

As the world's population continues to age rapidly it is important to understand the decline of health and functioning that accompany the aging process. Support of older adults poses a critical problem for aging societies around the world. As the nation with the highest percentage of elderly among OECD countries, Japan provides an optimal population to study health and functioning for a growing elderly population. While we tend to think that health and functioning steadily decline with age, most elderly see both improvement and deterioration in their ability to perform various functions. In this paper we investigate various covariates that may explain the return to, or loss of, functioning. These covariates include age, gender, education, various chronic illnesses or ailments, living in an urban or rural setting, as well as marital status and coresidence with adult children.

There is a significant literature linking health with age, gender, and relationships. To get a better understanding of the possible causes or correlations in gaining or losing the ability to perform certain functions we include numerous covariates. For example, recent studies show that traditional values are shifting in Japan, and that while tradition dictates that elder care is the responsibility of the eldest son and his wife, there is a growing preference for daughters to perform elder care.<sup>i</sup> Further, studies have also shown gender differences in Japan in disability and mortality,<sup>ii</sup> making it clear that studies need to account for both the gender of the parent and child coresiding families as well as the gender of the respondent when coresidence is not occurring. We also control for regional variations as there may be differences in traditional family values or types of health care or disease prevention and susceptibility by region.<sup>iii</sup> Additionally, research in the United States shows that close relationships with family, including being married, and having close friends have been linked to positive health outcomes in a variety of settings,<sup>iv, v</sup> while being widowed and receiving emotional support solely from children may

lower morale.<sup>vi</sup> While there is significant research in the United States pertaining to marital status and health, the connection between personal relationships and healthy behavior of older adults is relatively unexplored for Asian countries, including Japan.

This paper utilizes data from the Nihon University Japanese Longitudinal Study of Aging to examine the change in functional ability of Japanese 65 years or older over the span of 10 years. The first wave of face-to-face interviews was conducted in 1999, followed by interviews in 2001, 2003, 2006 and 2009. Additional respondents were added in waves 2 and 3 to maintain a large sample and supplement the number of young old represented in the sample. The respondents of 75 and older were oversampled by a factor of two and weights were developed and implemented to account for this oversampling.

This paper is modeled after an article that uses the US Longitudinal Study of Aging to investigate the functional gains and losses among older Americans.<sup>vii</sup> We use three scales of functioning (activities of daily living (ADL), instrumental activities of daily living (IADL), and activities necessary to work outside the home (Nagi measures)) to investigate if some areas of functioning decline earlier than others, or if some functions are more likely to get better or worse while others simply decline. We use logistic regression to ascertain the odds of those with functioning difficulty at wave T but who regain the ability to perform that function at wave T+1 (gaining functioning) given the previously mentioned covariates. We also investigate the odds of those who are able to perform a function at wave T but who develop functioning difficulties by wave T+1 (losing functioning). A number of covariates, such as education, coresidence with adult children, and living in rural or urban settings, are rarely significantly correlated with functioning outcomes. As such these covariates are not included for the final analysis to eliminate a high number of dropped cases due to missing data.

Preliminary analyses show that on average a respondent who loses one function between the 1999 and 2001 surveys also loses 7.19 other functions on the 23 point scale that combines ADL, IADL, and Nagi measures. However, between 2006 and 2009 losing one function results in losing on average 6.66 other functions. On average gaining the ability to perform a function between 1999 and 2001 results in gaining the ability to perform 4.72 other functions, while gaining the ability to perform a function between 2006 and 2009 results in gaining the ability to perform an average of 3.83 other functions. Thus we see less change in the total gain and loss in the older sample (2006 to 2009) than we do when they were younger (1999 to 2001). This does not fit the popular conception that there will be higher levels of decreased functioning the older a person gets. Instead we see more stability; those with less functioning do not gain back as much as previously, but also they lose other functions less quickly. (Have you considered different interval length? I mean, have you adjusted for the interval length. We should be able to observe events more in the longer interval.)

Analyses also suggest that deterioration in ADL and IADL functioning are frequently noted by respondents to be caused by stroke and dementia. While it is more difficult to ascertain the cause of deterioration of the Nagi functions since different questions were asked than with the ADL and IADL scales, there is a large proportion of respondents (over 20%) who with the onset of stroke, high blood pressure, arthritis, and chronic back pain have lost Nagi functions between consecutive waves.

Further, as there is an increase in the number of other functioning difficulties, we find that there are lower odds of regaining a Nagi function than regaining ADL and IADL functions. Aging consistently increases the odds of losing a Nagi function, though this is much stronger in the 1999 to 2001 surveys when respondents were younger and more likely to still be in the

workforce than in the 2006 to 2009 surveys when they may have already lost many of the Nagi functions. Further, the presence of arthritis decreases the odds of regaining Nagi function for the earlier surveys but is not significant in the later surveys.

Age and an increase in the number of other functioning difficulties yield higher odds of losing almost all of the ADL and IADL functions but unlike the Nagi measures there is little difference in the size of the effect between the waves. In each of the three measurement scales there is no pattern of chronic ailments or illnesses that significantly and consistently correlate to the odds of gaining or losing functioning with the exception of arthritis as mentioned above. As mentioned previously, there is also no consistent pattern associated with living with an adult child, but further analyses will investigate reasons for living with children, proximity to children who are not coresiding with the respondent, as well as if the respondent lives with a daughter or oldest son.

While health among older adults is often thought to steadily decline, we find that there deterioration is not necessarily a steady process and that functional improvement may occur simultaneously with functional deterioration; an individual who loses one function may see improvement in another function. The number of other functioning difficulties is the only consistent indicator besides age of the likelihood of a function improving or declining over time, though various functions are affected by chronic illnesses while others are not.

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<sup>i</sup> Fuse, Kana. (2013). "Daughter preference in Japan: A reflection of gender role attitudes?" *Demographic Research*, 28:1021-1052.

<sup>ii</sup> Chan, Angelique, Zachary Zimmer, and Yasuhiko Saito. (2011). "Gender differentials in disability and mortality transitions: The case of older adults in Japan." *Journal of Aging and Health*, 23(8):1285-1308.

<sup>iii</sup> Takagi, Emiko, Merrill Silverstein, and Eileen Crimmins. (2007). "Intergenerational coresidence of older adults in Japan: Conditions for cultural plasticity." *Journals of Gerontology Series B-Psychological Sciences and Social Sciences*, 62(5):330-339.

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- <sup>iv</sup> Adams, Rebecca G. and Rosemary Blieszner. (1995). "Aging well with friends and family." *American Behavioral Scientist*, 39(2):209-224.
- <sup>v</sup> Baldassare, Mark, Sarah Rosenfield, and Karen Rook. (1984). "The types of social relations predicting elderly well-being." *Research on Aging*, 6(4):549-559.
- <sup>vi</sup> Takagi, Emiko and Yasuhiko Saito. (2013). "A longitudinal analysis of the impact of family support on the morale of older parents in Japan: Does the parent's normative belief in filial responsibilities make a difference?" *Ageing and Society*, 33:1053-1076.
- <sup>vii</sup> Crimmins, Eileen M. and Yasuhiko Saito. 1993. "Getting Better and Getting Worse: Transitions in Functional Status Among Older Americans." *Journal of Aging and Health* 5(1):3-36.