Published in final edited form as:

J Cross Cult Gerontol. 2010 June ; 25(2): 199–216. doi:10.1007/s10823-010-9118-6.

Social Integration and Healthy Aging in Japan: How Gender and Rurality Matter

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Abstract

The current study analyzed the 1999 and 2001 waves of the Nihon University Japanese Longitudinal Study of Aging. Two measures of social integration were associated with lower risks of being physically disabled or depressed at Wave 1 and with a lower risk of progressing into deeper levels of physical disability and depression by Wave 2. *Ceteris paribus*, compared to elderly urbanites, elderly ruralites had a much higher risk of being physically disabled but much lower odds of being depressed. And compared to elderly men, elderly women had similar risks of being physically disabled but much higher odds of being depressed. Suggestions are made on how future research on longevity in Japan, the world's most longevous nation, can explore the links among social integration, place, gender, and the postponement of mortality.

Keywords

ADLs; IADLs; Depression; Longitudinal survey; Role enhancement; Role strain

Introduction

Japan has the world's longest life expectancy at birth, 82 years in 2007 (Population Reference Bureau 2008). However, the Total Fertility Rate has declined to 1.3 lifetime births per woman, which is much below the replacement level of 2.1 (Population Reference Bureau 2008). In short, ever-larger numbers of elderly Japanese people are surviving to ever-older ages while the numbers of children and grandchildren to care for them are shrinking. Because Japan has publicly funded universal health care, public concern has arisen over how to postpone permanent disability and to promote healthy aging.

Fortunately, as in the U.S. case, the decline of mortality in Japan has been driven by a decline or postponement of disability among the elderly across a wide variety of economic and socio-demographic groups (Schoeni *et al.* 2005). Therefore, scholars and the general public are coming to view Japanese adults in late life as healthy and vigorous and able to choose not only to be cared for by, but also to care for, important people in their lives. Simultaneously, the social integration of older people into mutually supportive networks of relatives, neighbors, and friends is coming to be seen as a possible social-resource factor

promoting a disability-free survival to the oldest-old ages. As such, finding how social-support networks can prolong healthy aging has become a top research priority.

To date, U.S. scholars have conducted most studies on this topic by using two theoretical approaches. The first, known as the role-strain perspective, argues that an increasing complexity of social integration can rush the onset of chronic disease, permanent disability, and death by creating competing demands that produce physical and psychic stress for an older adult (Barnett *et al.* 1992; Kandel *et al.* 1985; Voydanoff and Donnelly 1999). The second approach, called the role-enhancement perspective, holds that an increasing complexity of social integration (for example, through adding many different kinds of social roles) improves emotional and physical health. To wit, it can create a multifaceted set of social identities that people can fall back on for physical and psychological support (Barnett and Hyde 2001; Chrouser and Ryff 2006; Moen *et al.* 1989; Wethington *et al.* 2000). The two approaches are not mutually exclusive, since a complex set of social networks can create both strains and supports. As such, the basic question is how these competing effects are balanced. The answer is culturally shaped.

Below, we review the evidence based on the U.S. studies and the few studies from East Asia, of which Japan provides an instructive example. Unlike the U.S. family, the patriarchal Japanese family puts a premium on having a son with whom to live in old age and emphasizes the importance of the group over the individual. In addition, a higher proportion of Japanese older people (compared to U.S. elderly people) are living in farming or fishing villages throughout the Japanese archipelago, where they are more likely to live with their oldest son and his children than is true for elderly Japanese in urban places (Traphagan 2004). The present study seeks how gender and rurality can have cultural effects on healthy aging, after taking social integration into account. In conclusion, we discuss what the findings mean for future research in Japan.

Materials

Studies in the U.S. lend more support to the role-enhancement perspective than to the role-strain perspective. For instance, Moen *et al.* (1989) analyzed 427 married mothers first interviewed in an upstate New York community in 1956 and followed up in 1986. The measure of social integration was the sum of six possible roles the wives occupied in 1956: worker, church member, friend, neighbor, relative, and club/organization member. The larger the count, the higher was the chance that the respondent survived to Wave 2 in 1986. In addition, when Moen *et al.* decomposed the total count into its component parts, having a membership in a club/organization was the only social role that increased the odds of survival to Wave 2. They speculated that while the other five social roles might create as many strains as enhancements to physical health, membership in a club/organization might produce more health benefits than health costs. A limitation of this study, typical of early research on this topic, was its exclusive focus on women.

The importance of gender in shaping the effect of social integration on health was shown in Adelman's analysis of the respondents aged 60 or older in the 1986 Americans' Changing Lives Survey. Adelman (1994) measured social integration as the simple sum of eight possible roles occupied: employee, homemaker, student, spouse, volunteer, parent, grandparent, or caregiver. The larger the sum, the more highly the adults tended to rate their own health and their satisfaction with life and to have fewer depressive symptoms. As hypothesized, the accumulation of social roles had a stronger salubrious effect on men than women. Adelman (1994: 160) speculated that women might experience greater burdens than men in the occupancy of a role. For example, if employed women feel that they should be full-time homemakers and should leave the job of earning money to men, then the

women might not reap the health benefits of the worker role (Barnett and Hyde 2001: 789). A limitation of Adelman's study was that the cross-sectional nature of the data made it impossible to disentangle the direction of causality between social integration and healthy aging.

Because gender-role ideology should affect the relationship between social integration and the health of elderly people (Barnett and Hyde 2001), it is instructive to examine studies on this topic for such patriarchal societies as Taiwan and Japan. Both societies have a patrilineal kinship system in which children, particularly oldest sons, are morally obligated to obey and care for elderly parents in their later lives. For example, in Taiwan, 68% of elderly parents with any sons live with one; and 21% of elderly parents with any daughters live with one (Knodel and Ofstedal 2002). However, because of massive rural-to-urban migration of young adults, the average number of coresident children is larger for elderly parents who live in urban than rural Taiwan (respectively, 1.09 and .96; Knodel and Ofstedal 2002), as is the average number of children living nearby (respectively, 1.32 and 1.27).

Cornman *et al.* (2003) used a four-wave longitudinal survey (1989, 1993, 1996, and 1999) to examine the connection between living arrangement and four health measures of older Taiwanese (the probability of dying, the number of functional limitations, the probability of reporting poor health, and a depression scale score). In addition, the respondents' total number of social activities (exercise, socializing with friends/neighbors, and/or memberships in a religious group, business association, political group, clan association, and/or an elderly organization) was summed and introduced into the event history analysis. After controls for prior health status, the number of coresident children was unrelated to respondents' health measures. However, having a larger number of social activities was associated with fewer functional limitations and depressive symptoms. These results for Taiwan are congruent with Moen *et al.*'s results for New York: that certain extrafamilial social roles may confer greater benefits on certain health dimensions than familial roles can. Unfortunately, Cornman and associates did not examine how rural/urban residence influenced these findings. If rurality means less regular access to one's children, then it could cause the health of rural elders in Taiwan to be worse than that of their urban counterparts.

Kumagai's (1987) work suggests that familial social roles may be more important for the health and well-being of elderly people in Japan than in Taiwan or the U.S. This study examined a sample of three-generation households in Yamato-machi, a rural town in Northern Japan, and Setagaya-ku, the most populous ward in Tokyo. The three-generation household was selected for study, since, as in Taiwan, the majority of elderly Japanese people live with a child. The average number of people living in the three-generation household was much larger in Yamato-machi than Setagaya-ku (4.28 v. 2.07), but the two populations of elders did not differ in their life-satisfaction score. Kumagai concluded that dual patterns of aging are occurring in rural and urban Japan but did not analyze how that duality might create similarity in healthy aging.

Sugisawa *et al.* (1994) sampled 2,200 people aged 60 or older from the Resident Registries and interviewed them in November, 1987. A respondent's social participation was measured by organizational attendance. A two-dimensional scale of social support was created by assessing: (1) the amount of love and caring the respondent could expect from significant others; and (2) the willingness of significant others to listen to the respondent's problems and inner feelings. Self-rated health in 1987 was measured on a five-point scale ranging from (1) poor to (5) excellent. Both social participation and social support were related to a better self-rated health score in 1987. Furthermore, respondents with a higher social participation score were more likely to survive over the next 36 months (to November, 1990); but social support did not predict survival over those 3 years. Therefore, social

support indirectly postponed death by raising one's self-rated health, which in turn, was positively related to survival over the 3-year period.

Using this same data set, Kikuzawa (2006) elaborated this research by looking at which social roles (spouse, parent, grandparent, worker, friend, and voluntary organization member) might be more important in avoiding depressive symptoms that could lead to a neglect of one's health. Kikuzawa eliminated the grandparent role from the set because it was collinear with the parent role. She found that being a friend, volunteer, or worker was unrelated to the Center for Epidemiologic Studies - Depression (CES-D) scale score, while being a spouse or a parent had about equal associations with a lower score.

Kikuzawa found that Japanese women had a higher CES-D score than Japanese men in 1987, and it was probably for important cultural reasons. Given the very old life expectancy in Japan, many young-old women may be suffering caregiver stress from taking care of a parent-in-law or other senior relatives of their husband's family, as well as of grandchildren, who may be co-resident. At the same time, elderly Japanese men may be more reluctant than the women to admit frequent depressive symptoms, because the admission contradicts cultural images of masculinity.

Kikuzawa pointed out that work after retirement in Japan generally carries fewer rewards than pre-retirement work; in fact, self-employment in small family businesses, fisheries, or farming generally continues after formal retirement, mainly to supplement pensions. Therefore, the better access to opportunities for self-employment in rural than urban Japan could give greater protection against depression to rural Japanese elders.

Finally, Japanese elders do not expect to receive practical help from people outside their immediate families because to do so would be culturally shameful. Thus, the importance of parenthood and spousehood (but not of extrafamilial associations) for having fewer depressive symptoms was seen as consistent with Japanese culture in the late 1980s. Nevertheless, the author noted that the Japanese government has since organized new social-service programs for the elderly. As such, extrafamilial friendships and volunteerism may have emerged as important factors shaping the health and longevity of elderly Japanese. It invites new research, and our literature review shows that gender and rurality may nuance the relationship between healthy aging and the number and composition of social roles.

In light of this literature review, we raise two research questions. Namely, compared to elderly Japanese people who are less socially integrated, are their more socially integrated counterparts:

1. at a lower risk of being physically disabled and psychologically depressed; and if so, how do gender and rurality matter?
2. facing a greater risk of improving health; and if so, how do gender and rurality matter?

Methods

Data

The data are from the first two waves (1999 and 2001) of the nationally representative Nihon University Japanese Longitudinal Study of Aging (NUJLSOA). This is a longitudinal study of Japanese people at ages 65 and older, and special efforts were made to encourage participation and retention. There were two pretests of the questionnaire for Wave 1 and one pretest for Wave 2, all pretests consisting of 50 respondents. Major newspapers announced the forthcoming survey wave as a scientifically important study by Nihon University of

Tokyo. Respondents were paid a small incentive of US\$10, plus other small gifts. The response rate to Wave 1 was 4,997 people (= 75 percent of the targeted 6,700). The retention rate at Wave 2 was 4,044 (= 81% of the participants in Wave 1). Because non-responders and drop-outs can differ systematically from those responding and retained, we statistically model the first two groups, as explained more fully below.

Measures

Independent variables—Social integration was measured in three ways, all measures being taken at Wave 1. First, role accumulation is the sum of five possible roles occupied simultaneously by the respondent: spouse, parent, grandparent, worker, and member of a voluntary organization. The sum ranged from “0” to “5.”

Second, the type of living arrangement indicates the depth of daily contact with intimate others. This variable was scored “0,” living alone (12.4% at Wave 1); “1,” living only with the spouse in a single-generation household (34.3%); “2,” living in a two-generation household with a child of the respondent, whether or not the respondent’s spouse is present (21.9%); “3,” living in a three-generation household, with a child or grandchild, whether or not the respondent’s spouse is present (31.5%). The three percent with other living arrangements were dropped from the analysis.

Third, we sought which ones of the five above-named social roles were occupied by the respondent. Occupancy was scored “1;” vacancy, “0.”

Dependent variables—We assessed physical disability at Wave 1 with two dimensions. We used seven Activities of Daily Living (ADLs: bathing or showering; dressing; eating; standing up from a bed or chair/sitting down on a chair; walking around the house; going outside (leaving the house); and toileting) and seven Instrumental Activities of Daily Living (IADLs: preparing meals; leaving home to purchase items or necessary medication; taking care of financial matters (paying utility or newspaper bills); using the telephone; dusting, cleaning or other light housework; taking the bus or train to leave home; and taking medication as prescribed). We scored “1” for each activity that the respondent reported difficulty in performing; “0” otherwise. Because most respondents were disability-free on both dimensions, the average number of ADLs at Wave 1 was 0.32; IADLs, 0.42. To answer Question 1, we trichotomized each dimension of physical disability: (0) disability-free on this dimension; (1) 1–7 disabilities on this dimension; (2) no answer/don’t know.

The third dimension was psychological health. We used a nine-question version of the Centers for Epidemiologic Studies in Depression (CES-D) scale. These questions covered depressive-affect symptoms (“felt depressed,” “felt sad”), somatic symptoms (“trouble sleeping,” “didn’t have much appetite,” “trouble feeling motivated,” “ordinary things felt troublesome”), and interpersonal difficulties (“felt lonely,” “felt people were unfriendly,” “felt hated by others”). Like Kikuzawa (2006), we excluded the positive-affect sub-scale, since previous studies suggest that it is not a well-grounded factor for measuring depression in Japan (Krause and Liang 1992). Respondents were asked the frequency with which they experienced a symptom. No points were given for “rarely;” one point, for “sometimes;” and two points for “often.” Since the scores for the nine weighted items were summed, the summary score ranged from a theoretical low of “0” to a theoretical high of “18,” with higher scores meaning greater depression. The resulting Cronbach’s alpha was .789, indicating a high intercorrelation among the nine response items. However, 20% of the respondents omitted answers to the CES-D scale at Wave 1, because proxy respondents did not provide responses for the CES-D scale. To avoid the selectivity biases from excluding these cases, we trichotomized the CES-D scale score at Wave 1: (0) disability-free on this dimension; (1) 1–18; (2) no answer/don’t know.

Question 2 requires measures of change in the ADLS, IADLS, and CES-D scale scores. To avoid selectivity bias, we wished to retain all cases with invalid scores (NA/DK) at Wave 1. Moreover, the logistic regression (described below) requires that every case in the omitted (reference) category of the dependent variable be at theoretical risk of entering the other mutually exclusive and collectively exhaustive categories of the dependent variable. Since the cases with an invalid score at Wave 1 could not leave that category, we imputed a missing value on each of the three dependent variables at Wave 1 by assigning it the mean of the valid responses rounded off to the nearest integer. Then we subtracted the Wave 1 score, after any imputation, from the Wave 2 score, if valid, and categorized the remainder as: (1) Fewer ADLs/IADLs/depressive symptoms at Wave 2; (2) More ADLs/IADLs/depressive symptoms at Wave 2; (3) Don't know due to deaths, drop-outs, or no replies at Wave 2; or (4) Same number ADLs/IADLs/depressive symptoms at both waves.

Because only 2 years separated Waves 1 and 2, the cautious reader may wonder whether significant change could have occurred in the number of ADLs, IADLs, or depressive symptoms. Using only cases with valid replies at both dates, we computed a paired *t*-test of individuals' scores at the two waves and found the *t*-tests to be statistically significant for all three dependent variables (Table 1). In addition, while 2.4% of the ADLs for Wave 1 were imputed before calculating the change score, there were 3.8% of respondents with a lower ADL score at Wave 2 and 8.6% with a higher score. Seventeen percent of the IADLs were imputed for Wave 1; and after imputations, 8.6% of the respondents had fewer IADLs at the next wave; and 8.1%, more. Twenty percent of the CES-D scores were imputed for Wave 1; and after these imputations, 18.6% of the respondents had a lower score at Wave 2; and 19.3%, a higher score. We conclude that the imputations avoided the loss of a significant number of observations between the waves without minimizing the variation in the scores between the waves. To control the impact that the imputations may have had on the observation of change in the dependent variables, we introduce "imputation" ("1"=yes, imputed; "0"=no) as a dichotomous predictor variable in the regressions for change in IADLs and CES_D scores. This predictor is not employed in the regressions for change in ADLs because the small number of imputations produced some empty cells. In addition, in the regressions for the change scores, we controlled the baseline count at Wave 1 after any imputations.

Cultural variables—Because the Japanese family is argued to be patriarchal, the gender of the respondent should be significantly related to health. Sex was scored "1" for men; "0" for women.

The respondents were asked: "What sort of community do you currently live in?" The categories for reply were "1," in a city or suburbs, or "0," in a farming or fishing village. In 1999, urbanites (city or suburban dwellers) made up 62% the sample, and that percentage was below the 80% mark counted in the 2000 U.S. Census of Population.

Control variables—Age was measured in single years at Wave 1, when it ranged from 65 to 99 and averaged 73 years.

Two indicators of socioeconomic status were used. Education was the highest level of schooling attended or completed: (1) junior high school; (2) high school; (3) vocational school or junior college; (4) 4-year university or graduate school. Income at Wave 1 was obtained from the question: "Approximately how much do you (and your spouse) receive as income annually, including bonuses before tax?" Respondents chose from the following categories: (1) less than 500,000 yen; (2) 500,000–1 million yen; (3) 1 million–1.5 million yen; (4) 1.5–2 million yen; (5) 2–3 million yen; (6) 3–4 million yen; (7) 4–5 million yen; (8)

5–6 million yen; (9) 6–8 million yen; (10) 8–10 million yen; (11) 10–12 million yen; (12) 12–15 million yen; (13) more than 15 million yen.

Statistical Analyses—All dependent variables are categorical. Thus, multinomial logistic regressions were used to examine Research Question 1; and a discrete-time Event History Analysis based on multinomial logistic regressions was used for Research Question 2. A special advantage of multinomial logistic regressions in answering the second question is that it allowed respondents lost to follow-up at Wave 2 to be modelled as one category of the dependent variable. That modelling minimized the biases created by sample attrition on the external generalizability of the findings. For a more comprehensive discussion of the advantages of multinomial logistic regressions for event history analyses, see Agresti (1996).

Results

Research question 1

ADLs—Social integration has a strong association with the odds of no ADLs (Table 2). For each social role present in the role set, the odds of having any ADLs dropped by 42.1% ($421 = 1 - 0.579$; Model 1). Independently of the number of roles, living in a household with a deeper intergenerational residency was associated with greater odds of having any ADLs ($OR = 1.181$, $p < .01$; Model 2). Perhaps the living arrangement is a result of the respondent's having ADLs.

To understand which social roles were more strongly related to the odds of no ADLs, we reran the logistic regression in Model 1 to decompose the total number of social roles into the component parts (Model 3, Table 2). Those who were workers or social-group participants had significantly lower risks of having any ADLs (respective OR 's = .277 and .227, p 's < .001). This outcome is consistent with Cornman and colleagues' findings for Taiwan.

IADLs—The results on the association of higher social integration with the absence of IADLs parallel those for ADLs. Having a larger number of roles in the role set reduced the odds of having any IADLs ($OR = .588$, $p < .001$; Model 1, Table 3). But independently of the size of the role set, living in the household with a second- or third-generation family member increased the odds of any IADLs ($OR = 1.223$, $p < .001$; Model 2, Table 3). The key social roles reducing the risks of IADLs were being a worker or a social-group participant (respective, OR 's = .273 and .215). This finding strengthens the view that extrafamilial social roles have emerged since 1987 as a deterrent to the disablement of elderly Japanese, contrary to Kikuzawa's report based on 1987 data.

CES-D Scale scores—There are two noteworthy differences between Table 4 versus Tables 2 and 3. First, living in a deeper intergenerational family residency was associated with a greater chance of ADL disability and IADL disability but a lower chance of any depressive symptoms ($OR = .883$, $p < .01$; Model 2, Table 4). Second, having a spouse was not associated with the risk of ADL disability or IADL disability but was associated with a lower risk of having any depressive symptoms ($OR = .741$, $p < .01$; Model 3, Table 4). The importance of having close relatives at hand, especially a spouse, for avoiding depression is congruent with Kikuzawa's findings about depression for Japanese elders in 1987. However, a significant difference with Kikuzawa's earlier study is the association of the worker role with the lower risk of depression ($OR = .683$, $p < .001$; Table 4). Perhaps one reason is that Kikuzawa's survey was collected in 1987; and our Wave 1, in 1999. In Japan, the 1990s were dubbed "the Lost Decade" because of economic stagnation. Perhaps in 1999, having a paying job at ages 65 or older lead to much more peace-of-mind than not having one.

Cultural variables—*Ceteris paribus*, gender did not matter for the risks of having any physical disabilities (Tables 2 and 3). However, men had much lower odds than women of reporting any depressive symptoms (OR=.688; Model 2, Table 4), a finding also present in Kikuzawa's 1987 survey. The same gendered relationship appears among elderly people in the U.S. (Verbrugge 1983). Moen and Chermack (2005) reason that women are more prone to depression than men when the women provide more emotional support to their spouse and children than their husbands provide.

Like gender, urbanism mattered, but in more complex ways, for being a healthy ager in Japan. Urbanites had much lower risks than ruralites of having any ADLs or IADLs (Model 1, Tables 2 and 3). But after the household living arrangement had been controlled, the relation of urbanism with IADLs (but not with ADLs) vanished (Model 2, Table 3). It implies that families may more often unite into one household to accommodate an elder's IADLs if the household is urban rather than rural. However, IADLs usually predate ADLs over the life course so that household living arrangements do not respond as strongly to the latter.

Finally, like gender, urbanism mattered strongly for the risk of depressive symptoms. Namely, urbanites had 1.4 times the risk of ruralites for being depressed (Models 1–3, Table 4). Plausible interpretations are that rural elderly women may be more engaged in informal neighboring than their urban counterparts, and rural elderly men may be more engaged in informal income generation than their urban counterparts, both activities being antidotes to depression.

Research question 2

Change in ADLs. Living arrangements at Wave 1 were unrelated to any change in the number of ADLs between Waves 1 and 2 (Table 5). However, the larger the number of social roles, the lower was the risk of having fewer or more ADLs rather than the same number of ADLs at Wave 2 vis-a-vis Wave 1 (respective ORs=.785 and .757, p 's<.05). The social roles that were crucial in forestalling the progression into more ADLs were the worker role and the social-group-participant role (respective ORs=.544 and .591, p 's<.01; Table 6). Stated differently, the longitudinal data show that these extrafamilial social roles protected one from *being* ADL-disabled (Table 2) at Wave 1 and from *becoming* or being more ADL-disabled by Wave 2 (Table 6).

Change in IADLs. After the number of IADLs at Wave 1 was controlled, the living arrangements at Wave 1 did not predict the change in the number of IADLs by Wave 2 (Table 7). However, having more social roles at Wave 1 slowed the progression into more IADLs over the next 2 years (OR=.814, p <.05; Table 7). Being workers or participants in a social group at Wave 1 were the key roles retarding the multiplication of IADL disabilities (respective ORs=.426 and .736, p 's<.05; Table 8), with the worker role being the stronger brake. So far, these effects of the two extrafamilial roles are consistent with the findings from the longitudinal survey in Taiwan by Cornman *et al.*

Change in CES-D scale scores. As was true for the risk of *being* depressed at Wave 1 (Table 4), living arrangements were strongly associated with the odds of *becoming* more depressed by Wave 2 (OR=.905 < .05; Table 9). Being married, a grandparent, or a social-group participant lowered the risk of developing more depressive symptoms (middle panel, Table 10), although none of these effects attained statistical significance at p <.05.

Cultural variables—*Ceteris paribus*, men and urbanites had a smaller chance than women and ruralites of recovering from ADL disabilities after Wave 1 rather than having the same

number of ADL disabilities at Wave 2 (Tables 5 and 6). However, gender and urban residence were unrelated to changes in the number of IADLs or of depressive symptoms.

Discussion

The current study analyzed two waves (1999 and 2001) of the Nihon University Japanese Longitudinal Study of Aging (NUJLSOA). The findings show that social integration deters the existence of physical disability or depression among Japanese elders. The larger the number of social roles (intrafamilial plus extrafamilial), the lower was the chance of being ADL- or IADL-disabled or depressed. Elders who occupied the roles of worker or social-group participant had an especially lower risk of being disabled by the two kinds of physical disability; and being a worker was especially important in reducing the chance of reporting depressive symptoms. Furthermore, having a larger number of social roles slowed the progression into a larger number of ADLs or IADLs over the next 2 years. And living in a household with more generations under the roof not only reduced the odds of reporting any depressive symptoms at Wave 1 but also the odds of reporting more depressive symptoms 2 years later. Thus, our results contribute to the sparse literature on social integration and healthy aging in Japan by supporting the results of Kumagai (1987), Sugisawa *et al.* (1994), and Kikuzawa (2006) with more recent data. We extend their important works by using a longitudinal survey allowing an assessment of how social integration affects the progression into a higher number of physical disabilities or depressive symptoms.

As a third innovation, we demonstrate how culture can operate through gender to affect healthy aging. For example, older Japanese men had a much lower risk of reporting any depressive symptoms, *ceteris paribus*, than older Japanese women. The same gendered relationship is found in the U.S. despite the fact that the patrilocal, patriarchal family is more rare in the U.S. than in Japan (Moen and Chermack 2005; Verbrugge 1983). This result for Japan seems contrary to the fact that suicide shortens the life expectancy at birth more for Japanese males than for Japanese females (Tanaka and Johnson 2006). Future research could make use of more waves of the NUJLSOA to examine how social integration affects the timing and the cause of death differently for older men and women in Japan. Qualitative studies are also necessary to understand how the *quality* of social relationships affects the health of elderly Japanese men and women.

Another innovation is our finding that rural and urban elders in Japan had different health profiles, *ceteris paribus*. For example, elderly ruralites had a higher risk than their urban counterparts of being ADL- or IADL-disabled. Future research is needed to isolate the reasons. In the United States, nonfatal occupational injury rates are higher in agriculture, forestry, and fishing than in all industries at large (Schulman and Slesinger 2004). These occupations may also be responsible for nonfatal but disabling injuries that are more prevalent in rural than urban Japan. However, the effect of residence might represent only the selection of non-disabled rural elderly people into rural-to-urban migration streams in anticipation of a future need for assistance with, or professional care for, disabilities. Future waves of the NUJLSOA might allow researchers to trace the connections between disability and rural-to-urban migration.

Paradoxically, despite ruralites' higher risk of being physically disabled (compared to urbanites), ruralites had a significantly lower chance of reporting depressive symptoms. Perhaps there is a higher proportion of elderly citizens bonded into extrafamilial social roles in rural than urban Japan, or maybe rural families are larger and more cohesive than their urban counterparts. If mental health is more important than physical health in increasing life expectancy in Japan, then rural elders may outlive their urban counterparts, as appears to happen in the United States (McLaughlin *et al.* 2001).

Acknowledgments

This study used data from the Nihon University Japanese Longitudinal Study of Aging (NUJLSOA) conducted by the Nihon University Center for Information Networking. We thank Dr. Yasuhiko Saito for making the data available to us. This work was supported by a postdoctoral fellowship to the first author from the National Institute on Aging (T32 AG00129) through the Center for Demography of Health and Aging (P30 AG17266) and the Center for Demography and Ecology (R24 HD047873), and by a grant to the second author under the Hatch Act from the U.S. Department of Agriculture to Michigan Agricultural Experiment Station Project MICL01874. We would like to also thank James Raymo, Ph.D., Cathy Liu, Ph. D., and Rita Gallin Ph.D. for critical insights in developing this study. An earlier draft was presented at the annual meetings of the Rural Sociological Society, Manchester NH, July 2008.

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Table 1

Paired-Sample *t*-Tests of Dependent Variables

Variable	Time 1 M	(SD)	Time 2 M	(SD)	df	T	Sig.
Psychological Health ^a	1.2772	2.07	1.3966	2.32	2,869	-2.587	.010
ADL ^b	.3181	1.19	.4728	1.46	3,908	-8.249	.000
IADL ^c	.4197	1.38	.5861	1.65	2,991	-8.075	.000

^a Depression measures (CES-D) include nine items: **1** Didn't have much appetite, **2** Felt depressed, **3** Ordinary things felt troublesome, **4** Trouble sleeping, **5** Felt lonely, **6** People seem unfriendly, **7** Felt sad, **8** Felt hated by others, **9** Trouble feeling motivated. Two points were given to anyone who OFTEN found these items to be true during the past week. A point was given to anyone who SOMETIMES found these items to be true during the past week. No point was given to anyone who RARELY felt these items to be true in the past week. The score ranged from a theoretical low of "0" to a theoretical high of "18."

^b ADL measures include seven items: **1** Bathing or showering problems, **2** Dressing, **3** Eating, **4** Standing up from a bed or chair/sitting down on a chair, **5** Walking (around the house), **6** Going outside (leaving the house), **7** Toileting. A point was given to anyone who answered they had trouble with one of these items. The possible range is "0" (no difficulty performing ADL items) and "7" (difficulty in performing all ADL items)

^c IADL measures include seven items: **1** Preparing meals, **2** Leaving home to purchase necessary items or medication, **3** Taking care of financial matters (paying utility or newspaper bills), **4** Using the telephone, **5** Dusting, cleaning, and other light housework, **6** Taking the bus or train to leave home, **7** Taking medication as prescribed. A point was given to anyone who answered who had trouble with one of these items. The possible range is "0" (no difficulty performing IADL items) and "7" (difficulty in performing all IADL items)

Table 2

Multinomial Logistic Regressions of Presence of ADLS on Social Integration Variables, Cultural Variables, and Control Variables: NUJLSOA Wave 1

Variables	Model 1			Model 2			Model 3		
	Yes	NA/DK	SE	Yes	NA/DK	SE	Yes	NA/DK	SE
Social Integration Variables:									
No. Of roles	.579***	.832	.054	.535***	.823	.061			
Living Arrangements				1.181**	1.142	.053			
Spouse role (1=Yes)							1.076	.140	.350
Parent role (1=Yes)							.991	.275	.622
Grandparent role (1=Yes)							.763	.204	.454
Worker role (1=Yes)							.277***	.205	.352
Social Group							.227***	.117	.286
Participant (1=Yes)									
Cultural Variables:									
Male (1=Yes)	1.063	.942	.120	1.126	.956	.122	.839	.130	.334
Urban (1=Yes)	.766*	.986	.116	.769*	.970	.119	.708**	.120	.302
Control Variables:									
Age	1.115***	1.079**	.009	1.109***	1.083***	.009	1.115***	.009	1.090***
Income	1.028	.963	.029	1.036	.972	.029	1.019	.031	.081
Education	.836*	.596	.081	.847*	.621	.082	.857	.083	.268
Likelihood Ratio Chi-Square	392.954***			377.955***			528.562***		
Degrees of freedom	12			14			20		

OR = odds ratio; SE = Standard Error of beta. For each of the three models, the omitted (reference) category of the dependent variable is "No ADLs."

* $p < .05$;

** $p < .01$;

*** $p < .001$

Table 3

Multinomial Logistic Regressions of Presence of IADLs on Social Integration Variables, Cultural Variables, and Control Variables: NULSOA Wave 1

Variables	Model 1			Model 2			Model 3		
	Yes	NA/DK	SE	Yes	NA/DK	SE	Yes	NA/DK	SE
Social Integration Variables:									
No. Of Roles	.588***	.920	.055	.568***	.877*	.061	.568***	.877*	.056
Living Arrangements				1.223***	1.466***	.053			
Spouse role (1=Yes)							1.101	.141	.126
Parent role (1=Yes)							1.016	.277	.295
Grandparent role (1=Yes)							.854	.207	.198
Worker role (1=Yes)							.273***	.208	.118
Social Group							.215***	.117	.098
Participant (1=Yes)									
Cultural Variables:									
Male (1=Yes)	1.113	3.465***	.123	1.162	3.628***	.126	.890	.134	3.425***
Urban (1=Yes)	.758*	.728**	.117	.789	.786*	.121	.700**	.121	.713**
Control Variables:									
Age	1.122***	1.079***	.009	1.121***	1.074***	.009	1.123***	.009	1.076***
Income	.972	.947*	.030	.985	.954	.030	.958	.032	.952
Education	.827*	.838**	.082	.837*	.874*	.085	.850	.084	.843**
Likelihood Ratio Chi-Square	651.896***			663.919***			818.568***		
Degrees of freedom	12			14			20		

OR = odds ratio; SE = Standard Error of beta. For each of the three models, the omitted (reference) category of the dependent variable is "No IADLs."

* $p < .05$;

** $p < .01$;

*** $p < .001$

Table 4

Multinomial Logistic Regressions of Presence of Depressive Symptom(s) on Social Integration Variables, Cultural Variables, and Control Variables:
NUJLSOA Wave 1

Variables	Model 1			Model 2			Model 3		
	Yes	NA/DK	SE	Yes	NA/DK	SE	Yes	NA/DK	SE
Social Integration Variables:									
No. Of roles	.894**	.673***	.039	.895**	.673***	.041			
Living Arrangements				.883**	1.082	.037			
Spouse role (1=Yes)							.741**	.931	.127
Parent role (1=Yes)							1.153	1.313	.237
Grandparent role (1=Yes)							1.040	.607**	.168
Worker role (1=Yes)							.683***	.589***	.134
Social Group							.931	.432***	.101
Participants (1=Yes)									
Cultural Variables:									
Male (1=Yes)	.700***	1.088	.076	.688***	1.122	.078	.765**	.963	.113
Urban (1=Yes)	1.434***	1.138	.080	1.410***	1.154	.081	1.404***	1.113	.108
Control Variables:									
Age	1.010	1.071***	.006	1.008	1.069***	.007	1.002	1.072***	.009
Income	.939**	.968	.018	.937***	.979	.019	.957*	.958	.027
Education	1.067	.822**	.047	1.053	.826**	.048	1.065	.824**	.072
Likelihood Ratio Chi-Square	306.221***			303.632***			375.119***		
Degrees of freedom	12			14			20		

OR = odds ratio; SE = Standard Error of beta. For each of the three models, the omitted (reference) category is "No Depressive symptoms."

*
p<.05;

**
p<.01;

p<.001

Table 5

Multinomial Logistic Regression of Changes in No. Of ADLs (Wave 2–Wave 1) on Social Integration Variables, Cultural Variables, and Control Variables: NUULSOA

Variables	Fewer ADLs		More ADLs		NA/DK/Missing	
	OR	SE	OR	SE	OR	SE
Social Integration Variables:						
No. Of roles	.785*	.116	.757***	.072	.800***	.049
Living Arrangements	.905	.099	1.035	.061	1.008	.044
Cultural Variables:						
Male (1=Yes)	.478**	.230	.906	.143	1.025	.095
Urban (1=Yes)	.629*	.215	.843	.138	1.224*	.100
Control Variables:						
Age	1.026	.017	1.082***	.010	1.030***	.008
Income	1.047	.051	.906**	.037	.975	.023
Education	.901	.148	.812*	.103	.912	.061
No. Of ADLs at Wave 1	2.516***	.061	1.538***	.063	1.716***	.053
Likelihood Ratio Chi-Square	699.147***					
Degrees of freedom	24					

OR = odds ratio; SE = Standard Error of beta

Reference Group = No change in the number of ADLs between the two waves

* $p < .05$;

** $p < .01$;

*** $p < .001$

Table 6

Multinomial Logistic Regression of Changes in No. Of ADLs (Wave 2–Wave 1) on Social Integration Variables, Cultural Variables, and Control Variables: NUJLSOA

Variables	Fewer ADLs		More ADLs		NA/DK/Missing	
	OR	SE	OR	SE	OR	SE
Social Integration Variables:						
Spouse Role (1=Yes)	1.130	.249	1.024	.158	.851	.110
Parent Role (1=Yes)	.650	.461	.585	.326	.946	.213
Grandparent Role (1=Yes)	.826	.345	1.058	.259	.851	.152
Worker Role (1=Yes)	.643	.309	.544**	.196	.780*	.114
Social Group Participant (1=Yes)	.858	.219	.591***	.131	.623	.090
Cultural Variables:						
Male (1=Yes)	.457**	.240	.802	.150	1.002	.100
Urban (1=Yes)	.634*	.209	.802	.135	1.205	.098
Control Variables:						
Age	1.037*	.017	1.080***	.011	1.033	.008
Income	1.041	.052	.893**	.038	.970	.024
Education	.915	.144	.819*	.101	.922	.059
No. Of ADLs at Wave 1	2.290***	.056	1.388***	.058	1.578	.048
Likelihood Ratio Chi-Square	721.712***					
Degrees of freedom	33					

OR = odds ratio; SE = Standard Error of beta

Reference Group = No change in the number of ADLs between the two waves

* $p < .05$;

** $p < .01$;

*** $p < .001$

Table 7

Multinomial Logistic Regression of Changes in No. Of IADLs (Wave 2–Wave 1) on Social Integration Variables, Cultural Variables, and Control Variables: NUULSOA

Variables	Fewer IADLs		More IADLs		NA/DK/Missing	
	OR	SE	OR	SE	OR	SE
Social Integration Variables:						
No. Of roles	1.076	.092	.814 *	.080	.928	.046
Living Arrangements	.938	.080	1.102	.067	1.101 *	.042
Cultural Variables:						
Male (1=Yes)	.822	.178	.961	.162	1.579 ***	.090
Urban (1=Yes)	.938	.167	.933	.151	1.196	.093
Control Variables:						
Age	.971 *	.014	1.122 ***	.012	1.048 ***	.008
Income	1.005	.040	.916 *	.040	.985	.021
Education	.876	.108	.773 *	.113	.874 *	.056
No. Of IADLs at Wave 1	2.320 ***	.054	1.406 ***	.053	1.505 ***	.041
Imputed No. IADLs at Wave 1 (1=Yes)	253.071 ***	.283	14.810 ***	.293	22.196 ***	.248
Likelihood Ratio Chi-Square	1,732.382 ***					
Degrees of freedom	27					

OR = odds ratio; SE = Standard Error of beta

Reference Group = No changes in the number of IADLs between the waves

* $p < .05$;

** $p < .01$;

*** $p < .001$

Table 8

Multinomial Logistic Regressions of Changes in No. Of IADLs (Wave 2–Wave 1) on Social Integration Variables, Cultural Variables, and Control Variables: NUULSOA

Variables	Fewer IADLs		More IADLs		NA/DK/Missing	
	OR	SE	OR	SE	OR	SE
Social Integration:						
Spouse Role	1.585*	.214	1.095	.173	1.072	.104
Parent Role	1.407	.418	.893	.350	1.081	.203
Grandparent Role	.781	.277	.853	.267	.885	.142
Worker Role	.815	.197	.426***	.237	.860	.102
Social Group Participant	1.126	.164	.736*	.146	.841*	.087
Cultural Variables:						
Male (1=Yes)	.768	.194	.885	.169	1.511***	.093
Urban (1=Yes)	.886	.165	.897	.147	1.151	.091
Control Variables:						
Age	.978	.014	1.116***	.012	1.052***	.008
Income	1.003	.040	.899**	.041	.973	.022
Education	.881	.106	.807*	.108	.873*	.054
No. Of IADLs at Wave 1	2.197***	.052	1.331***	.050	1.445***	.038
Imputed No. Of IADLs at Wave 1 (1=Yes)	269.605***	.282	16.670***	.290	24.035***	.247
Likelihood Ratio Chi-Square	1,773.968***					
Degrees of freedom	36					

OR = odds ratio; SE = Standard Error of beta

Reference Group = No changes in the number of IADLs between the two waves

* $p < .05$;

** $p < .01$;

*** $p < .001$

Table 9

Multinomial Logistic Regression of Changes in No. Of Depressive Symptoms (Wave 2–Wave 1) on Social Integration Variables, Cultural Variables, and Control Variables: NUJLSOA

Variables	Smaller #		Larger #		NA/DK/Missing	
	OR	SE	OR	SE	OR	SE
Social Integration Variables:						
Multiple roles	1.008	.063	.903	.056	.791***	.054
Living Arrangements	1.000	.056	.905*	.050	1.004	.048
Modifying Variables:						
Male (1=Yes)	.906	.118	.937	.106	1.383**	.102
Urban (1=Yes)	.984	.123	1.133	.111	1.046	.105
Control Variables:						
Age	1.008	.010	1.022*	.009	1.055***	.009
Income	1.023	.028	.998	.025	.985	.024
Education	1.006	.073	1.041	.065	.948	.064
No of Depressive Symptoms at Wave 1	3.092***	.056	1.857***	.057	2.439***	.054
Imputed No. Of Depressive Symptoms at Wave 1 (1=Yes)	3.995***	.204	2.669***	.201	6.779***	.181
Likelihood Ratio Chi-Square	1,354.563***					
Degrees of freedom	27					

OR = odds ratio; SE = Standard Error of beta

Reference Group = No changes in the number of depressive symptoms between the two waves

* $p < .05$;

** $p < .01$;

*** $p < .001$

Table 10

Multinomial Logistic Regression of Changes in No. Of Depressive Symptoms (Wave 2–Wave 1) on Social Integration Variables, Cultural Variables, and Control Variables: NUJLSOA

Variable	Fewer		More		NA/DK/Missing	
	OR	SE	OR	SE	OR	SE
Social Integration Variables:						
Spouse Role (1=Yes)	.851	.141	.874	.127	.825	.121
Parent Role (1=Yes)	1.294	.295	1.017	.245	1.090	.241
Grandparent Role (1=Yes)	1.198	.198	.859	.169	.913	.167
Worker Role (1=Yes)	.983	.132	1.027	.116	.741**	.115
Social Group Participant (1=Yes)	.930	.117	.837	.104	.571***	.098
Cultural Variables:						
Male (1=Yes)	.950	.123	.942	.111	1.303*	.106
Urban (1=Yes)	.995	.121	1.150	.109	1.038	.103
Control Variables:						
Age	1.003	.011	1.024*	.009	1.051***	.009
Income	1.030	.028	.992	.026	.976	.025
Education	1.002	.072	1.050	.064	.978	.062
No. Of Depressive Symptoms at Wave 1	3.011***	.054	1.844***	.055	2.368***	.053
Imputed No. Of Depressive Symptoms at Wave 1 (1=Yes)	4.234***	.204	2.740***	.200	6.908***	.180
Likelihood Ratio Chi-Square		1,410.983***				
Degrees of freedom		36				

OR = odds ratio; SE = Standard Error of beta

Reference Group = No changes in the number of depressive symptoms between the two waves

* $p < .05$;

** $p < .01$;

*** $p < .001$