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Research Article

Mechanisms Linking Neighborhood Age Composition to Health

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Abstract

Purpose of the Study: Age integration theory posits that the age composition of spaces affects the social interactions in which people can engage. This study aimed to examine whether social interactions perceived to involve generativity (i.e., commitment to younger generations), daily discrimination, and/or social cohesion mediate associations between neighborhood age composition, self-reported health, and psychological well-being.

Design and Methods: We applied multilevel structural equation models to data from 4,017 participants aged 30–84 who participated in the 2004–2006 wave of National Survey of Midlife Development in the United States, merged with data on their 3,714 neighborhoods from the 2010 U.S. Census.

Results: Neighborhoods that represented the age distribution of the United States and neighborhoods that overrepresented older adults were contexts in which residents reported the most generativity and social cohesion. In turn, generativity and social cohesion were associated with better self-reported health and higher psychological well-being.

Implications: The nature of social interaction links neighborhood age composition to health and well-being. These results clarify the results of prior studies, advance measurement, suggest elaborations to age integration theory, and point to new directions for aging-in-place initiatives.

Key words: Structural equation models, Self-rated health, Sociology of aging/social gerontology, Well-being

In the quest to identify the best living situations for aging persons, gerontologists have paid much attention to aging-in-place, or remaining in one's home and neighborhood despite declines in physical, social, and/or financial well-being (Greenfield, 2012). Both older adults and the scholars who study them widely view aging-in-place as desirable. However, the success individuals experience with aging-in-place depends on the place (Greenfield, 2012). As such, scholars have related a neighborhood's characteristics, such as socioeconomic disadvantage and racial/ethnic composition, to the health and well-being of its older adult residents (Yen, Michael, & Perdue, 2009).

A less-studied dimension of neighborhoods is age composition, even though this is a dimension for which theory appears inconsistent with data. Age integration theory argues that institutional, cultural, and spatial factors unite or separate people across age groups and that poor health and well-being are the consequences of the absence of intergenerational contact for people of all ages (Hagestad & Uhlenberg, 2005, 2006). Yet empirically, there is no evidence that Americans living in more age-integrated neighborhoods enjoy better health than their peers in more age-segregated neighborhoods, and some evidence that people in more age-segregated neighborhoods are in fact healthier (Browning, Feinberg, Wallace, & Cagney, 2006; Kubzansky et al., 2005; Subramanian, Kubzansky, Berkman, Fay, & Kawachi, 2006).

In the present paper, we draw on age integration theory to posit that the relationship between neighborhood age

composition and health is contingent upon the nature of social interaction with neighbors. We ask whether generativity, daily discrimination, and/or social cohesion mediate associations between neighborhood age composition, self-reported health, and psychological well-being. We use data from 4,017 participants aged 30–84 who participated in the 2006 wave of National Survey of Midlife Development in the United States (MIDUS II), merged with data on neighborhood characteristics from the 2010 U.S. Census. The results of this study have implications for adding nuance to age integration theory, for operationalizing and measuring neighborhood age composition, and for policy concerning aging-in-place.

Spatial Age Segregation and Health

Riley, Johnson, and Foner (1972) recognized that age functions as a useful criterion for sorting people into productive roles and for organizing social institutions. However, Riley and other theorists worried about the entrenchment of age as a means of segregation. In other words, institutional, cultural, and spatial factors maintain the separation of people of different ages in neighborhoods and elsewhere (Hagestad & Uhlenberg, 2005, 2006). Spatial factors include the physical and social variations in places, such as cost of living, the accessibility of homes and public spaces, and services and amenities available in an area. For example, older adults typically need smaller houses with fewer bedrooms than do families with minor children (Jacobsen, Mather, & DuPuis, 2012). Housing with similar characteristics tends to be clustered, such that neighborhoods comprised of small houses become neighborhoods comprised of older persons. Through such processes, social interactions become age-segregated (Uhlenberg & de Jong Gierveld, 2004).

Theorists argue that the results of age segregation for society include ageist attitudes and behaviors and hindered socialization for people of all ages (Hagestad & Uhlenberg, 2006). Age segregation may also harm at the individual level. Older adults in particular become isolated and lack opportunities for productive engagement, resulting in lower psychological well-being (Hagestad & Uhlenberg, 2005; Riley et al., 1972). Social isolation and disconnectedness also beget poor self-rated health (Cornwell & Waite, 2009).

However, empirical studies testing for associations between neighborhood age segregation and health and well-being have yielded mixed results, possibly because studies have examined only the proportion of older adults in the neighborhood. Studies that have used U.S. national probability samples have found no relationship between neighborhood age composition and older individuals' depressive symptoms or change in depressive symptoms over time (Aneshensel et al., 2007; Wight, Cummings, Karlamangla, & Aneshensel, 2009). Similarly, studies of Chicago residents have found no relationship between age composition and older adults' self-rated health (Cagney, Browning, & Wen, 2005) or rates of hypertension (Morenoff et al., 2007), and a study of five counties in North Carolina found no relationship between age composition and older adults' depressive symptoms (Hybels et al., 2006).

Other studies have found that the proportion of older adults in a neighborhood is associated with *better* health among older adults. In a study of 28 census tracts in New Haven, CT, the greater the proportion of older adults in a neighborhood, the fewer the depressive symptoms individual residents experienced (Kubzansky et al., 2005) and the better their self-rated health (Subramanian et al., 2006). Browning and colleagues (2006) found that a greater proportion of neighborhood residents aged 65 and older were associated with lower mortality rates for older adults during the 1995 Chicago heat wave. The only study to identify an association between the proportion of older adults in a neighborhood and *poorer* health among older adults is a study of Japanese older adults, who experienced more disability and poorer functional health when living among a high proportion of other older adults (Vogelsang & Raymo, 2014).

The Nature of Social Interactions

We posit that one reason scholars have found mixed results is that they have not examined the mechanisms by which neighborhood age composition might be related to health. The nature of social interactions is a probable mechanism. We propose that perceptions of generativity, daily discrimination, and social cohesion are three possibilities when interacting with neighbors and that these perceptions are related to health and well-being.

Neighborhoods may provide the setting for good health and well-being through interactions that provide opportunities for generativity or "concern for and commitment to promoting the development and well-being of future generations" (McAdams & de St. Aubin, 1992). Lack of opportunity for generativity is one of the major consequences of age segregation that theorists identify (Hagestad & Uhlenberg, 2006). Intergenerational interaction with non-kin (e.g., neighbors) can result in increased generativity (Knight, Skouteris, Townsend, & Hooley, 2014). In turn, generative behavior is predictive of physical health (Gruenewald, Liao, & Seeman, 2012) and psychological well-being (Cheng, 2009). Therefore, we hypothesize that age integrated neighborhoods may provide more opportunities for generativity and thus better health and well-being.

Alternatively, an age-integrated neighborhood may expose older adults not to positive, generative interactions, but instead to negative, discriminatory interactions. These interactions could manifest as microaggressions or "subtle insults (verbal, nonverbal and/or visual), directed often automatically or unconsciously" (Solorzano, Ceja, & Yosso, 2000, p. 60). For example, age is one basis for microaggression, with older adults commonly stereotyped as "warm but incompetent" or "doddering but dear" (Cuddy, Norton, & Fiske, 2005). Like other types of discrimination, ageism has been associated with a wide variety of negative health

outcomes (Levy, 2009). Therefore, we hypothesize that age integrated neighborhoods may provide more opportunities for discrimination and thus poorer health and well-being.

A third potential mechanism linking neighborhood age composition to health and well-being is social cohesion or "neighbors' mutual trust, solidarity, connectedness, shared values, and support" (Bromell & Cagney, 2014). Cohesion is essentially the opposite of the social isolation that Hagestad and Uhlenberg (2006) predict for older adults in age-segregated communities, and indeed, social cohesion predicts companionship (Bromell & Cagney, 2014). Additionally, social cohesion is associated with health and well-being (e.g., Echeverría, Diez-Roux, Shea, Borrell, & Jackson, 2008). An open question is whether cohesion will promote health most in age-integrated neighborhoods or in age-segregated neighborhoods. Although theorists tout age integration, a large proportion of older adults in a neighborhood may promote social inclusion and collective efficacy (Browning et al., 2006; Cagney, 2006). Therefore, we do not extend a hypothesis, but rather ask: Do age integrated neighborhoods provide for greater social cohesion and better health and well-being, or lesser social cohesion and poorer health and well-being?

We expect that investigation of these three mechanisms simultaneously will make clearer the associations between neighborhood age composition and health and well-being as theorized and identified in prior research. Studies showing null results may do so because positive social interactions, like generative ones, and negative interactions, like those that include discrimination, counter one another. Results indicating that age segregation is linked to good health among older adults may be due to a preponderance of older adults shielding one another from discrimination or social isolation. We extend prior work by examining these mediators among both midlife and older adults so as to advance age integration theory.

Methods

Data and Participants

Data for the present study came from two sources. All individual data were drawn from the second wave of the National Survey of Midlife Development in the United States (MIDUS II, 2004–2006). Neighborhood-level data came from the 2010 U.S. Census.

MIDUS II

The MIDUS study began in 1995 with MIDUS I, a national probability sample of noninstitutionalized, English-speaking residents of the lower 48 United States, aged 24–74. Participants were recruited via random digit dial (RDD), with additional participants garnered from an urban oversample, siblings of main RDD sample participants, and a national RDD sample of twins (Ryff et al., 2012). Of the 7,108 MIDUS I participants, 4,963 (three-quarters of those living) participated in MIDUS II and were thus reinterviewed between 2004 and 2006. Of these, 4,041 (81.42%) completed both a phone interview and a self-administered questionnaire (Ryff et al., 2012).

2010 Census

On April 1, 2010, the Census Bureau distributed a 10-question form including each household member's date of birth to every American household (U.S. Census Bureau, 2013a). Data for this project came from Table PCT12 of Summary File 1, which reported the age of all U.S. residents by census tract (U.S. Census Bureau, 2011). Census tracts nest within counties and are "[d]esigned to be relatively homogeneous units with respect to population characteristics, economic status, and living conditions" and to encompass approximately 4,000 residents each, with a range of 1,000–8,000 residents (U.S. Census Bureau, 2013b). In 2010, the United States was comprised of 71,864 inhabited tracts.

To protect MIDUS participants' confidentiality, MIDUS II and 2010 Census data sets were merged by the Institute on Aging at the University of Wisconsin, which houses and maintains MIDUS data. Data were able to be merged for 4,017 of 4,041 (99.41%) MIDUS II participants. These persons, living within 3,714 census tracts, comprised the analytic sample for the present study.

Dependent Measures (MIDUS)

Psychological Well-Being

A 43-item scale was used to measure psychological well-being (Ryff & Keyes, 1995). Responses ranged from 1 (*strongly disagree*) to 7 (*strongly agree*), such that higher values indicated greater well-being. Scores were summed and then divided by 43 to generate a mean ($\alpha = .94$).

Self-Rated Health

Participants were asked to rate their health on an ordinal scale from 1 (*poor*) to 5 (*excellent*).

Neighborhood Age Composition (Census)

U.S. studies have measured neighborhood age composition in a linear fashion, as the proportion of a census tract comprised of persons older than 60 or 65. One study of Japanese older persons divided neighborhoods into the categories of less than 10%, 10–15%, 15–20%, and 30% or more persons aged 65 or older, on the hypothesis that effects were nonlinear (Vogelsang & Raymo, 2014). All prior studies have focused on the older population and have neglected the distribution of young and midlife adults in the neighborhood.

Neighborhood Types

First, we classified age groups as minors (0–18) or young (18–29), midlife (30–59) or older (60 plus) adults. We then combined age groups based on the family life cycle: Minors live primarily with adults aged 30–49 in families, whereas

young adults live in smaller households, as do older adults (Jacobsen, Mather, & DuPuis, 2012).

Second, we used these age groups to characterize neighborhoods as one of six types, based on their age compositions relative to the national distribution. Table 1 displays the age distribution of the lower 48 United States—from which MIDUS participants were drawn—as of the 2010 Census, and Table 2 displays the distribution of age groups in each of our neighborhood types. We classified neighborhoods that represented all of our age groups within ±5% as *age representative neighborhoods* (*N* = 1,392). We used an arbitrary threshold of ±5% threshold in order to make certain that only substantial divergences from age representativity were coded as such.

Minors and adults aged 30–49 accounted for the majority (51.16%) of the U.S. population. Therefore, *neighborhoods that overrepresented families* were those that were comprised of 56.17% or more residents in those age categories (*N* = 495). Because of their national prevalence, we used neighborhoods that overrepresented families as our reference group. These neighborhoods are not the most common type in the MIDUS II because participants' average age was 56, and so they were likely to live in neighborhoods with an older age composition. We also identified *neighborhoods that overrepresented older adults* by 5% or more (*N* = 993) and *neighborhoods that overrepresented young adults* by 5% or more (*N* = 312). There were also a variety of hybrid neighborhood types, which were not age representative but also did not overrepresent any age group. For instance, 8.99% of census tracts in our sample underrepresented young adults without overrepresenting any other age grouping, which we classified as *neighborhoods lacking young adults* (*N* = 334). We aggregated the remaining 5.06% of neighborhoods as *other neighborhoods* (*N* = 188).

Social Interaction (MIDUS)

Generativity

The six-item Loyola Generativity Scale was used to measure generativity (McAdams & de St. Aubin, 1992). Responses ranged on a 4-point Likert scale such that higher values indicated greater generativity (α = .85).

Table 1. Age Distribution of Persons in the Lower 48 States, 2010

Age group	*N*	%
Young adults: 18–29	51,259,360	16.75
Families		
Under 18	73,589,456	24.04
30–49	83,011,404	27.12
Reference group: 50–59	41,593,904	13.59
Older adults: 60+	56,619,160	18.50
Total	306,073,284	100

Notes: Figures exclude Alaska, Hawaii, and Washington, DC.
Source: U.S. Census Bureau, 2010 Census Summary File 1.

Daily Discrimination

A nine-item scale was used to measure daily discrimination due to *any* cause(s), including age but also race/ethnicity, gender, etc. (Williams, Yu, Jackson, & Anderson, 1997). Original responses were given on a 4-point scale (α = .91). Nearly 40% of participants reported no discrimination at all, so we recoded the scale to reduce skew. Final categories included a mean of 1.00 (*never*), a mean of 1.01–1.50, a mean of 1.51–2.00, and a mean of 2.01 or higher (*more than rarely*).

Social Cohesion

A three-item scale was used to measure social cohesion (Keyes, 1998). Responses ranged on a 7-point Likert scale such that higher values indicated greater social cohesion (α = .74).

Control Measures

In order to reduce the possibility that any significant effects were spurious, we accounted for a number of potential neighborhood and individual-level confounds. For example, if families with minor children are concentrated in disadvantaged urban neighborhoods, any health deficits may actually be due to neighborhood wealth or poverty rather than to neighborhood age composition. Using Census data at the census tract level, we measured race, ethnicity, and socioeconomic status (*percentage of residents below the poverty line* and *median household income*). Prior neighborhoods literature has identified these as strong correlates of residents' self-rated health (Cagney et al., 2005; Subramanian et al., 2006).

The Census Bureau redefines tracts that experience significant population shifts between decennial surveys, in order to maintain approximately 4,000 resident tracts (U.S. Census Bureau, 2013b). For a resident whose census tract was redefined between 2000 (i.e., the census tract boundaries available to MIDUS) and 2010 (i.e., the census tract boundaries we use in the present study), neighborhood-level measures were a combination of information from all 2010 tracts that were formerly part of the 2000 tracts in which residents resided. In analyses, we used a dichotomous indicator to signal participants who lived in redefined tracts.

Using MIDUS data at the individual level, we included participants' age, gender, marital status, parental status, employment status, race/ethnicity, income, education, as these factors are related to both health and residential patterns (Wight et al., 2009). We also include an indicator for MIDUS subsample (i.e., RDD, urban, sibling, twin). Descriptive statistics for all measures, by neighborhood type, are displayed in Table 3.

Analytic Strategy

We estimated a multilevel generalized structural equation model (GSEM) in Mplus 7.3 to address our research questions. This allowed us to estimate simultaneous outcomes

Table 2. Composition of Neighborhood Types by Age Group, MIDUS II (N = 3,714)

	Young adults: 18–29	Families: under 18 or 30–49	Reference group: 50–59	Older adults: 60+
Neighborhood types				
Overrepresent families (13.33%; n = 495)	11.75%–21.75%	56.17% or more	8.59%–18.59%	13.50%–23.50%
Age representative (37.48%; n = 1,392)	11.75%–21.75%	46.16%–56.16%	8.59%–18.59%	13.50%–23.50%
Overrepresent older adults (26.74%; n = 993)	11.75%–21.75%	46.16%–56.16%	8.59%–18.59%	23.51% or more
Overrepresent young adults (8.40%; n = 312)	21.76% or more	46.16%–56.16%	8.59%–18.59%	13.50%–23.50%
Lack young adults (8.99%; n = 334)	11.74% or less	46.16%–56.16%	8.59%–18.59%	13.50%–23.50%
Other[a] (5.06%; n = 188)	10.32%–39.28%	22.47%–65.34%	6.50%–22.58%	5.61%–29.65%

Notes: [a]The category "other" is comprised of neighborhoods of a variety of age compositions, none numerous enough to analyze statistically. Therefore, the ranges reported are empirical observations rather than preselected criteria.

with multiple mediators, and to estimate indirect effects mathematically, rather than resorting to a logic-based test of mediation such as the causal steps method. The model was a complete mediation model in which individual-level and neighborhood-level control measures were related to each of the three mediators and to the two outcomes.

Data were clustered in a framework of 4,017 individuals nested within 3,714 census tracts. That is, only 8% of participants shared a census tract with another participant. Nonetheless, unconditional or "empty" models showed significant variance at the tract level for both outcomes, making multilevel models necessary. Single-level models would underestimate standard errors in these data, potentially resulting in false-positive results. Thus, for both outcome measures, intercepts were allowed to vary by neighborhood (i.e., were modeled as random), whereas the effects of independent measures were held stable across neighborhoods (i.e., were modeled as fixed).

Nominal variables (i.e., neighborhood types) and ordinal variables (i.e., daily discrimination; self-reported health) required the use of generalized models rather than models that assume multivariate normality. We therefore used a robust weighted least squares estimator (WLSMV).

We assessed fit using the root mean square error of approximation (RMSEA) and the comparative fit index (CFI). An RMSEA below 0.05 and a CFI above 0.95 indicate good model fit (Schumacker & Lomax, 2004).

Of the 4,017 cases in our individual-level analytic sample, 3,362 (83.69%) had complete data for all measures, and the measure missing the most data was income, with 15.19% of cases missing. There were no missing data at the neighborhood level. Missingness was not patterned by any of the observed measures. Therefore, we conducted multiple imputation using the individual-level measures only. We generated five complete data sets by Markov chain Monte Carlo (MCMC) methods. Results were aggregated across the 5 datasets using Rubin's (1987) rules. Although imputation enhanced final sample size, it did not alter conclusions when compared with analyses using listwise deletion.

In addition to testing listwise deletion, we conducted other sensitivity analyses (available upon request). First, we tested a partial mediation model, which included paths directly from neighborhood type to self-rated health and psychological well-being. The complete mediation model had superior fit. Second, we operationalized neighborhood age composition as prior studies have: proportion of residents aged 60 and older. This proportion was not significantly associated with any of the mediators or outcomes. Third, we tested whether the model differed for midlife adults and older adults. It did not. Fourth, we estimated models for each outcome alone and for both outcomes simultaneously but not allowing their error variances to correlate. The substantive results were the same across models. We show the model that includes a correlation between error variances because self-reported health and psychological well-being have a significant bivariate correlation (r = .31, p < .001).

Results

Descriptive statistics for all measures, by neighborhood type, are shown in Table 3. Average psychological well-being was 4.95 (SD = 0.60) on a scale from 1 to 7 where 7 was the highest possible level of well-being (not shown). With regard to self-rated health, the greatest proportion of participants (38.89%) reported being in "very good" health, whereas 17.21% reported being in "excellent" health and only 3.59% reported being in "poor" health (not shown).

Table 4 shows the results of the final GSEM model. Neighborhood type was associated with two of the three mediators. Residents of age representative and "other" neighborhoods reported higher generativity than residents of neighborhoods that overrepresented families, and residents of age representative neighborhoods and neighborhoods overrepresenting older adults reported higher social cohesion than residents of neighborhoods that overrepresented families. Neighborhood type was not associated with daily discrimination. The mediators were related to self-reported health and psychological well-being as anticipated: Greater generativity and higher social cohesion were associated with better health and well-being, whereas more frequent daily discrimination was associated with poorer health and well-being.

Table 3. Descriptive Statistics for All Measures by Neighborhood Types (4,017 Individuals Living in 3,714 Census Tracts)

	Overrepresent families[a]	Age representative[b]	Overrepresent older adults[c]	Overrepresent young adults[d]	Lack young adults[e]	Other[f]	Significant differences
	Mean (*SD*) or %	Mean (*SD*) or %	Mean (*SD*) or %	Mean (*SD*) or %	Mean (*SD*) or %	Mean (*SD*) or %	
Dependent measures							
Psychological well-being	4.93 (0.60)	4.92 (0.61)	4.95 (0.59)	4.99 (0.59)	5.04 (0.54)	4.93 (0.65)	be
Self-rated health							be, ce
Poor	2.42%	4.08%	3.88%	3.90%	2.43%	3.08%	
Fair	8.92%	13.17%	10.16%	10.81%	7.28%	7.18%	
Good	30.86%	30.08%	30.66%	27.33%	24.26%	29.74%	
Very good	40.89%	38.03%	37.49%	39.04%	41.24%	43.08%	
Excellent	16.91%	14.64%	17.82%	18.92%	24.80%	16.92%	
Mediators							
Daily discrimination							bc
Never	38.52%	37.51%	43.47%	35.54%	44.96%	35.57%	
Almost never	24.10%	25.39%	23.38%	27.41%	22.07%	24.74%	
Somewhat rarely	23.73%	24.91%	25.16%	24.40%	23.43%	24.23%	
More than rarely	13.66%	12.19%	7.98%	12.65%	9.54%	15.46%	
Social cohesion	4.74 (1.31)	4.90 (1.34)	5.03 (1.30)	4.85 (1.37)	4.97 (1.28)	4.80 (1.39)	ac
Generativity	2.78 (0.60)	2.84 (0.66)	2.82 (0.65)	2.83 (0.66)	2.85 (0.57)	2.90 (0.66)	
Individual-level controls							
Age	53.31 (11.31)	56.09 (12.65)	58.59 (12.24)	55.60 (12.96)	56.23 (11.83)	54.16 (11.81)	ab, ac, ad, bc, be, cd, cf
Income	$33,100 (18,420)	$25,075 (16,720)	$23,240 (16,820)	$27,124 (17,479)	$33,500 (19,419)	$29,499 (17,639)	ab, ac, be, ce
Gender							
Female	56.51%	55.88%	54.94%	55.56%	52.29%	55.61%	
Male	43.49%	44.12%	45.06%	44.44%	47.71%	44.39%	
Marital status							
Married	75.46%	71.17%	71.07%	58.61%	77.57%	67.69%	ad, bd, cd, de
Never married	6.69%	7.56%	6.01%	15.11%	4.59%	8.72%	ad, bd, cd, de
Widowed	5.20%	7.63%	9.80%	6.34%	5.41%	8.21%	
Divorced or separated	12.64%	13.65%	13.12%	19.94%	12.43%	15.38%	
Parental status							
Children	89.22%	88.24%	87.17%	76.88%	89.22%	84.69%	ad, bd, cd, de
No children	10.78%	11.76%	12.83%	23.12%	10.78%	15.31%	ad, bd, cd, de
Employment status							
Employed	54.49%	49.16%	43.51%	50.45%	55.41%	54.08%	ac, ce
Retired	22.10%	29.18%	35.62%	30.93%	23.51%	23.98%	ac, bc, ce
Unemployed	23.41%	21.66%	20.87%	18.62%	21.08%	21.94%	

Table 3. *Continued*

	Overrepresent families[a]	Age representative[b]	Overrepresent older adults[c]	Overrepresent young adults[d]	Lack young adults[e]	Other[f]	Significant differences
	Mean (*SD*) or %	Mean (*SD*) or %	Mean (*SD*) or %	Mean (*SD*) or %	Mean (*SD*) or %	Mean (*SD*) or %	
Education							
Less than high school	4.83%	7.30%	5.92%	4.20%	4.86%	7.14%	
High school graduate	24.16%	30.19%	28.68%	20.72%	22.97%	19.39%	bd
Some college	30.67%	28.78%	27.84%	26.73%	27.30%	34.69%	
College graduate	23.98%	18.21%	18.32%	21.62%	20.00%	17.35%	
Education beyond college	16.36%	15.53%	19.24%	26.73%	24.86%	21.43%	ad, bd, be
Race/ethnicity							
White	88.95%	89.59%	92.84%	87.65%	95.92%	84.02%	ae, be, cf, de, ef
Black	3.75%	4.16%	2.23%	6.33%	0.82%	7.22%	cd, cf, de, ef
Hispanic	4.31%	3.02%	2.23%	3.61%	0.27%	3.61%	ae
Other	3.00%	3.22%	2.70%	2.41%	2.99%	5.15%	
MIDUS subsample							
Main random digit dial	45.54%	46.79%	44.69%	42.64%	37.74%	41.33%	
Twin	29.00%	31.08%	31.67%	26.43%	27.76%	26.53%	
Sibling	16.17%	14.04%	16.90%	16.82%	15.63%	20.92%	
City	9.29%	8.09%	6.74%	14.11%	18.87%	11.22%	ae, bd, be, cd, ce
Neighborhood-level controls							
Black	11.12% (17.44)	10.79% (18.08)	4.77% (11.57)	12.16% (15.73)	2.44% (5.62)	12.00% (18.79)	ac, ae, bc, be, cd, cf, de, ef
Hispanic	16.50% (19.97)	9.09% (11.89)	5.30% (7.55)	10.99% (12.13)	3.67% (4.30)	14.89% (18.47)	ab, ac, ad, ae, bc, be, bf, cd, cf, de, df, ef
Other race	15.16% (13.68)	9.35% (10.32)	6.85% (8.83)	12.42% (8.81)	6.38% (5.92)	13.73 (12.43)	ab, ac, ad, ae, bc, bd, be, bf, cd, cf, de, ef
Below poverty line	10.34% (9.64)	12.21% (7.77)	10.15% (6.71)	18.76% (10.38)	5.40% (4.30)	14.15% (10.07)	ab, ad, ae, af, bc, bd, be, cd, ce, cf, de, df, ef
Median household income	$73,081 (29,581)	$54,633 (19,002)	$57,884 (26,388)	$46,844 (17,769)	$84,491 (28,470)	$53,865 (21,570)	ab, ac, ad, ae, af, bd, be, cd, ce, de, ef

Notes: Statistics are reported prior to multiple imputation. Means and standard deviations are presented for continuous measures; proportions are shown for categorical measures. One-way analysis of variance tests with post hoc Scheffe tests were used to evaluate significant differences across neighborhood types. Significant subgroup differences are denoted as follows: ab = overrepresent families vs age representative; ac = overrepresent families vs overrepresent older adults; ad = overrepresent families vs overrepresent young adults; ae = overrepresent families vs lack young adults; af = overrepresent famiilies vs other; bc = age representative vs overrepresent older adults; bd = age representative vs overrepresent young adults; be = age representative vs lack young adults; bf = age representative vs other; cd = overrepresent older adults vs overrepresent young adults; ce = overrepresent older adults vs lack young adults; cf = overrepresent older adults vs other; de = overrepresent young adults vs lack young adults; df = overrepresent young adults vs other; ef = lack young adults vs other.

Finally, there were significant indirect effects indicating mediation. Via greater generativity, residents of age representative neighborhoods experienced better health and well-being than residents of neighborhoods that overrepresented families. Via higher social cohesion, residents of age representative neighborhoods experienced better psychological well-being, and residents of neighborhoods overrepresenting older adults experienced better health and well-being, than residents of neighborhoods that overrepresented families.

Discussion

The present paper examined the nature of social interactions as the mechanism by which age composition is related to health. We found that age representative neighborhoods and neighborhoods that overrepresent older adults are contexts in which residents report the most generativity and social cohesion. In turn, generativity and social cohesion are associated with better self-reported health and higher psychological well-being. These results lead us to clarify the results of prior studies, recommend new directions in measurement, suggest elaborations to age integration theory, and hypothesize about aging-in-place.

Neighborhood Age Composition: Mechanisms and Measurement

Prior studies have found mixed results concerning the relationship between neighborhood age composition and health, ranging from no relationship (e.g., Cagney et al., 2005), to a relationship such that a greater proportion of older neighbors are associated with better health (e.g., Subramanian et al., 2006), to a relationship such that a greater proportion of older neighbors are associated with poorer health (Vogelsang & Raymo, 2014). We suggest that this variability may be due to inattention to explanatory mechanisms and to crude measurement of age composition. First, the present study found that net of racial/ethnic and socioeconomic neighborhood composition, generativity, and social cohesion fully mediated the links between neighborhood age composition and health and well-being. Generativity and social cohesion are well-established predictors of physical health and psychological well-being (Cheng, 2009; Echeverría et al., 2008; Gruenewald et al., 2012). Our demonstration that they are associated with the neighborhood context may encourage more researchers to examine them.

Second, the present study examined the distribution of ages in neighborhoods relative to the national distribution, whereas prior studies have examined only the proportion of the neighborhood comprised of older adults. Our strategy has two advantages. One is that it considers the age groups that comprise the neighborhood beyond older adults. Two neighborhoods with an equal proportion of older adults might have a very different feel depending on who else resides there (Cagney, 2006). In our results, neighborhoods that overrepresented families were common and were the contexts in which residents reported the poorest health and well-being because they reported the least generativity and social cohesion. This finding is consistent with research showing that older adults have the highest levels of socialization with neighbors and involvement in community activities (Cornwell, Laumann, & Schumm, 2008).

A second advantage to our neighborhood typology approach is that it identifies the proportion of older adults that is representative or "normal" for the United States. Treating the percentage of older adults as linear implies that there is no expected distribution. Notably, the single study to divide the proportion of older residents into ordered categories found results distinct from those of other studies (Vogelsang & Raymo, 2014), although it also differed from other studies in its examination of the Japanese, rather than U.S., context. Future increases in the proportion of older adults in the population may result in changes in individuals' social interactions; for example, as the proportion of older adults has increased, age stereotypes have become increasingly negative (Ng, Allore, Trentalange, Monin, & Levy, 2015). Thus, we recommend that researchers continue to revisit this topic, and do so using neighborhood typologies rather than the simple proportion of older residents.

Neighborhood Age Integration and Social Interaction

Theorists state that the cultural, institutional, and spatial segregation of people by age results in loneliness and unproductivity for older adults, as well as negative age stereotypes and discrimination against older persons (Hagestad & Uhlenberg, 2006). Additionally, people of all ages lack opportunities to learn from and interact with members of other age groups. These propositions seem reasonable, yet little empirical research has attempted to test aspects of the theory. We do so in the present paper and find some clear support and some nuances. First, the result that age representative neighborhoods are places in which midlife and older residents report better self-rated health and higher psychological well-being is support for age integration theory. The finding indicates that representation of all age groups in proportion is associated with opportunities for generativity and social cohesion and does not expose people to daily discrimination. Age representative neighborhoods may act like good families, as institutions in which people of different ages, albeit non-kin, can connect to one another in meaningful ways (Knight et al., 2014).

The results also indicate that some age-segregated neighborhoods can be healthful contexts for midlife and older adults. Specifically, neighborhoods that overrepresent persons aged 60 and older have residents of all ages who report high generativity and social cohesion. This result may be due to the social skills that most older adults possess. Older persons are better than younger persons at

Table 4. Multilevel Structural Equation Model of Neighborhood Age Composition, Social Interaction, and Health and Well-Being Among Middle-Aged and Older Adults (N = 4,017)

	Generativity	Daily discrimination	Social cohesion	Self-reported health	Psychological well-being
	B (*SE*)	*B* (*SE*)	*B* (*SE*)	Probit (*SE*)	*B* (*SE*)
Neighborhood types					
Reference: overrepresent families					
Age representative	0.09** (0.04)	−0.02 (0.06)	0.15* (0.07)		
Overrepresent older adults	0.06 (0.04)	−0.10 (0.07)	0.21** (0.08)		
Overrepresent young adults	0.03 (0.05)	−0.04 (0.09)	0.10 (0.10)		
Lack young adults	0.08 (0.05)	−0.06 (0.08)	0.19 (0.10)		
Other	0.11* (0.05)	0.02 (0.10)	0.07 (0.11)		
Mediators					
Generativity: 1 (*least*) to 4 (*most*)				0.43*** (0.10)	0.40*** (0.03)
Daily discrimination: 1 (*never*) to 2+ (*more than rarely*)				−0.19*** (0.05)	−0.14*** (0.04)
Social cohesion: 1 (*weakest*) to 7 (*strongest*)				0.21*** (0.04)	0.20*** (0.02)
Significant indirect effects[a]					
Age representative → Generativity				0.04* (0.02)	0.04** (0.01)
Age representative → Social cohesion					0.03* (0.01)
Overrepresent older adults → Social cohesion				0.05* (0.02)	0.04** (0.01)
Fit statistics					
χ^2; *df*			70.68; 20		
RMSEA			0.03		
CFI			0.95		

Notes: Weighted least squares estimation was used. Unstandardized coefficients are shown. Results for controls, error variances, covariances, and nonsignificant indirect effects are available upon request. CFI = comparative fit index; RMSEA = root mean square error of approximation.

[a]All indirect effects were estimated; only statistically significant indirect effects are shown.

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

preventing interpersonal conflict, and when conflict does arise, older adults handle it using more personal respect, less blame, and greater forgiveness (Fingerman & Charles, 2010). These skills seem likely to lead to positive outcomes such as social cohesion for all of an older person's neighbors. Therefore, age integration theory might expand to discuss mechanisms by which age integration promotes positive social interaction, as well as the contexts in which a degree of age segregation is all right.

Limitations

The present study has a number of limitations. First, we use a number of proxy measures. Using census tract to represent neighborhoods is common in the literature, but tracts are an imperfect proxy (Lee et al., 2008). Residents' subjective experience of their neighborhood may differ from their census tract boundaries, and thus the lived experiences of their neighborhoods—and the influence of neighborhood age composition—may not be adequately captured by the census tract approach. Future research may take advantage of advancements in geographic information systems (GIS) technology to better represent neighborhoods. Additional proxies include our mediators, which were comprised of general questions that did not ask specifically about interactions with neighbors of various ages.

Second, in the absence of prior studies establishing standards of measurement, the ±5% threshold we used to define divergences from age representativity was arbitrary. Using a ±3% threshold or a ±7% threshold (available upon request), the mediations beginning with neighborhoods that overrepresent older adults retain statistical significance. The mediations beginning with representative neighborhoods do not because the primary effect of moving the threshold is to increase or decrease the number of neighborhoods categorized as representative. We use ±5% to maximize both statistical power and the integrity of the meaning of "representative."

Third, the two data sources used here were cross-sectional and collected at different points in time. We cannot be sure that the mediators precede health and well-being causally. Additionally, the cross-sectional data do not document change in neighborhood composition over time. MIDUS II data were collected between 2004 and 2006, whereas the decennial U.S. Census was performed in 2010. The use of 2010 Census data is preferable to 2000 Census data, which is both outdated and misaligned with MIDUS data collection, but in either scenario there is a gap of 4–6 years between the two data sources.

Moreover, neither the MIDUS I nor the MIDUS II contain information on residential stability, although persons who relocate may differ from persons who do not. Selection effects plague neighborhoods research because people do not reside at random. We do not know how residents chose their neighborhoods, nor which residents would prefer to live elsewhere but are unable to move. Fortunately, research suggests that selection may result in underestimation of neighborhood effects in cross-sectional data (Grafova, Freedman, Lurie, Kumar, & Rogowski, 2014).

Conclusion

Neighborhood age composition is related to the nature of the social interactions that residents have, in particular, opportunities for generativity and social cohesion. In these data, neighborhoods that were representative of the age composition of the U.S. population and neighborhoods that overrepresented older adults were salubrious. Initiatives aimed at supporting aging-in-place may target these types of neighborhoods for maximal benefit to residents (Greenfield, 2012). Alternatively, perhaps neighborhoods that lack optimal age composition are the neighborhoods that aging-in-place initiatives should target, as compensation and in an effort to increase the overall availability of age-friendly communities to people who wish to remain in their homes. Policymakers should carefully consider the goals of aging-in-place initiatives, and future research should continue to attend to the characteristics of neighborhoods with an eye toward aging-in-place as a policy priority.

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