of hours of caregiving (7.8%) and average of frequency of interaction (4.6%). The overall working sample excludes missing values on any variable included in the analysis (averaged around 1,836 individuals across waves, excluding death, loss to follow-up, and missing information about grandchild care). We conducted sensitivity tests using mean imputation and dummy variable adjustment (including a dummy variable suggesting missingness in the model). The results are robust, so we treat them as missing at random. Because the hours of caregiving variable have the highest missing cases and about 10% of coresidential grandparents are missing on this variable, we take extra precaution by alternatively coding the variable in all possible values of caregiving hours. Again the results are insensitive to different specifications.

Key variables of interest are grandparents' living arrangements and amount of caregiving they provide for their grandchildren. We choose these two separate measures to reflect our conceptualization of grandparent care. Hours of caregiving and residential status are separate, but overlapping concepts. Not all coresidential grandparents in our sample provide a high level of care to grandchildren and, likewise, a sizable proportion of noncoresidential grandparents in our sample are also heavily involved with grandchildren care. This conceptual difference is particularly important when focusing on race/ethnicity, as different norms and practices about grandchild care exist across racial/ethnic groups.

As seen in Table 1, most grandparents in the HRS sample do not live with their grandchildren (93.8%). At the same time, there are substantial differences by racial/ethnicity in grandparents' coresidential patterns. Three times as many black (11.4%) and Hispanic grandparents (13.1%) live in multigenerational households compared with white grandparents (3.3%). Further, black grandparents have the highest rate of skipped generation residency (5.3%), followed by that of Hispanic grandparents (3.3%) and white grandparents (1.0%).

HRS respondents were also asked if they had spent 100 hr or more taking care of grandchildren in the previous 2 years. If respondents answered yes, they were asked how many hours they had spent on grandchild care. Based on this question, we construct a three-category variable that captures amount of caregiving provided by grandparents: 0–99 hr in 2 years, 100–499 hr, and 500+ hr. Similar to the distribution of living arrangements, a majority of grandparents

Table 1. Caregiving Hours and Household Residence for Total Sample and Race/Ethnic Subgroups

	Total sample (*N* = 69,668 obs.)	White, non-Hispanic (*N* = 54,178 obs.)	Black, non-Hispanic (*N* = 9,484 obs.)	Hispanic (*N* = 6,006 obs.)
Residence				
% No grandchild in household	93.76	95.76	83.31	83.62
% Multigenerational household	4.68	3.25	11.35	13.06
% Skipped generation household	1.56	1.00	5.33	3.32
Grandparent caregiving				
% Caring 0–99 hr/2 years	68.23	68.76	63.66	67.96
% Caring 100–499 hr/2 years	17.68	18.15	15.89	14.33
% Caring 500+ hr/2 years	14.09	13.08	20.44	17.72

Notes. HRS = Health and Retirement Study. Data are weighted to represent the U.S. population, using HRS wave-specific weight.

provide extremely low hours of care to grandchildren (68.2% in the 0–99 hr category). About 14.1% of grandparents provide over 500 hr of care.

Dependent Variable: FI

We follow Yang and Lee (2010) to construct our dependent variable, the FI, by including 30 questions on chronic illnesses, disabilities in activities of daily living, disabilities in instrumental activities of daily living, depressive symptoms, self-reported health, and obesity (body mass index ≥30). The FI is defined as a count of deficits divided by the total number of possible deficits, yielding a proportion with values typically ranging from 0 to 1. To aid the interpretation of the coefficients, we multiply it by 100 and treat it as a percentage. Although these measures are based on self reports, studies comparing respondents' reports and physician evaluations of morbidity have found considerable evidence for accuracy in respondents' reports (Guralnik, Fried, Williamson, & Hochberg, 1996; Harlow & Linet, 1989).

We find that grandparents with no grandchildren living in the house have a lower level of frailty than those who live with grandchildren (Figure 1). There is not a clear difference between those in multigenerational households and skipped generation households, except for the black sample, where grandparents living in skipped generation households have the highest frailty level. At the same time, those who provide the least amount of care to grandchildren have the highest frailty level across different racial/ethnic groups (Figure 2).

Bivariate analysis of grandparents' living arrangements and amount of caregiving clearly suggests that grandparent involvement is associated with varied FI scores and that the pattern differs by racial/ethnic group. Nonetheless, caregiving for grandchildren does not occur at random and reflects individuals' characteristics, family context, and cultural choices. Does the bivariate relationship we observe hold up after taking these contextual factors into account? In the following section of the paper, we describe our research strategy and multivariate findings.

Growth Curve Analysis

We analyze these data using growth curve models or hierarchical linear models (HLM), which allow us to examine the effects of grandparent caregiving on health (FI) initially and over time and to incorporate other time-varying and time-invariant predictors (Raudenbush & Bryk, 2002). We specify two-level hierarchical linear models to estimate age trajectories of health and heterogeneity in these trajectories by grandparent caregiving:

Level 1 model:

$$y_{ti} = \beta_{0i} + \beta_{1i}\mathrm{Age}_{ti} + \beta_{2i}\mathrm{Age}_{ti}^2 + e_{ti} \quad (1)$$

Level 2 model:

Model for the intercept:

$$\beta_{0i} = \gamma_{00} + \gamma_{01}X_{1i} + \gamma_{02}X_{2i} \ldots + \gamma_{0q}X_{qi} + u_{0i} \quad (2)$$

The Level 1 model characterizes within-individual change of FI over time or individual growth trajectory with age. In this model of repeated measurement within individuals, the response variable y_{ti} (FI) for person i at time t is modeled as a function of linear and quadratic terms of age for person i at time t. The coefficients β_{0i}, β_{1i}, and β_{2i} represent the intercept or mean level, the linear rate of change, and the quadratic rate of change in FI with age, respectively. The error term e_{ti} is assumed to be independently and normally distributed with a mean of 0 and a constant variance of σ^2.

The goal of the Level 2 analysis is to detect heterogeneity in change across individuals and determine the association between predictors and the shape of each person's growth trajectory in FI. Individual is the unit of analysis and modeling is performed to capture how characteristics of the individual alter β_{0i}, a parameter in the Level 1 analysis (see Equation 2). The growth curve (HLM) model allows data to be unbalanced across time because it includes all persons when estimating trajectories, irrespective of attrition status or number of waves (Raudenbush & Bryk, 2002). In preliminary analysis, we model β_{1i} and β_{2i}, respectively, but do not include them in the final analysis because of the lack of significant results for our key grandparenting variables. Thus, our growth curve model is essentially a random intercept model.

The key independent variables of grandparent caregiving are measured in two ways: coresidence status and amount of caregiving, as described in above univariate and bivariate analysis. They

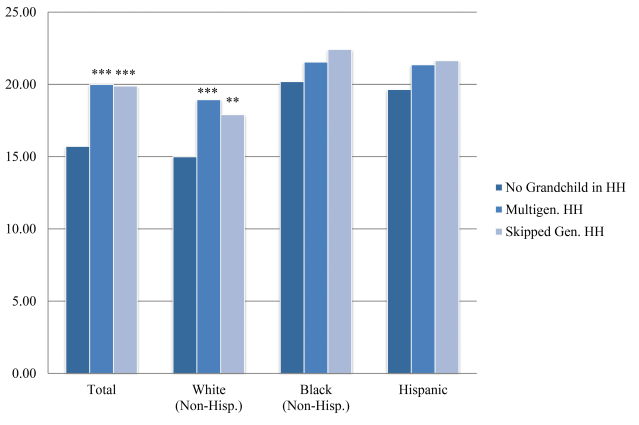

Figure 1. Frailty Index by household residence. *p < .05; **p < 0.01; ***p < .001. *Notes.* Data are weighted to represent the U.S. population, using Health and Retirement Study wave-specific weight. No grandchild in household is the reference group in bivariate analyses.

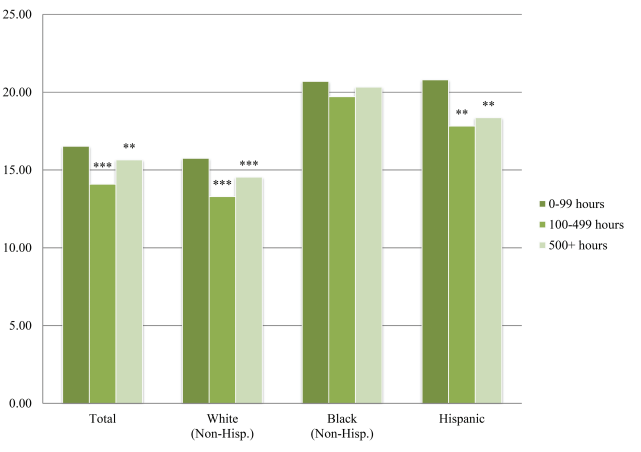

Figure 2. Frailty Index by caregiving hours. *p < .05; **p < .01; ***p < .001. *Notes.* Data are weighted to represent the U.S. population, using Health and Retirement Study wave-specific weight. 0–99 hr is the reference group in bivariate analyses.

are time varying and measured at the same waves over time as the dependent variable (FI). For black grandparents, we also consider history of skipped generation household residence in supplementary analysis. Among black grandparents who have ever lived in skipped generation households, about 86% did so for one to three waves and the rest for four waves or more. Control variables are at Level 1 for time-varying covariates (such as SES, social support) and at Level 2 for time-constant covariates (such as gender, attrition status). Descriptive statistics of all variables are presented in Table 2. In addition to standard demographic variables of age (years), sex, and nativity (foreign born vs not), we also include SES and social support. Measures of SES include education (years of education), household income (natural log), and the net value of all financial nonhousing wealth (divided by 100,000). We also include measures of SES more specific to older populations, including whether the respondent has long-term care insurance, is currently receiving a pension, and is currently working for pay. Measures of social support include whether the respondent is married or partnered, has a relative living nearby, has a friend living nearby, and frequency of interaction (number of times gets together with someone) per week.

Following statistically significant interactions with race/ethnicity (results not shown), we run separate analyses by subsamples of race/ethnicity. In preliminary analysis, we conducted separate analysis for grandmothers and grandfathers but did not find any significant difference in the subsamples. We use restricted maximum likelihood estimation to obtain the parameter estimate, using the "Proc Mixed" procedure in SAS (which estimates hierarchical linear models in SAS) as well as Akaike information criterion and Bayesian information criterion to assess goodness of fit of the model (Singer & Willett, 2003).

Further, we take additional cautionary steps in addressing potential issues of sample selection. First, longitudinal data analysis is often prone to sample attrition by loss to follow-up and mortality. We control for the potential influence of selection in all models by entering dummy variables for deceased and nonrespondents in the Level 2 models to yield unbiased estimates, a relatively straightforward and intuitive approach to account for nonrandom selection through attrition (see also Chen & Liu, 2012; Yang & Lee, 2010). Second, we use propensity score weighting to account for nonrandom selection because intensive care is most likely to be selective in nature, as compared with occasional babysitting (Guo & Fraser, 2009). We first estimate a logistic regression to determine the conditional probability of child care provided by the grandparents (500 hr or more vs not), using covariates including household structure (multigenerational, skipped generation, no grandchild), demographic characteristics (such as age, gender, race/ethnicity, foreign-born status), SES measures (such as employment and income), health conditions, as well as measures capturing the potential needs for childcare by adult children (such as whether children experience marital or partnership disruption in the last 2 years, whether new grandchildren were born in the last 2 years, whether providing financial help to children or grandchildren in the last 2 years, whether paying for adult children's education, number of adult children working full time, whether adult children live within 10 miles, whether adult children are in school; results available upon request). We then calculate a weight measure based on the predicted probabilities generated from the models (the propensity scores) using the following formula (Hirano & Imbens, 2001):

$$w(t,x) = \frac{t}{\hat{e}(x)} + \frac{1-t}{1-\hat{e}(x)}$$

where $\hat{e}(x)$ represents the estimated propensity scores and t stands for treatment (whether provided 500 hr or more of childcare in the past 2 years). The propensity score weight is then included in all growth curve models as a sampling weight (Guo & Fraser, 2009). Comparison of models using the weight versus not shows that the magnitude of the grandparenting variables are smaller than those without the adjustment, suggesting potential selection effects were captured by using propensity score weighting (results not shown).

Table 2. Mean Statistics for Total Sample and Race/Ethnic Subgroups

	Total sample (N = 69,668 obs.)	White, non-Hispanic (N = 54,178 obs.)	Black, non-Hispanic (N = 9,484 obs.)	Hispanic (N = 6,006 obs.)
Frailty Index (%)	15.972 (0.178)	15.146 (0.169)	20.462 (0.401)	19.938 (0.521)
Age	67.008 (0.178)	67.508 (0.213)	64.620 (0.261)	64.162 (0.535)
Female (yes = 1, no = 0)	0.589 (0.004)	0.581 (0.004)	0.650 (0.010)	0.604 (0.015)
Foreign born (yes = 1, no = 0)	0.074 (0.005)	0.040 (0.003)	0.055 (0.006)	0.515 (0.023)
Socioeconomic status				
Education (years)	12.505 (0.074)	12.913 (0.049)	11.541 (0.101)	8.855 (0.342)
Income (Ln)	10.456 (0.022)	10.597 (0.018)	9.848 (0.030)	9.574 (0.069)
Net wealth (/100,000)	1.282 (0.087)	1.497 (0.102)	0.171 (0.028)	0.163 (0.024)
Has long-term care insurance (yes = 1, no = 0)	0.118 (0.005)	0.130 (0.005)	0.068 (0.005)	0.037 (0.004)
Currently receiving pension (yes = 1, no = 0)	0.277 (0.006)	0.296 (0.007)	0.217 (0.011)	0.128 (0.013)
Currently working for pay (yes = 1, no = 0)	0.383 (0.006)	0.383 (0.007)	0.398 (0.013)	0.364 (0.014)
Social support				
Married/partnered (yes = 1, no = 0)	0.678 (0.005)	0.709 (0.005)	0.441 (0.013)	0.628 (0.017)
Relative living nearby (yes = 1, no = 0)	0.298 (0.006)	0.296 (0.007)	0.332 (0.014)	0.285 (0.010)
Friend living nearby (yes = 1, no = 0)	0.670 (0.005)	0.681 (0.006)	0.616 (0.013)	0.604 (0.014)
Frequency of interaction/week	1.831 (0.030)	1.810 (0.034)	2.146 (0.078)	1.665 (0.079)
Attrition status				
Deceased (yes = 1, no = 0)	0.155 (0.004)	0.158 (0.004)	0.150 (0.010)	0.122 (0.011)
Loss to follow-up (yes = 1, no = 0)	0.005 (0.001)	0.006 (0.001)	0.002 (0.001)	0.004 (0.001)

Notes. HRS = Health and Retirement Study. Data are weighted to represent the U.S. population, using HRS wave-specific weight. Standard errors of means are presented in parentheses.

Table 3. Growth Curve Models Predicting Frailty Index for Race/Ethnic Subgroups

	White (non-Hispanic; *N* = 54, 178 obs.)	Blacks (non-Hispanic; *N* = 9,484 obs.)	Hispanics (*N* = 6,006 obs.)
Fixed effects			
Intercept	28.389*** (0.659)	29.725*** (1.354)	28.561*** (1.438)
Linear growth rate: age	0.191*** (0.011)	0.087** (0.030)	0.047 (0.039)
Nonlinear growth rate: age^2	0.011*** (0.001)	0.011*** (0.002)	0.007* (0.003)
Female	0.708*** (0.195)	4.165*** (0.560)	3.519*** (0.706)
Foreign born	−0.876 (0.473)	−1.883 (1.117)	−0.530 (0.709)
Caregiving hours			
100–499 hr/2 years	−0.549*** (0.109)	−0.747* (0.329)	−0.846 (0.475)
500+ hr/2 years (Ref. cat. = 0–99 hr/2 years)	−0.481*** (0.105)	−0.714** (0.276)	−1.220** (0.380)
Household residence			
Multigenerational household	0.572** (0.220)	0.162 (0.378)	−0.224 (0.499)
Skipped generation household (Ref. cat. = no G'Child in household)	0.125 (0.279)	2.027*** (0.457)	−0.453 (0.727)
Socioeconomic status			
Education (years)	−0.818*** (0.038)	−0.793*** (0.085)	−0.493*** (0.081)
Income (Ln)	−0.124** (0.044)	−0.201* (0.093)	−0.346*** (0.093)
Net wealth (/100,000)	−0.005 (0.005)	−0.263 (0.136)	−0.206 (0.264)
Has long-term care insurance	−0.376** (0.140)	0.253 (0.435)	1.214 (0.789)
Currently receiving pension	−0.479*** (0.112)	−1.332*** (0.313)	−1.531** (0.531)
Currently working for pay	−2.488*** (0.107)	−3.706*** (0.299)	−4.525*** (0.425)
Social support			
Married/partnered	−2.723*** (0.155)	−1.336** (0.410)	−2.910*** (0.553)
Relative living nearby	0.181* (0.088)	0.289 (0.250)	0.534 (0.337)
Friend living nearby	−0.706*** (0.086)	−0.823*** (0.244)	−0.466 (0.306)
Frequency of interaction/week	−0.015** (0.005)	0.022 (0.011)	0.009 (0.033)
Attrition status			
Deceased	3.630*** (0.239)	5.012*** (0.637)	4.736*** (0.938)
Loss to follow-up	−1.910** (0.735)	1.071 (3.224)	−6.439 (3.932)
Random effects			
Level 1			
Within-person	75.812***	108.610***	127.120***
Level 2			
In intercept	0.265**	0.927**	1.806***
In linear growth rate	0.357***	0.441***	0.393***
Goodness of fit			
AIC	332,017.800	58,631.900	37,704.600
BIC	332,047.800	58,655.200	37,726.200

Notes. AIC = Akaike information criterion; BIC = Bayesian information criterion. Results adjusted for propensity score weighting, respectively, for each race/ethnic subgroup.

*p < .05. **p < .01. ***p < .001.

Results and Findings

Results of growth curve analyses are presented in Tables 3–4. Because the effect of grandparent caregiving differs greatly and statistically significantly from one racial/ethnic group to the other, we split the samples to three subsamples: whites, blacks, and Hispanics. We begin with a model including age, squared age, gender, whether one is foreign born, and most importantly, our key independent variables, categories of grandparent caregiving hours, and grandparents' coresidence status. We then add indicators of socioeconomic status, various measures of social support, and attrition status. The effects of the grandparenting variables remain robust across models, so we present only the full models in Table 3.

The results clearly suggest that providing care for grandchildren and coresidence status affect the FI of grandparents of different racial/ethnic groups in distinctive ways. First, caregiving has a protective effect on FI, although the intensity of care does not seem to matter notably. White and black grandparents experience decreases in frailty when providing moderate (100–499 hr in the last 2 years decreases frailty by 0.549 and 0.747, respectively) and high amounts of caregiving (500 hr or more in the last 2 years decreases frailty by 0.481 and 0.714, respectively) compared with grandparents who provide minimal caregiving (0–99 hr in the last 2 years). For Hispanics, moderate levels of caregiving (100–499 hr in 2 years) do not have a statistically significant effects, but higher levels of caregiving decrease FI by 1.220, an effect that is more than twice as strong as whites. In sum, high hours of caregiving reduce frailty by about one half to over 1% at any given time, depending on race/ethnicity.

Although providing care for grandchildren is negatively associated with FI for white and black samples, the effect of coresidence status is in the opposite direction. Whites in multigenerational households have a level of frailty that is about a half percent higher (0.572 units) compared with those who do not live with grandchildren. Interestingly, blacks grandparents in multigenerational households are not worse off in terms of frailty compared with those who do not live with grandchildren. However, blacks in skipped generation households are much higher in their FI (2.027 units) than those who do not live with grandchildren. In other words, black grandparents in skipped generation households are 2% more frail than those who do not live with

Table 4. Growth Curve Models Predicting Frailty Index for Race/Ethnic Subgroups With Statistically Significant Interaction Effects

	White (non-Hispanic; *N* = 54,178 obs.)	Blacks (non-Hispanic; *N* = 9,484 obs.)
Fixed effects		
Intercept	28.297*** (0.660)	29.219*** (1.417)
Household residence		
Multigenerational household	0.166 (1.113)	0.232 (2.349)
Skipped generation household (Ref. cat. = no G'Child in household)	9.469*** (1.398)	11.843*** (3.259)
Socioeconomic status		
Education (years)	–0.807*** (0.038)	–0.748*** (0.088)
Income (Ln)	–0.124** (0.044)	–0.202* (0.103)
Net wealth (/100,000)	–0.005 (0.005)	–0.258 (0.136)
Social support		
Frequency of interaction/week	–0.049*** (0.009)	0.021 (0.014)
Interaction effects		
Multigen.HH × Education (years)	0.020 (0.088)	–0.354** (0.127)
Skip.Gen.HH × Education (years)	–0.721*** (0.114)	–0.014 (0.163)
Multigen.HH × Income (Ln)		0.399 (0.221)
Skip.Gen.HH × Income (Ln)		–0.912** (0.312)
Multigen.HH × Net Wealth	0.162 (0.125)	
Skip.Gen.HH × Net Wealth	–0.342** (0.124)	
Multigen.HH × Freq. of Interaction	0.047*** (0.011)	0.016 (0.024)
Skip.Gen.HH × Freq. of Interaction	–0.196** (0.072)	–0.234** (0.088)
Random effects		
Level 1		
Within-person	75.787***	108.070***
Level 2		
In intercept	0.272**	0.919**
In linear growth rate	0.356***	0.439***
Goodness of fit		
AIC	331,949.000	58,619.800
BIC	331,979.000	58,643.200

Notes. AIC = Akaike information criterion; BIC = Bayesian information criterion; Multigen.HH = multigenerational household; Skip.Gen.HH = skipped generation household. All models include individual-level covariates (age, age squared, female, foreign born, caregiving hours, household residence, education, income, net wealth, has long-term care insurance, currently receiving pension, currently working for pay, married/partnered, relative living nearby, friend living nearby, frequency of interaction, deceased, loss to follow-up). Results adjusted for propensity score weighting, respectively, for each race/ethnic subgroup. Results for Hispanic sample are not presented because no significant interaction effect is found.

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

grandchildren. In contrast, coresidence has no significant effect on frailty for Hispanics and the coefficients are in the opposite direction.

Because blacks are overrepresented in skipped generation households and experience the strongest negative health deficit from this household structure, we examine residential history to explore the effect of long-term skipped generation household residence on FI. We summarize the key findings in Figure 3, as the effects of the other variables in the model are consistent from those in Table 3. This additional analysis suggests that blacks who live in skipped generation households any time between 1 and 3 waves are 3.256 higher in FI, or 3% more frail, than those who never lived in skipped generation households during this 12-year interval. Such a health deficit is more than double (8.030) when they live in skipped generation households for four waves of the study. In other words, after controlling for a range of selection factors and other characteristics over time, blacks who lived in skipped generation households for about 8 years are 8% more frail than blacks who never resided in a skipped generation household. We note that the effect of being in skipped generation households in five to seven waves is in the opposite direction, which could suggest a potentially beneficial effect of long-term stability in family living arrangements. However, the effect is nonsignificant and very few grandparents are in this category. Thus, we refrain from making any generalized interpretation of this effect.

All control variables behave in the expected directions across race/ethnicity. Grandmothers tend to have higher FI, with black grandmothers having the most health deficits compared with black grandfathers. Higher income, higher education, receiving a pension, and currently working are associated with lower FI across racial/ethnic subsamples. Married grandparents are less frail than unmarried grandparents, regardless of race/ethnicity. Having friends living nearby reduces frailty in the white and black samples. Frequency of interaction with friends and relatives also has a significant negative effect on FI for whites.

We further test the hypotheses of whether the *negative* health effects of grandparent–grandchildren coresidence are moderated by socioeconomic resources and social support for different racial/ethnic subsamples. We did not test for interaction effects with the caregiving hours variable because we find the main effects to be protective (opposite in direction of the effect of coresidence). Although we expect that better socioeconomic resources and social support may ameliorate adverse effects of coresidence, we do not hypothesize or find any evidence that they will enhance the beneficial effect of providing some amount of caregiving. We interact the coresidence variables with all measures of socioeconomic resources and social support. The statistically significant findings are presented in Table 4. We dropped two sets of interaction terms (Household

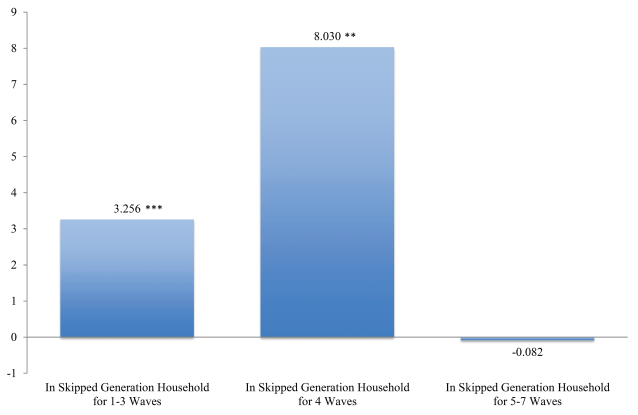

Figure 3. Effects of household history for non-Hispanic black grandparents in skipped generation households. *$p < .05$; **$p < .01$; ***$p < .001$. *Notes.* $N = 9,484$ obs. The reference category is never being in a skipped generation household. In skipped generation household for 1–3 waves = 1,176 obs., In skipped generation household for 4 waves = 78 obs., In skipped generation household for 5–7 waves = 113 obs. The model includes individual-level covariates (age, age squared, female, foreign born, caregiving hours, skipped generation household history, education, income, net wealth, has long-term care insurance, currently receiving pension, currently working for pay, married/partnered, relative living nearby, friend living nearby, frequency of interaction, deceased, loss to follow-up). Results adjusted for propensity score weighting, respectively, for the black non-Hispanic subgroup.

Structure × Income in the white subsample, and Household Structure × Net Wealth in the black subsample, out of concern for collinearity and model parsimony). Because the main effects of coresidential status are not statistically significant for the Hispanic subsample, we do not include this group in Table 4. For whites in skipped generation households, the health deficit is reduced for those with higher education and higher net wealth. Similarly, for black grandparents, higher household income reduces the negative effects of skipped generation residence. Frequent interaction with friends and relatives appears to buffer negative health consequences of skipped generation living arrangements for whites and blacks.

Discussion and Conclusion

Our results suggest that grandparent caregiving affects health through a complex process of role strain and role enhancement, filtered through a cumulative inequality/disadvantage lens, for white, black, and Hispanic grandparents. First, it is important to recognize the influence of selection into grandparent caregiving. Not all grandparents are equally likely to provide care for grandchildren or to reside with them. We explicitly take into account a possible selection effect by using propensity score weighting in our growth curve models. Guided by the cumulative inequality perspectives (Dannefer, 2003; Ferraro et al., 2009), we find that providing care for grandchildren is not a random process and is driven by the needs of adult children and grandparent characteristics (such as race/ethnicity, SES, and health). Using propensity score weighting appears to attenuate negative effects of coresidence and positive effects of caregiving, underscoring the importance of considering positive and negative selection into caregiving.

Second, some of the observed consequences of grandparent involvement (positive and negative) remain strong after adjustment for propensity score weighting, suggesting a clear independent effect of grandparent caregiving on health. In addition, health consequences of grandparent caregiving clearly differ by racial/ethnicity. First, consistent with our first hypothesis, coresidence is associated with negative health consequences, but only for whites and blacks. For whites, living with grandchildren has adverse consequences for health. Black grandparents in a skipped generation households experience the highest level of health deficit. If we assume that grandparents in skipped generation households are custodial grandparents, it seems that these grandparents are the most adversely affected group. Our descriptive statistics and previous literature illustrate that black grandparents' economic position is precarious, even before accounting for grandchild care. Thus, consistent with the role strain theory (Goode, 1960; Rozario et al., 2004), black grandparents in skipped generation households likely face additional financial, mental, and physical challenges, the combination of which translate into the worst overall health. Although it is possible that household stability reduces harm over the extreme long-term, we find that lengthy coresidence in skipped generation households leads to further health deterioration particularly for black grandparents. This finding is consistent with cumulative inequality and cumulative disadvantage theory (Dannefer, 2003; Ferraro et al., 2009) and highlights the health risks faced by black custodial grandparents in the United States.

Counter to our first hypothesis, we do not find any negative health effects of coresidence with grandchildren for Hispanics. This finding is particularly meaningful considering that Hispanics coreside with grandchildren more than whites. On the other hand, consistent with previous literature (Fuller-Thomson et al., 1997), Hispanic grandparents in our analysis are far less likely than black grandparents to live in skipped generation households. These caregiving and residential circumstances reveal distinguishing details about Hispanic grandparents. Like African Americans, Hispanic Americans likely have a stronger cultural emphasis on more traditional familistic values and therefore may have increased desire for and benefit from the grandparent caregiving role (Fuller-Thomson et al., 1997; Gallo et al., 2009). Despite adverse life circumstances, social resources and familism may enhance health resiliency for Hispanic grandparents. This is a plausible explanation given that more than half of the Hispanic grandparents in our sample are foreign born. However, Hispanics are also more likely than blacks to have adult children present in the household, which may provide a key buffer that enhances health resiliency. In other words, the structural vulnerability of Hispanic grandparents may be moderated by their emphasis on familism. For Hispanic grandparents, strong familism may function as part of a cultural tool kit that diversifies family caregiving strategies and nullifies the negative effects of coresidence on health (see Swidler, 1986).

In addition to role strain mechanisms, we also find evidence for role enhancement theory and partial support for our second hypothesis regarding the benefits of limited hours of caregiving. Controlling for coresidency status, grandparent caregiving is beneficial for health. We observe similar effects across race/ethnic groups, with even stronger effects for Hispanics. Although healthier grandparents are more likely to provide care, our propensity score weight adjustment accounts for previous health status, thereby reducing the possibility that this finding is due solely to selection bias. Therefore, despite variation in household structure, social resources, and socioeconomic resources, it appears that moderate caregiving hours are not detrimental to grandparents' health in the United States. Some degree of care to grandchildren may enhance physical activity, provide a healthy amount of role fulfillment, and benefit grandparents.

Our analysis also offers preliminary support for our third and fourth hypotheses. SES partially explains racial/ethnic disparities in

grandparent health, but potentially in complex ways that point to the significance of several moderating mechanisms that also differ by race/ethnicity. Consistent with previous research (House et al., 1988; O'Rand, 2006; Rozario et al., 2004; Szinovacz & Davey, 2006), we find that economic resources (e.g., income, education) and social ties (e.g., frequent social interactions) may offset some of the negative effects of a potentially stressful event, such as coresidence. Because Hispanics do not experience health declines associated with coresidence, the buffering effect of these resources applies only to whites and blacks, yet the effects differ. For example, whites experience this buffer only when in skipped generation households, yet very few of them live in this type of household structure and it is not directly related to poor health. In contrast, the health of black grandparents is buffered in both skipped and multigenerational households. For both groups, higher education and frequency of interaction are important, but wealth is more important for whites and income more important for blacks. These varying effects delineate differential profiles of life course resource and risk accumulation among white, black, and Hispanic grandparents (Dannefer, 2003; Ferraro et al., 2009). Not only do white, black, and Hispanic grandparents perform different types of care, but they also likely rely on different forms of resources to cope with caregiver stress. Therefore, although the moderating effects of these social and economic resources are small, they provide some example of potential buffers to cumulative disadvantage. Finally, resource buffers are particularly important for black grandparents in skipped generation households who, consistent with our fifth hypothesis and previous research (Bachman & Chase-Lansdale, 2005; Minkler & Fuller-Thomson, 2005; Pruchno & McKenney, 2002; Ross & Aday, 2006; Szinovacz et al., 1999), are at the highest risk for negative health consequences as a result of grandchild caregiving.

Despite this contribution, our study is not without limitations. First, our measure of amount and intensity of grandchild caregiving is rather crude. By measuring amount in terms of raw hours cared over 2 years, we may be missing key details in transitions and variation within that 2-year window. In addition, the differences between 0–99 hr, 100–499 hr, and 500 or more hours may be rather subjective, considering the difficulty of self-assessing raw hours cared over 2 years and the fact that 500 or more hours over 2 years still represents a relatively moderate amount of care. In terms of coresidence, we examine the presence of a grandchild and the presence of an adult child. In HRS data, the adult child present may or may not be the parent of the grandchild. Future research should continue to explore multiple measures for grandchild care amount and intensity, as well as selection and buffering effects of social and economic resources.

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