"Older Rural Counties, Social Engagement, and Elderly Self-Rated Health"

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Introduction

An area's age structure may be related to elderly health if population composition differs by area age structure or if area age structure is related to other place characteristics that influence health. These possible relationships are relatively unexplored, despite the fact that virtually all counties in the United States are becoming older. This may be particularly important for elderly living in rural areas, since these places are more likely to be older than larger metro areas (Jones, Kandel, & Parker, 2007), and levels of population aging between rural places vary widely. In addition, elderly living in rural areas may be more secluded and, as such, more reliant on services or characteristics of places (including social capital) that could have associations with both age structure and health. These same rural and older places are virtually ignored in the environmental gerontology literature, including those manuscripts that consider age structure as a possible important correlate of health.

In recent years, more studies have examined the linkages between place health for the elderly; since this group may be especially sensitive to environmental influences (Glass & Balfour, 2003; Yen, Michael, & Perdue, 2009). Unfortunately, population age structure has largely been ignored, even though there are reasons to believe it may be related to economic conditions, spatial features, community structure, and social functioning—all of which may be associated with older residents' well-being (Cagney, 2006). In addition, considerations of how social capital may be particularly relevant for elderly health (e.g., more reliant on neighbors; family may have died or moved) is underdeveloped (Poulsen, Christensen, Lund, & Avlund, 2011), and age structure is omitted as a component of social capital theory (Cagney & Wen, 2007).

This study uses structural equation modeling to examine pathways linking county-level age structure to elderly self-rated health (SRH), addressing some of the limitations (detailed in "Methods", below) of most "place effect" studies (Stafford et al., 2008). In doing so, I investigate how county attributes, elderly-related services, measures of structural social capital, and individual-level attributes help explain or obscure these associations and pathways—particularly for elderly residents in older, rural areas.

Literature Review

Environmental gerontology studies mostly focus on how health differences systematically vary by economic context (e.g., area poverty, mean income), ignoring age structure as a possible correlate of health. I am aware of only four studies using U.S. data that have explored relationships between *age structure* at the local level and *elderly health* at the individual level. These studies, which examined mortality (Browning, Wallace, Feinberg, & Cagney, 2006;

Wight, Cummings, Karlamangla, & Aneshensel, 2010), depression (Kubzansky et al., 2005) and self-rated health (Subramanian, Kubzansky, Berkman, Fay, & Kawachi, 2006) broadly share four limitations. One, these studies focused only on elderly living in an urban setting; ignoring rural areas and distant suburbs—the same places that are more likely to have a greater proportion of elderly. Two, they all operationalized "place" at the neighborhood or census tract level, even though larger levels of aggregation (e.g., county) may be more appropriate to capture some dimensions of social capital, *particularly in rural areas*. Three, these studies operationalized age structure in a linear fashion, even though it may be relative differences between places—or only places experiencing extreme population aging—that matter for some mechanisms that impact health. Lastly, the main focus of these studies was not age structure. Instead, age structure was included with a number of other census measures without explicitly considering pathways in which age structure may be related to other attributes of. Generally, these studies found that within cities, older neighborhoods attracted more elderly-related services that may have provide "protection" from negative health outcomes. Conversely, a study using nationally representative Japanese data found that elderly living in relatively older municipalities (which included a number of rural areas and small towns) had an increased risk for reporting a disability (Vogelsang & Raymo, Forthcoming).

Age Structure and Place Effects on Health

A number of studies have found negative associations between social capital and poor self-rated health; although the definitions and operationalizations of social capital vary widely (Kim, Subramanian, & Kawachi, 2008). One common typology is "structural social capital"—referring to what people "do"—and includes networks, activities, actions, and membership in groups (Harpham, Grant, & Thomas, 2002). One reason to expect that relatively older areas may have increased structural social capital is possible greater opportunities for "bonding" (Szreter & Woolcock, 2004), referring to the power of relations between members of a network that share a common social identity (e.g., elderly in older rural areas). Previous studies examining relationships between neighborhood age structure and elderly health primarily focused on neighborhood-centered elderly-related services, concentrating little on social engagement and relationships that may occur outside the proximate neighborhood. For elderly living in rural counties with a low population density and fewer or remote elderly-focused services, bonds still may provide a protective effect for the elderly that live there—especially if other family members have moved away. For example, counties with a high proportion of elderly residents may have increased opportunities for social engagement, even if these activities require a significant commute. In addition, social comparison and adaptive framing theories suggest that elderly with more exposure to other (possibly frail) elderly may view their own health more positively (Street & Burge, 2012; Suls, Marco, & Tobin, 1991).

Study Goals

This study has two goals. One, I explore whether elderly SRH has relationships with relative differences in county-level age structure. Two, I will ascertain how any relationships between county-level age structure and SRH may be explained or suppressed by individual-level and county-level spatial characteristics, with a focus on structural social capital.

Methods—SEM Approach to Place Effects

Researchers examining "place effects" often use census measures (such as poverty rates, or even age structure) as a proxy for contextual and social characteristics that influence health. Identifying the intermediary mechanisms or pathways that explain why these compositional measures are associated with health are much less explored. Further, most "place effect" or "neighborhood effect" studies share at least one of three limitations when linking attributes of space and place to health—1) employing only a limited number indicators to designate "place"; 2) combining indicators into summary indices that do not distinguish or assign importance between these factors; and 3) not accounting for the multicollinearity of these indicators (Stafford et al., 2008). A structural equation modeling (SEM) approach, used sparsely in the literature, somewhat addresses these concerns by a) allowing many variables from different data sources (i.e., survey, census measures) signify underlying theoretical construct (e.g., structural social capital); and b) evaluating the individual importance and statistical significance of these variables as indicators or modifiers of these constructs. Lastly, an SEM approach allows the researcher to develop a theoretical model that explores potential causal pathways (Stafford et al., 2008).

The first step of my analysis will involve using a confirmatory factory analysis to assess whether particular observed variables (both census and survey) capture two latent constructs that I believe have associations with both age structure and **self-rated health**—"Structural Social Capital" and "Elderly-Related Facilities". For example, I will use measures of social and civic engagement (e.g., voting rates, participation in clubs) to capture social capital. The second step involves an empirical model testing how these constructs, predictors of these constructs (e.g., crime rates, residential stability) and other independent individual-level attributes (e.g., gender, SES) have associations with self-rated health and each other. In particular, I am interested in how *county-level age structure* is associated with these latent constructs as well as predictors of these constructs.

Data & Measures

I will use restricted versions the two most recent waves of the Wisconsin Longitudinal Survey (WLS) that includes respondents' residence—Wave 4 (2004; mean age=64) and Wave 5 (2011; mean age=71; just released on September 9, 2013). The WLS is a long-term study of a random sample of 10,317 men and women who graduated from Wisconsin high schools in 1957. For W4, both a phone and mail survey were completed by respondents. Out of the 9,030 respondents

that were alive for W4, 7,063 (78.2%) completed a *phone* interview and 6,279 (69.5%) also completed a detailed *mail* interview. For W5, 8,370 were alive, 5,822 (66.7%) completed an *in-person* interview and 5,177 (59.3%) also completed a detailed *mail* interview. I will limit my analysis to those individuals that still reside in Wisconsin, in order to more easily match and compare residential attributes to individual responses. Since social comparison theory suggests that SRH may depend on the reference category, I will employ three different measures of self-rated health—1) a global 5-category measure; 2) an age-comparative measure; and 3) a self-comparative measure (a retrospectively reported measure of SRH change).

Preliminary Descriptive Statistics

My preliminary analysis examined whether a few county characteristics varied by county-age structure categories (see Table 1). Counties (72) were be grouped into 6 groups. The first two of these were Milwaukee and Dane counties, since they have unique social and population characteristics, contain the two largest cities and collectively house one-quarter of Wisconsin's population. The second group are those other counties that include the "average" or modal population age structure (≤15% elderly). These 26 counties incorporate the majority of the major metropolitan areas and contain, in total, one-half of Wisconsin's population. The remaining counties (43) are mostly rural (91%) and were segregated into three remaining classifications based upon demarcations used by Wisconsin's Department of Health Services—15-18% elderly; 18-21% elderly; and those experiencing the most extreme population aging (>21% elderly).

Collectively these three categories of "old counties" (representing 60% of all Wisconsin counties) are sparsely populated and have average *total* populations roughly the size as many American municipalities (mean size=30,625 residents). At the same time, these predominantly rural places house 23% of Wisconsin's population, and almost one-third (30%) of the state's elderly population. Racial composition and income inequality did not appear to vary by age structure. The latter is particularly relevant since income indicators are the most often-included measure of place theorized to impact health in the "health and place" literature. Three county characteristics (i.e., whether or not a county lost population; voter turnout; doctors per capita), appear to have a linear relationship with a category's proportion elderly. The oldest counties had the highest voter turnout, were more likely to be shedding population, and contained the fewest doctors per capita. There are reasons to believe that other attributes and social processes (e.g., increased social engagement; increased social disorder) may also be related to both age structure and elderly subjective health in meaningful ways. Next, I will examine whether WLS survey responses (i.e., self-rated health; demographic covariates; survey measures of social engagement) and other contextual attributes also differ by age structure category.

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Table 1. Select County Characteristics by Age Structure Categories

	# Counties[1]	Ave. Pop.	Proportion 2010 Wisconsin Population	Proportion 2010 Wisconsin Elderly Population	County Average % Elderly	% Rural Counties	County Ave. Pop. Density	County Ave Income Inequality (Gini Coeffic.)	County Ave. Proportion White	% Lost Pop 2000-2010	County Ave. 2010 Voter Turnout	County Ave. PCP Doctors Per 100,000
Oldest (>21 %)	10	17,736	0.03	0.05	22.6 %	100 %	24.8	0.41	0.94	80 %	0.52	65.4
Older (>18%&≤21%)	15	25,208	0.07	0.09	19.2%	100 %	31.9	0.41	0.93	53 %	0.47	70.3
Old (>15%&≤18%)	18	42,299	0.13	0.16	16.1%	78 %	70.4	0.41	0.91	17 %	0.47	83.2
Normal (≤ 15%)	26	112,695	0.51	0.50	13.1 %	31 %	212.3	0.41	0.90	0 %	0.48	80.5
Dane[2]	1	488,073	0.09	0.06	10.3 %	0 %	408	0.44	0.82	0 %	0.57	142.7
Milwaukee	1	947,735	0.17	0.14	11.5 %	0 %	3,926	0.46	0.54	0 %	0.47	99.1

1 Menominee County, essentially a Native-American reservation (2010 population=4,322) is excluded from this analysis.

2 Includes Madison—Wisconsin's second largest city.