# Age and Gender Variations in the Effects of Socioeconomic Status on Self-rated Health in Korea

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**ABSTRACT**

We examine age variations in the effects of SES on self-rated health in Korea, which provides an interesting social setting and thus would help assess the extent to which previous findings mostly based on American or European experiences hold in different contexts. We include three alternative indicators of SES -- liquid assets, home ownership, and real estate ownership -- as well as two standard measures like education and household income. Furthermore, we consider the SES-health relationship and its variation by age for men and women separately. Our empirical findings in general do not support the hypothesis that the SES gap in health converges with age. Most of SES effects on self-rated health remained constant across age groups or even increased with age. However, we did find some evidence of converging effects for household income and liquid assets among women. Differences in self-rated health by household income or liquid assets diverged and then converged with age.

# Age and Gender Variations in the Effects of Socioeconomic Status on Self-rated Health

## INTRODUCTION

A large body of literature has investigated the effects of socioeconomic status (SES) on physical health and variations in these effects among various demographic groups in the United States or European countries. Across various outcomes of physical health -- for example, chronic conditions (Hayward et al. 2000; House et al. 1994; Kington and Smith 1997), functional limitation (House et al. 1990; Smith and Kington 1997), or self-report measures of health status (Robert and House 1996; Ross and Mirowsky 1995; Mutchler and Burr 1991), it has been shown that SES is strongly related to health. Furthermore, many studies have tried to identify the mechanisms linking SES and health by looking at a variety of mediating factors such as health lifestyle, access to health care, or social-psychological resources like supports or control (Ross and Wu 1995).

To better understand the overall relationship between SES and health, particular attention has been paid to understanding age variations of the socioeconomic gap in health. It is often found that socioeconomic differences in health are generally small during early adulthood, reach a peak in middle and early old age, and then become minimal in later old age (Berkman 1988, House et al. 1990, 1994). Mortality studies have shown that the influences of socioeconomic variables on mortality are more profound in the younger age groups than in older people (Sorlie et al. 1995, Elo and Preston 1996, McDonough et al. 1997).

However, there are also some exceptions on this pattern of divergence throughout most of life with convergence in later old age. Ross and Wu (1996) provided empirical

findings that support the hypothesis of divergence in socioeconomic differentials in health with age. They found no evidence of convergence but instead the widening difference with age in physical functioning and physical well-being between those with high and low levels of educational attainment or between those with high and low income.[1] Based upon the cumulative advantage theory, they inferred that economic, social psychological, or health behavior-related resources associated with educational attainment cumulate throughout the life course. This leads to the increasing gap in health status between those in highest and lowest socioeconomic positions, as age advances.

To address this discrepancy[2], further efforts have extended earlier research in various important ways. Contending that standard SES measures like education or income may not properly reflect socioeconomic circumstances among elderly and thus the declining effects of those SES variables at older ages may be artifact of poor measurement, Robert and House (1996) employed two alternative indictors of SES: home ownership and liquid assets. They found that the two alternative SES measures not only add explanatory power to the model but their effects especially on functional status are indeed persistent until very old age groups even after education, income and other demographic variables are taken into account. Separate analysis of each age cohort confirmed that liquid assets and home ownership are particularly better predictors of functional status among older adults than the traditionally used SES measures like education and income, though this is not the case for other health outcomes like self-rated health or chronic conditions.

Another useful way of extending previous literature on the issue is to assess the extent to which the patterns of SES differentials in health by age observed mainly from

Western industrialized societies hold in other contexts that have vastly different social, economic, and cultural settings from those typically observed in Western societies. This is particularly relevant for testing an important explanation for the convergence of the SES gap in health in older ages. It is often claimed that social policies particularly geared to older people (like Medicare or Social Security in the U.S.) might help reduce SES differences in health at these ages by supporting access to health care and resources among the lower SES groups (Robert and House 1994). Thus, by looking at how the effects of socioeconomic position on health vary by age in societies that provide few welfare subsidies especially for older people we may obtain better insight into the implication of health and social policy as a mechanism underlying the pattern of age variations.

In this paper, we attempt to contribute to the literature by following the above two lines of extending prior research. First of all, we describe socioeconomic differentials in health across age groups for a representative population of the Korean urban areas. As will be clear soon, Korea provides an interesting case to examine how SES relates to health and how the relationship varies by age, which would help assess whether the results based on American or European societies to be unique in those settings.

In addition, we include three alternative indicators of SES as well as two traditional measures of education and household income: liquid financial assets, home ownership, and real estate ownership besides the resident home. In the study of Robert and House (1996), the first two measures were found to have significant impacts on health of elderly independent of traditional SES measures like education or income, and even to be better indictors of economic position among elderly for some health outcomes.

Our paper determines the extent to which relationships between financial assets or home ownership and health outcomes observed among Americans are replicated among Koreans. This addresses the issue of usefulness of these measures for investigating socioeconomic differentials in health among elderly across various contexts.

Furthermore, we examine the effect of real estate ownership to predict health status among older adults. As in many societies, wealth distribution in Korea is more unequal than income distribution, and in particular concentration of wealth through real estate (including land) holdings is a major factor leading to wealth inequality (Leipziger et al., 1992). Therefore, it is expected that in Korea having real estate may provide additional advantages in life chances above income and is likely to be more important as economic sources for older people who are no longer in labor force. By including real estate ownership as an additional indicator of SES, our study has a very detailed set of SES measures that covers various dimensions of economic circumstances.

However, it should be noted that our three alternative indicators of SES, i.e., liquid assets, home ownership, and real estate ownership are obtained from the household survey rather than individual data, while Robert and House's (1996: 365) measures of liquid assets and home ownership were derived from respondents' self-report. Therefore, our results cannot be exactly compared to those of Robert and House.

In addition to extending previous literature by examining the effects of alternative indicators of SES on health in the Korean society, which displays a quite interesting context, our study addresses gender differences in the SES effects on health and their variations by age. Although most studies in this area included gender as an independent variable, they usually did not consider how the relationship between SES and health

varies by gender (Ross and Wu 1996, House et al. 1990, Robert and House 1996).[3] Therefore, there is little known about gender differences in the age variations in the effects of SES on health. Our current study separately examines the effects of the five SES measures on health by gender and furthermore compares how men and women show different patterns of age variations in socioeconomic differentials in health.

## THE KOREAN SOCIETY

Along with rapid economic growth, overall health status among Korean population has substantially improved during the last few decades as the change in life expectancy at birth from 62.3 in 1971 to 75.6 in 1999 indicates. During the same period, life expectance among men increased from 59.0 to 71.7 and the corresponding increase among women was from 66.1 to 79.2. Life expectancy at age 60 also shows substantial increase during the period from 12.7 to 17.5 among men and from 18.2 to 22.2 among women.

However, Korea shows a substantially lower level of public or governmental subsidies on health. Table 1 presents two measures indicating the magnitude of public expenditure on health among 29 OECD countries in 1998: public expenditure on health as a percentage of gross domestic production (GDP) and as a proportion of total expenditure on health. First of all, among the 29 OECD countries Korea has the lowest level of public expenditure as a percentage of GDP, spending only 2.4 percent of its GDP to the public funding of health, while some European countries like Norway, Switzerland or Germany devote about 7 percent of their GDP to the public funding of health.

Korea is also distinctive in its low level of another indictor showing the degree to which expenditure on health is shared by the public sector. The proportion of expenditure

on health that comes from the public sector is only 46 percent in Korea, which is indeed the second lowest followed by 45 percent in the United States. In some European countries such as Sweden, Britain, or Czech Republic, the relative share of public funds for health is more than 80 percent. In sum, the table clearly shows the considerably lower levels of public subsidies on health in Korea and this provides an interesting setting for examining the impacts of SES on health and their age variations. The traditional emphasis on the role of family for taking care of the elderly and sick persons without substantial welfare provision or subsidies might have some influences on socioeconomic disparities in health.

Korea also exhibits a distinct pattern with regard to health behaviors and their gender differences. For instance, Korean men show the highest smoking prevalence in the world with 68 percent among 15 years of age and over (WHO 1997). However, Korean women's smoking prevalence is only 7 percent, which is substantially low in cross-national perspective. Simply compare with the prevalence rates among Americans: 28 percent among men and 23 percent among women. We observe a huge gender difference in smoking behavior among Koreans.

In contrast to the significantly higher rates of smoking among Korean men that may indicate their greater exposure to risk factors, however, a cross-national comparison on the prevalence of obesity shows a strikingly lower level of prevalence in Korea. The proportion of aged 15 and over whose body mass index (BMI) is more than 30kg/$m^2$ is only 1.6 percent among Korean men, while the corresponding proportions in Britain, Canada and the United States are 15 percent, 17 percent, and 20 percent, respectively (OECD 2001). The obesity prevalence is also considerably lower among Korean women

(2.7 percent) than those among Canadian (14 percent), English (21 percent), and American (25 percent) women.[4]

Considering distinctive features of social settings in Korea[5], in this paper we provide a cross-sectional description of variations across age groups in the relationship between socioeconomic position and health. We specially focus on the competing hypotheses that predict converging or diverging socioeconomic differentials in health throughout the life course. In the absence of detailed measures of health status, we consider only one self-reported indicators of health: self-rated overall health. It is an important limitation that the data used in the study do not have indicators of functional status, which in prior research turned out to have a particularly strong relationship with the two alternative SES measures, i.e., liquid assets and home ownership (Robert and House 1996).

## METHODS

### *Data*

Most social surveys available so far to study social inequality in Korea do not have information on health outcomes. If they do, they usually do not ask detailed information on respondents' socioeconomic status like education, income or employment status. Fortunately, the most recent (4th) wave of the Korean Labor Income Panel Study (KLIPS), conducted in 2001, collected various health-related information.

Starting in 1998, the KLIPS is a longitudinal survey of a representative sample of Korean households and individuals in the household who reside in non-rural areas.[6] In the first year of 1998, using the multistage and stratified area probability sampling the KLIPS

interviewed 13,317 persons in 5,000 households, with a 76% response rate. Since then, respondents who participated in the first wave were tracked in each year and some new people were added in the sample of each wave. Thus, the fourth wave conducted in 2001 consists of the total 11,501 individuals: the original samples of 10,607 who participated in the first survey or were added in the second or third waves, and 444 individuals who newly participated in the fourth survey.

As the title of survey implies, the KLIPS originally focused on the topic of economic activities, asking detailed information on educational attainment and occupational-relevant variables like employment status, wage, and working hours. In addition, the data also contain information on the household's economic and demographic characteristics like homeownership, household income, or household size. Therefore, the data are particularly useful for studies that need refined measures of socioeconomic position of individuals and their households.

Reflecting a rising interest in aging and health research in Korea, a special set of health-related questions was added in the 2001 fourth wave of the KLIPS. Along with detailed information on respondents' social and economic situation, this provides an excellent opportunity to specifically investigate the effects of SES on health among Korean people. Thus, the following analyses are based upon the samples who participated in the fourth survey. Among the total 11,051 participants, 8 individuals refused to answer health-related questions. The current study excludes 2,101 individuals who are less than 25 years old in 2001 and additional 6 cases who have missing information on variables used in the analysis, leading to the final samples of 4,580 females and 4,356 males. Note that although the KLIPS is a longitudinal data set, since the health-related questions were

asked only in the most recent fourth wave, at this moment I am only able to provide cross-sectional description of the health of the urban Korean population.

*Health Measures*

I use one indicator of health as the dependent variables: self-rated overall health. This is only a health outcome variable available in the data.[7] Respondents' subjective assessment of overall health is coded very poor (1), poor (2), fair (3), good (4), and very good (5). Self-rated health represents overall physical well-being rather than simply the absence of disease (Ross and Bird 1994, Ross and Wu 1996). As an independent predictor of mortality, self-assessed health is actually a stronger predictor of mortality than physician-assessed health (Mossey and Shapiro 1982, Idler and Benyamini 1997).

*SES Measures*

We include five indictors of SES to determine both gross and net effects of each measure to predict self-rated health status: education, household income, liquid assets, home ownership, and real estate ownership. Except for education, all other SES variables are obtained from household data. Education is coded in three categories: less than high school, high school completion, and some post-secondary or more (tertiary). Household income is total household income from all sources and is coded in three categories: less than 1,500,000 won, 1,500,000-2,999,999 won, and 3,000,000 won or more. Liquid financial assets consist of various components from all household members like bank accounts, stocks, saving insurance, or money landed to others. We had various experiments to determine the best categorization for the liquid asset variable and found

that using a dichotomous variable distinguishing those with less than 10,000,000 won and those with 10,000,000 won or more contains the main conclusion regarding the effect of the liquid asset variable.

Along with liquid assets, home ownership is another alternative indictor of SES considered by Robert and House (1996). In our study it is a dummy variable indicating whether household owns its home. Finally, our data also have information on whether household owns any real estates except for resident home and the real total amo unt of those owned real estates. Given that 75 percent of our sample do not have any real estates, a dichotomous variable is created to separate those having nay kinds of real estates from those who do not.

*Demographic Variables*

For this study examining how socioeconomic differentials in health vary by age, age is a key variable. Age is a continuous variable. We estimated the same model with age classified into six categories: 25-34, 35-44, 45-54, 55-64, 65-74, and 75 or older. Treating age as a continuous variable resulted in a better fit as well as described the data more parsimoniously. Gender is coded 0 for males and 1 for females. Marital status is also coded dichotomously (1 = married, 0 = others). Finally, since our four SES indicators except for respondents' own education are from household data, it is necessary to adjust for different sizes of household. Thus, a continuous variable of the number of household members is included in the model.

**THE EFFECTS OF THE FIVE SES MEASURES**

Before examining how the effects of socioeconomic status vary by age, we first look at gross and net effects of five different indicators of SES on self-rated health in the total sample. In Table 2, the column of "gross effect" indicates the results of OLS regression relating self-rate health to each of the five SES measures separately, controlling for demographic variables. The coefficients of demographic variables are those derived from the model that has only demographic factors as explanatory variables.[8] The table shows that each of five SES indicators is significantly associated with self-rated overall health for both men and women, though the effect of home ownership for men is marginally significant ($p = .06$). The direction of the effects of the two traditional SES measures on self-rated health is consistent with general expectations: those with higher education or higher household income report better health status than those with lower levels of these variables. Remember that higher value in our variable of self-rated health indicates better health. The three alternative indicators of SES show the same direction: those whose household has greater liquid assets, owns home or real estate are better off in self-rated than those who do not.

The column of "net effect" presents the coefficients from the multiple regression predicting self-rated health simultaneously with all demographic and SES variables. Among men, each of education, household income, and liquid assets is significantly related to self-rated health, after the other SES and demographic variables are taken into account. For example, those with high school diploma have 0.215-point higher value of self-rate health than those with educational attainment of less than high school. The self-rated health score of those with tertiary education is 0.282 higher than the score of those

whose educational attainment is less than high school completion. Those whose household' s liquid assets are 10,000,000 won or more are more likely to report better health that those with less than 10,000,000 won: the former have a score of self-rated health that is 0.121 higher than the score for the latter.

Turing to the other two SES indicators, home ownership, whose gross effect was marginally significant, does not have independent effects on self-rated health status, once education, household income, liquid assets and real estate ownership are controlled. However, those whose household owns real estate tend to report better health status, though the effect is marginally significant ($p = .054$).

We observe similar patterns in the effects of SES measures among women. The three SES indicators found to have significant impacts on self-rated health among men influence women' s self-rated health as well. Those who are more educated, have higher household income and assets of 10,000,000 won or more report better health status than their counterparts. Although the effect of home ownership was negligible among men, once other SES measures were controlled in the model, women whose household owns home seem to have a higher score of self-rated health than women whose household does not own home. Real estate ownership is also a significant predictor of self-rated health among women as well as among men. However, note that the effects of the two ownership variables are only marginally significant ($p = .075$ and $p = .099$).

The finding that for both men and women home ownership or real estate ownership shows only marginal significance or even nonsignificance, while education, household income, and assets have statistically significant impacts on self-rated health, suggests that the effects of the latter three indicators of SES are stronger than the effects

of the former two SES measures. This is confirmed by looking at the standardized coefficients in the table. Comparing standardized regression coefficients shows that among the five SES measures, in general education has the greatest impact on self-rated health, followed by household income and assets. The two ownership variables have relatively lower predictive powers. It is also interesting to see that for women, asset variable has an explanatory power as much as household income does.

In sum, the results of gross and net effects indicate that although the two standard SES measures of education and household income are in general more important to predict self-rated health than the three alternative indicators of SES, the latter do add the explanatory power to the model. In particular, the liquid asset variable for women has the effect as strong as household income has.

Before moving to discussion on age variations in the effects of those SES measures on self-rated health, we should point out one interesting finding with respect to the functional form of the age effect. As the negative coefficient of age variable indicates, older people report overall poor health than younger people for both men and women. However, the variable of age squared to capture non-linear change in the age effect presents different signs between men and women. Health decreases at an accelerating rate for men, as the negative coefficient of age squared indicates. The positive coefficient of age squared for women, however, indicates that decreasing rate of self-rated health slows as age advances.

**AGE VARIATIONS IN THE EFFECTS OF SES**

To examine how the effects of each SES indicator vary by age, we test whether including interaction terms between age and each SES measure significantly increases the variance of self-rated health explained, compared to the full addictive model in Table 2. For example, when we examine the interaction between age and education, the following three models are compared;

(1) Self-rated health = $b_0 + b_1 age + b_2 age^2 + b_3 marital + b_4 numhh + b_5 ed + b_6 hhinc + b_5 asset + b_6 home + b_7 estate$

(2) Self-rated health = $b_0 + b_1 age + b_2 age^2 + b_3 marital + b_4 numhh + b_5 ed + b_6 hhinc + b_5 asset + b_6 home + b_7 estate + b_8 (ed \times age)$

(3) Self-rated health = $b_0 + b_1 age + b_2 age^2 + b_3 marital + b_4 numhh + b_5 ed + b_6 hhinc + b_5 asset + b_6 home + b_7 estate + b_8 (ed \times age) + b_9 (ed \times age^2)$

The first model is our basic model used to obtain net effects of explanatory variables in Table 2, including demographic variables and all five SES indicators. The second model adds the interaction between age and education to the first model. If the interaction coefficient ($b_8$) between age and education turns out to be significantly positive, it indicates that the positive effect of education on self-rated health increases with age. On the other hand, a negative coefficient indicates that differentials in health by education decrease with age. If we find the interaction to be non-significant, we may conclude that education-based gap in self-rated health remain constant across age groups.

Finally, the last model has an additional interaction term between education and age squared. If the coefficient ($b_8$) of interaction between age and education is significantly positive and the coefficient of interaction ($b_9$) between education and age squared is significantly negative, it indicates that educational differentials in self-rated health diverge and then converge with age (Ross and Wu 1996). Thus, we can specifically test the hypothesis predicting convergence in socioeconomic gap in health at older ages. The three models are estimated for each SES measure separately.

Table 3 presents comparisons in the proportion of variance in self-rated health that is explained by each set of independent variables among the above three models. Let's first look at the results for men in the upper panel. Model 3 with the additional interaction between education and age squared increases the proportion of variance explained by 0.0004 than Model 2 with interaction between education and age only. This change is not statistically significant. Further test between Model 2 with the age-education interaction and Model 1 with no interaction shows that the former increases the proportion of variance explained by only 0.0004, which is not statistically significantly. Therefore, the results reveal that the effect of education on self-rated health does not vary substantially by age. The same conclusion may be drawn for the effects of home ownership and real estate ownership.

We observe a different pattern with respect to the effect of household income. Although 0.0013 increase in the proportion of variance explained by Model 3 than Model 2 is not significant as is the case for education, the proportion of variance explained by the interaction between age and household income in Model 2 (0.0019) is statistically significant. This indicates substantial age variations in the effect of household income. A

similar pattern is also found for the effect of assets: there is a significant interaction between age and asset that household has.

We find more substantial variations in the effects of each SES measures by age among women than men. The education-age, home ownership-age, and real estate ownership-age interactions appear significant, though the interaction between age and home ownership is marginally significant at .10 level. Interestingly, Model 3 with the additional interaction between household income and age squared improves upon Model 2 with the interaction between household income and age only. The effect of asset displays the same pattern as the effect of household income.

In order to further explore these significant interaction effects, we present the figures showing the relationship between age and self-rated health by each SES measure of which interaction turns out to be significant. Model comparisons in Table 3 showed that for men household income-age, and asset-age interactions are significant and regression results in Table 4 indicate that these interactions are positive indicating the gap in self-rated health by household income or asset increases with age. The top figure presenting predicted scores of self-rated health based on Model 2 in Table 3 for household income clearly show increasing differentials by age in health between those with different levels of household income. From the bottom figure we easily discern the increasing gap in health between those with assets 10,000,000 won or more and those without such amount of asset as age advances.[9]

Our result presented that for women Model 2 in Table 3, which includes an interaction term between age and education, or between age and home ownership, or between age and real estate ownership, is better than Model 3 with an additional

interaction with age squared. Furthermore, regression coefficients of these interactions in Table 4 have positive signs, which suggests that for women the education-based, home ownership-based, or real estate-based gap in self-rated health diverges with age. Each figure corresponding to each of the three SES measures clearly demonstrates this increasing differential in health as age advances.

Turing to the effects of household income and liquid assets, for which we found significant interactions with age squared, we see that in Table 4 the interaction between age and household or between age and liquid assets is significantly positive, while the interaction with age squared is significantly negative. As shown in the figures for home ownership or liquid assets, this indicates that the gap in self-rated health diverges and then converges with age.[10]

In sum, our results provide no evidence to support the hypothesis predicting convergence in socioeconomic differentials in self-rated health with age among Korean men. In contrast, we found that the effects of household income or liquid assets increase with age, while the education-, home ownership-, or real estate ownership-based gap in health remained constant across age groups. Nor the results support the convergence hypothesis among women with regard to the effects of education, home ownership, and real estate ownership, which indeed increased with age. However, we did find some evidence of convergence in the effects of household income and liquid assets at older ages.

## SUMMARY AND DISCUSSION

In this study, we described how socioeconomic differentials in self-rated health change with age among Korean men and women using five different indicators of SES. Prior research mostly dealing with European or American population has provided contrasting empirical findings. One the one hand, some studies have found the increasing SES gap in health with age, which supports the cumulative advantage hypothesis. This argues that economic, social psychological, or health behavior-related resources associated with socioeconomic status cumulate throughout the life course and it leads to the increasing gap in health status between those in highest and lowest socioeconomic positions, as age advances.

In contrast, others have found that the SES differentials in health indeed converge in old age (House et al. 1990, 1994, Robert and House 1996). One main explanation of convergence in the socioeconomic gap in health among older adults has claimed that standard SES measures like education, income or occupation might not be proper to indicate living conditions of older adults and thus the decreasing effects of SES on health with age are artifactual due to poor measurement (Berkman 1988, Robert and House 1994). Thus, if alternative SES measures that better reflect living conditions of older people are used, we may find substantial SES differentials in health even among older people.

In this line, Robert and House (1996) investigated the effects of liquid assets and home ownership as alternative SES measures among Americans. Our study extends their approach in several ways. We first examine the extent to which previous results mostly derived from the experiences of Europeans or Americans hold in a very different context

using Korean data. We further include real estate ownership as an additional alternative indicator of SES as well as liquid assets and home ownership. Real estate ownership is expected to have independently substantial impacts on health, given its importance in the Korean economic context. Finally, we consider the SES-health relationship and its variation by age for men and women separately. Most prior studies on the issue did not address specifically how age variations in the relationship between SES and age may differ by gender.

Our results of regression analysis predicting self-rated health with demographic and five SES measures for the whole samples indicated that although the three alternative measures -- liquid assets, home ownership, and real estate ownership -- do not have effects as strong as the two traditional indicators of education and household income have, they do add explanatory powers to the model. Particularly, liquid asset variable is as important as household income to predict women' s self-rated health.

More relevant for our main research goal is age variation in the effect of each SES measure. Our empirical findings in general do not support the convergence hypothesis especially among men. The effects of education, home ownership, and real estate ownership have not changed across age groups, while health differentials by household income or liquid assets actually increase with age. That is, for both standard and alternative indicators of SES we found no evidence that the SES gap in health converges in old ages.

Interestingly, we observed a different pattern of age variations in the effects of SES on self-rated health among women. First of all, we found a significant variation by age in each SES measure. Education, home ownership, or real estate ownership-based

differences in health increase with age, which is inconsistent with the expectation of convergence but is more consistent with the divergence hypothesis emphasizing the cumulative advantages of higher SES throughout life course.

However, we did find some evidence of converging effects for household income and liquid assets among women. Differences in self-rated health by household income or liquid assets diverged and then converged with age. Therefore, the results for women are not conclusive to assess the two contrasting hypotheses, whereas it is concluded that the hypothesis predicting convergence in old ages may not hold for men.

It has been argued that social policies especially geared to help access to medical care among the elderly such as Medicare or Social Security might mute the influences of SES on health among older people and thus partially explain the diminishing SES gap in health with age (Robert and House 1994, Ross and Wu 1996). Given its very limited social welfare provision in Korea especially for the elderly, the perspective focusing on the roles of social policies might provide an explanation of diverging or constant SES differentials in health with age among Koreans.

However, we still need to explain why there is a convergence in the effect of household income or liquid assets among women. At this moment, it is difficult to provide definite explanations of it. Instead, we can only propose future research to deal with the issue more specifically. One thing that needs to be noted, though, is that the two variables showing the same pattern of convergence with age represent direct financial or monetary resources available, compared to home ownership or real estate ownership. Interestingly, the effects of household income and liquid assets present the same pattern among men as well, though in this case the differences in health by household income or

liquid asserts diverge with age rather than converge in old age as for women. The finding seems to suggest that the distinction between monetary resources available like household income or liquid assets on the one hand and the other SES measures like education, home ownership, or real estate ownership on the other hand might be more important to understand the effects of SES on health among older people rather than the distinction between traditional and alternative indicators of SES. More empirical studies are needed to test whether this finding is unique to the Korean context.

Before concluding, it is necessary to point out several important limitations of our study, suggesting possible directions for further research. First of all, this study only provides a cross-sectional description of the effects of SES on health. As widely recognized in health research area, it is difficult to solve the issue of the direction of causality using cross-sectional data (Williams 1990). Without longitudinal data, we can't definitely rule out the possibility that health status is associated with SES more likely because poor health would prevent higher SES achievement rather than because better SES leads to better health.

The cross-sectional feature of our data also requires us to be cautious in interpreting the results with regard to age variations in the effects of SES. Here we only observed variations in the SES effects on health across age groups with cross-sectional data and interpreted the variations across age groups as reflecting the aging process of individuals throughout their life course. However, the variations observed could be due to cohort effects instead of aging effects: the particular relationship between SES and health in a certain age group could be a reflection of unique experiences of the cohort (Ross and Wu 1996, House et al. 1990). To address the issue, we need longitudinal data tracking

relatively long periods of individual's life course to address the issue. It should be also noted, however, that some empirical studies have provided results that seem to support an aging effect. Their analyses of the SES effects on the change in health status using longitudinal data showed the similar patterns of age variations in the SES effects as cross-sectional analyses, even though their longitudinal data covered very limited time spans.

Finally, self-rated health status was only a health outcome variable available from our data and thus we could not examine whether the results vary by different health outcome measures. In particular, previous research has found that SES differences are relatively large for physical functioning measures compared to self-rated health or disease measures, especially among older people (Robert and House 1996, Ross and Wu 1996). Therefore, it would be useful for future research to include functioning measures as well as disease measures among Korean people and examine how the patterns of age variations in the SES effects differ across various health outcomes.

**ENDNOTES**

[1] Ross and Wu (1996) also included self-rated health status as another health outcome and interestingly they found that the education-based gap in self-rated health remained constant across age groups for both data sets that used.

[2] Some empirical studies showed neither divergence nor convergence wit age in the SES gap in health but the constant gap across age groups. For example, the two studies which Ross and Wu (1996) referred to found that differences between those with different levels of educational attainment in health did not substantially change with age (Maddox and Clark 1992, Taubman and Rosen 1982).

[3] A gender dummy variable in most studies was found to indicate that women are general worse off than men in various health outcomes such as functional status or chronic diseases, controlling for other demographic and socioeconomic variables. Interestingly, gender differences in health seem to be relatively weaker in self-rated health compared to physical functioning or diseases. For instance, gender difference in self-rated health status appeared not to be significant in Ross and Wu (1996) and Robert and House (1996).

[4] The reference year of the data for Britain, Canada, and Korea is 1998, while the data for U.S. were obtained in 1991 (For detailed information on data sets in each country, see OECD 2001).

[5] Another interesting indictor of distinctive features with regard to aging in Korea is the considerably higher level of labor force participation among older people. For instance, in 1997 labor force participation rates among aged 65 and over were 23 percent and 42 percent among Korean women and men, respectively, which is substantially higher than 9 percent and 17 percent among American women and men. This level of economic activity among Korean people aged 65 and over is indeed higher than that of corresponding Japanese elderly who are often considered as a typical population that has higher levels of labor force participation among the elderly.

[6] See Phang et al. 1999 for detailed information on the survey.

[7] The only alternative measure available is whether the respondent has any kinds of chronic disease. Instead of asking to indicate if an individual has a specific chronic disease among the prepared lists of diseases as most surveys do, the KLIPS first asked whether a respondent has any kinds of chronic disease and then requested to list what the disease he or she has. Since respondents are not informed of the specific definition of "chronic disease", depending on how they perceive chronic disease, individuals even with the same disease may respond differently to this question. Due to this problem, we did not include the measure of chronic disease as another health outcome variable.

[8] To make the results more interpretable, age variable in the all regression analyses is centered at its mean separately for males and females. The mean age for males and females in our data is 45 and 47, respectively.

[9] For the figure of household income, other explanatory variables are fixed as follows: the mean of number of household members, non-married, high school completion, liquid assets of less than 10,000,000 won, no home ownership, and no real estate ownership. The figure for liquid assets is drawn with the same specification of explanatory variables except that in this case household income is fixed at the level of 1,500,000 won – 2,999,999 won.

[10] For the figure of education, other explanatory variables are fixed as follows: the mean of number of household members, non-married, household income of 1,500,000 won – 2,999,999 won, liquid assets of less than 10,000,000 won, no home ownership, and no real estate ownership. The figure for home ownership is based upon fixing explanatory variables at: the mean of number of household members, non-married, high school completion, household income of 1,500,000 won – 2,999,999 won, liquid assets of less than 10,000,000, and no real estate ownership. The similar specification is applied for the effect of real estate ownership. The figures for household income and liquid assets for women are drawn in the same way for men as specified in the note 9.

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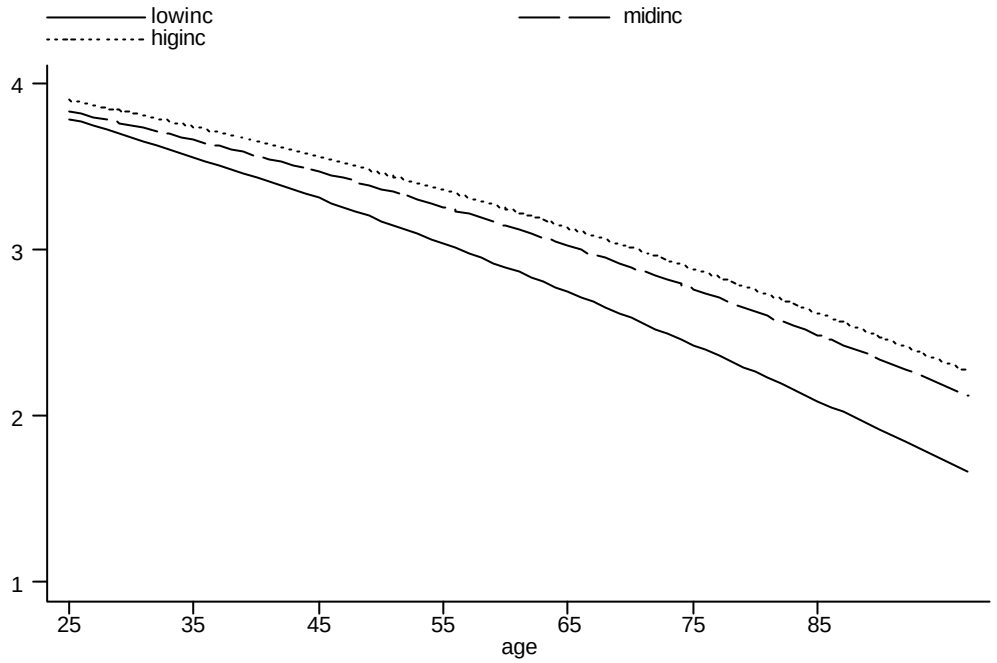
Figure 1. Changes in Self-rated Health by Age and SES among Men

A. Household Income




B. Liquid Assets

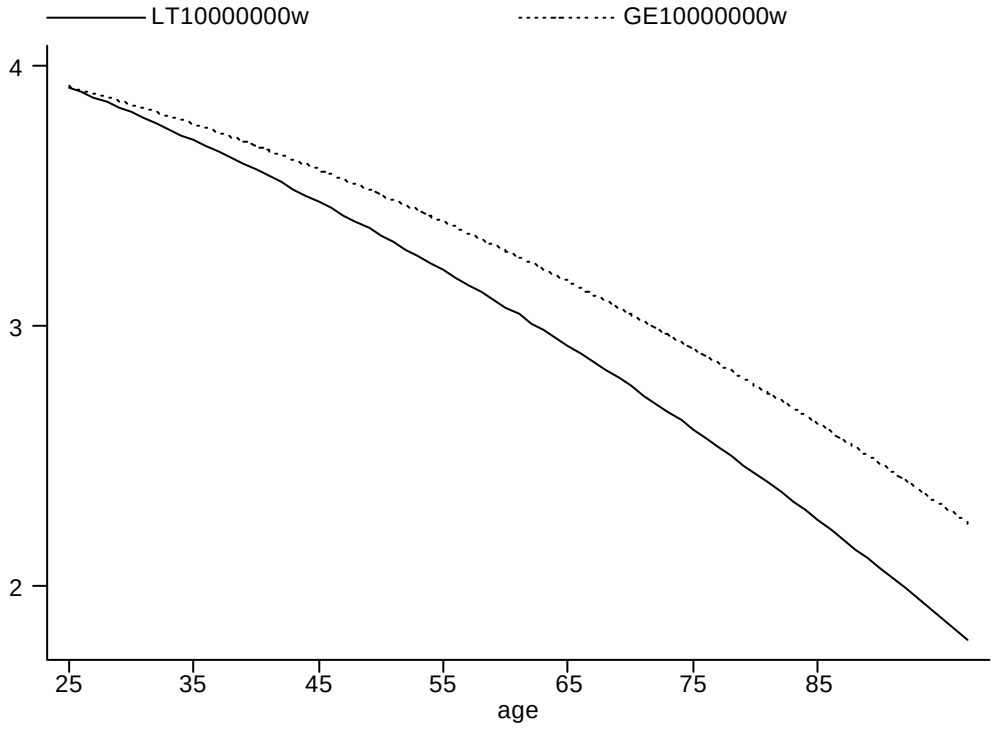
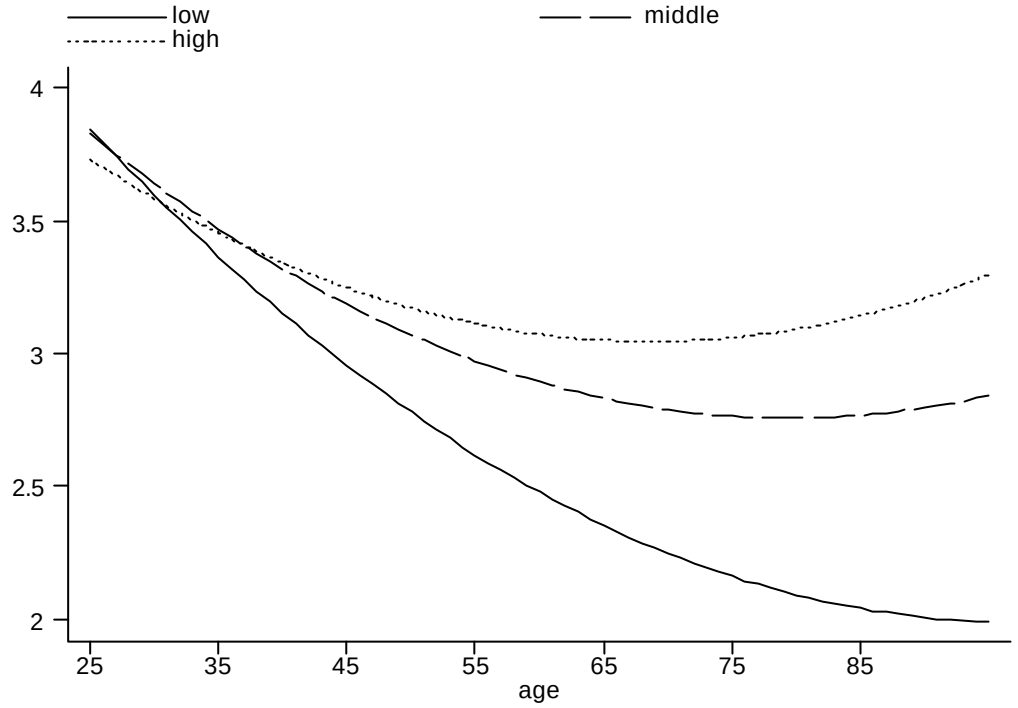
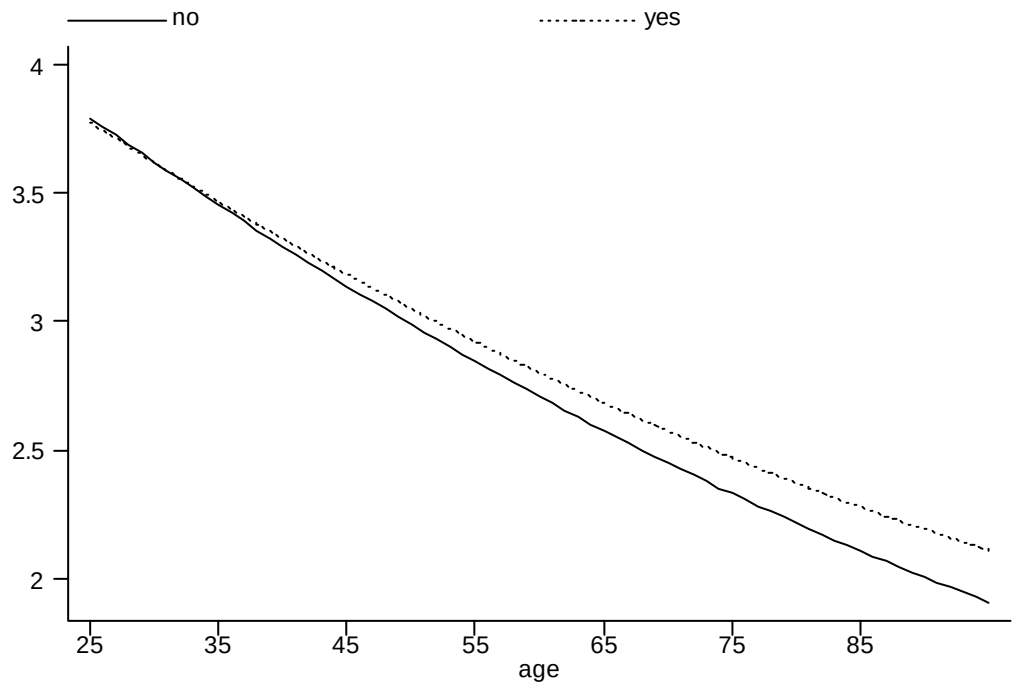


Figure 2. Changes in Self-rated Health by Age and SES among Women

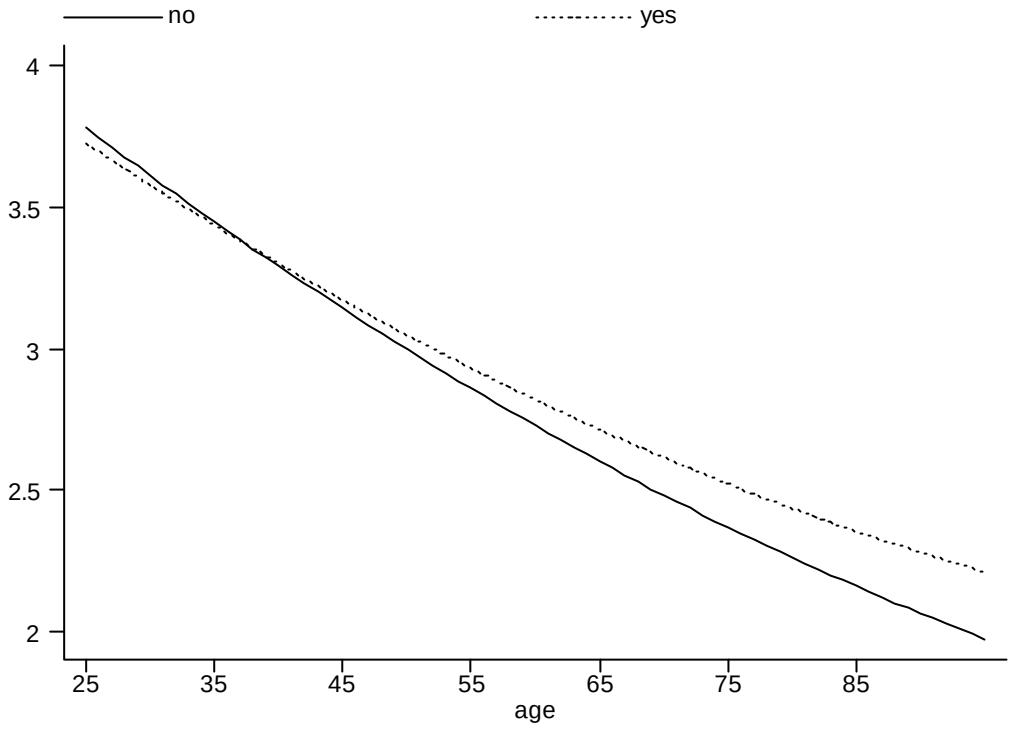
A. Education



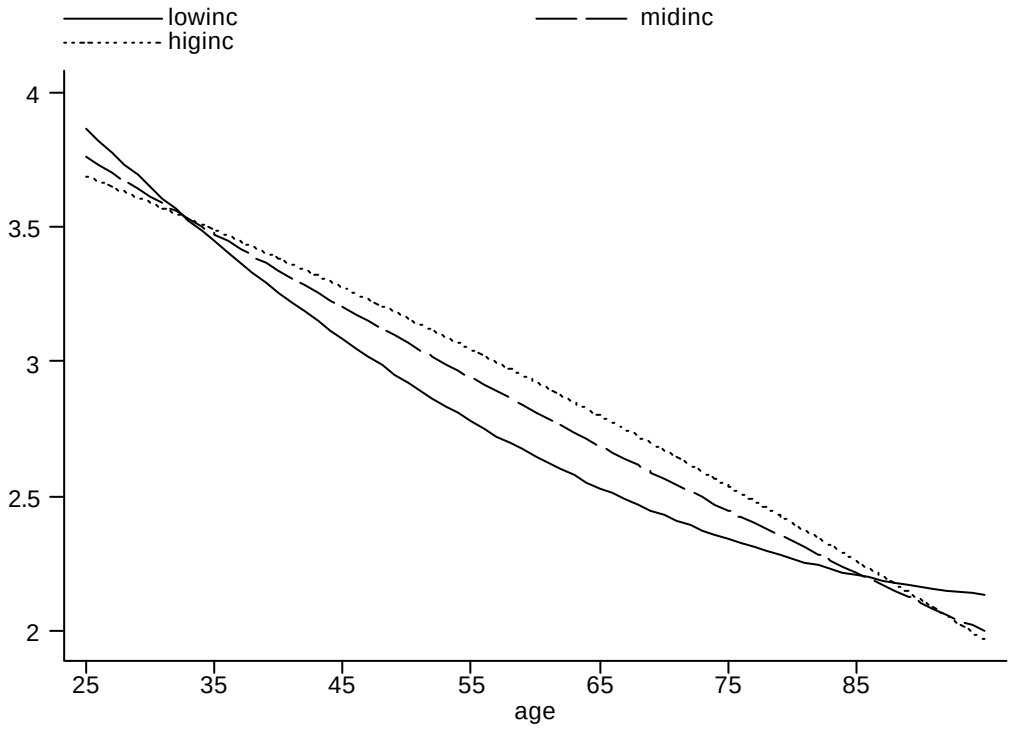

B. Home Ownership



C. Real Estate Ownership




D. Household Income



E. Liquid Assets

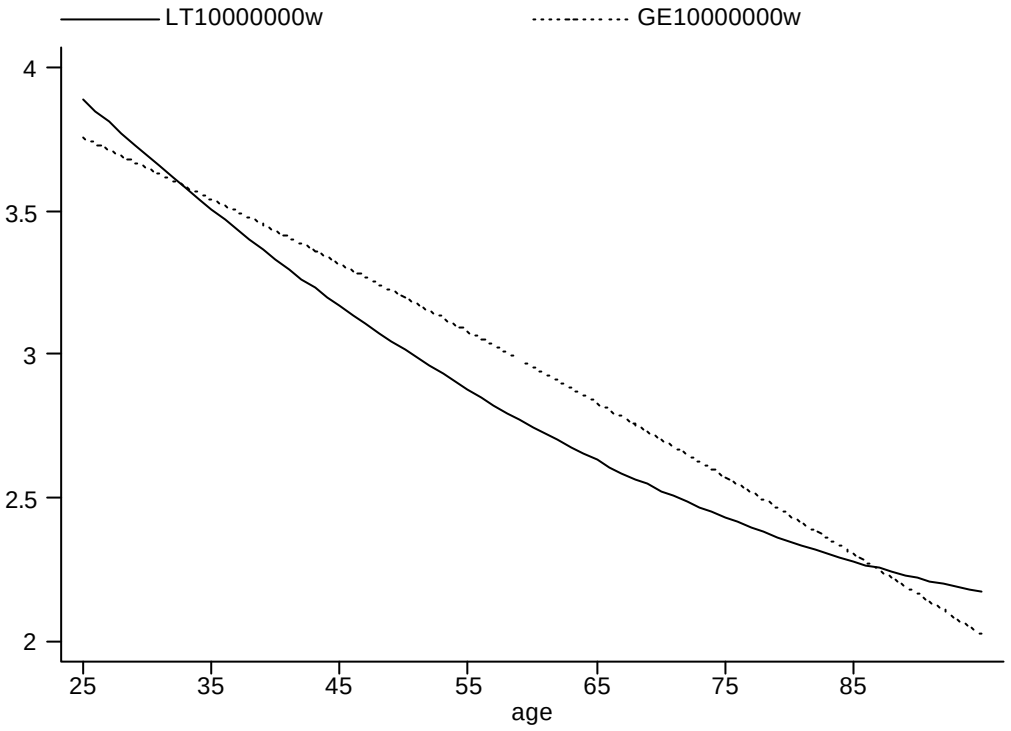


Table 1. Indicators of Public Expenditure on Health across 29 OECD Countries

| Country | Public expenditure on health as % of GDP | Public expenditure on health as % of total expenditure on health |
|---|---|---|
| Korea | 2.4 | 46.2 |
| Mexico | 2.6 | 48.0 |
| Turkey | 3.5 | 71.9 |
| Poland | 4.2 | 65.4 |
| Greece | 4.7 | 56.3 |
| Portugal | 5.1 | 66.9 |
| Hungary | 5.2 | 76.5 |
| Ireland | 5.2 | 76.8 |
| Finland | 5.3 | 76.3 |
| Spain | 5.4 | 76.4 |
| Italy | 5.5 | 67.3 |
| Luxembourg | 5.5 | 92.4 |
| United Kingdom | 5.7 | 83.3 |
| Austria | 5.8 | 71.8 |
| Japan | 5.8 | 78.5 |
| United States | 5.8 | 44.8 |
| Australia | 6.0 | 70.0 |
| Netherlands | 6.0 | 68.6 |
| Belgium | 6.1 | 71.2 |
| New Zealand | 6.3 | 77.0 |
| Canada | 6.5 | 70.1 |
| Czech Republic | 6.5 | 91.9 |
| Sweden | 6.6 | 83.8 |
| Denmark | 6.8 | 81.9 |
| Iceland | 7.0 | 83.9 |
| Norway | 7.1 | 75.8 |
| France | 7.3 | 77.7 |
| Switzerland | 7.6 | 73.2 |
| Germany | 7.8 | 75.8 |

Note: Countries are ranked in ascending order of public expenditure on health as % of GDP
source: OECD (2001)

Table 2. The Effects of Demographic and Socioeconomic Variables on Self-rated Health by Gender

| | Men | | | Women | | |
|---|---|---|---|---|---|---|
| | Gross | Net | Standardized | Gross | Net | Standardized |
| Age | -0.029 (0.001)* | -0.023 (0.001)*** | -0.347 | -0.034 (0.001)*** | -0.028 (0.001)*** | -0.444 |
| Age2 | -0.0002(0.00006)** | -0.0002(0.00006)** | -0.043 | 0.0002(0.00005)*** | 0.0001(0.00005)* | 0.039 |
| Marital Status | | | | | | |
| Married | 0.096 (0.035)** | 0.039 (0.035) | 0.017 | 0.119 (0.031)*** | 0.089 (0.031)** | 0.040 |
| Others | | | | | | |
| Number of HH members | 0.000 (0.010) | -0.022 (0.010)* | -0.031 | 0.030 (0.009)*** | 0.013 (0.009) | 0.018 |
| Education | | | | | | |
| LT HS | | | | | | |
| HS | 0.263 (0.032)*** | 0.215 (0.032)*** | 0.116 | 0.299 (0.033)*** | 0.262 (0.033)*** | 0.129 |
| Tertiary | 0.390 (0.036)*** | 0.282 (0.038)*** | 0.137 | 0.324 (0.044)*** | 0.237 (0.046)*** | 0.088 |
| HH Income (Won) | | | | | | |
| LT 1,500,000 | | | | | | |
| 1,500,000 - 2,999,999 | 0.214 (0.029)*** | 0.156 (0.029)*** | 0.083 | 0.123 (0.029)*** | 0.079 (0.029)** | 0.040 |
| 3,000,000 or more | 0.380 (0.036)*** | 0.246 (0.039)*** | 0.103 | 0.232 (0.036)*** | 0.125 (0.039)*** | 0.049 |
| Liquid Assets | | | | | | |
| LT 10,000,000 | | | | | | |
| 10,000,000 or more | 0.228 (0.026)*** | 0.121 (0.028)*** | 0.063 | 0.164 (0.026)*** | 0.091 (0.027)*** | 0.045 |
| Home Ownership | | | | | | |
| No | | | | | | |
| Yes | 0.051 (0.027)^ | -0.002 (0.027) | -0.001 | 0.082 (0.026)** | 0.047 (0.026)^ | |
| Real Estate Ownership | | | | | | 0.023 |
| No | | | | | | |
| Yes | 0.110 (0.029)*** | 0.057 (0.029)^ | 0.027 | 0.090 (0.028)*** | 0.047 (0.028)^ | 0.021 |
| Constant | | 3.194 (0.146)*** | | | 2.736 (0.048)*** | |
| $R^2$ | | 0.2359 | | | 0.3148 | |
| N | | 4356 | | | 4580 | |

*** p < .001 ** p < .01 * p < .05 ^ p < .10

Table 3. Changes in the Proportion of Variance ($R^2$) in Self-rated Health Explained by Each Set of Independent Variables

| | Education | HH Income | Assets | Home Ownership | Real estate Ownership |
|---|---|---|---|---|---|
| Men | | | | | |
| Non-linear Interaction (Model 3) vs. Linear Interaction (Model 2) | 0.0004 | 0.0013 | 0.0004 | 0.0002 | 0.0005 |
| Linear Interaction (Model 2) vs. No Interaction (Model 1) | 0.0004 | 0.0019* | 0.0018** | 0.0000 | 0.0000 |
| Women | | | | | |
| Non-linear Interaction (Model 3) vs. Linear Interaction (Model 2) | 0.0005 | 0.0015* | 0.0012* | 0.0000 | 0.0000 |
| Linear Interaction (Model 2) vs. No Interaction (Model 1) | 0.0029*** | --- | --- | 0.0005^ | 0.0007* |

*** p < .001 ** p < .01 * p < .05 ^ p < .10

Table 4. Estimates of Interactions with Age from the Best Model in Table 3 for Each SES indicator

| | Men | | Women | |
|---|---|---|---|---|
| Education*Age | | | | |
| HS*Age | | | 0.012 | (0.003)*** |
| HS*Age$^2$ | | | 0.020 | (0.004)*** |
| Tertiary*Age | | | | |
| Tertiary*Age$^2$ | | | | |
| HH Income*Age | | | | |
| (1,500,000 - 2,999,999)*Age | 0.006 | (0.002)** | 0.006 | (0.002)** |
| (1,500,000 - 2,999,999)*Age$^2$ | | | -0.0002 | (0.0001)* |
| (3,000,000 or more)*Age | 0.007 | (0.003)* | 0.010 | (0.003)*** |
| (3,000,000 or more)*Age$^2$ | | | -0.0004 | (0.0001)* |
| Liquid Asset 10,000,000 or more *Age | 0.006 | (0.002)** | 0.007 | (0.002)*** |
| Liquid Asset 10,000,000 or more *Age$^2$ | | | -0.0003 | (0.0001)** |
| Home ownership*Age | | | 0.003 | (0.002)^ |
| Home ownership*Age$^2$ | | | | |
| Real estate ownership*Age | | | 0.004 | (0.002)* |
| Real estate ownership*Age$^2$ | | | | |

*** p < .001 ** p < .01 * p < .05 ^ p < .10

# 토론문

장상수(순천대 사회교육)

우리 사회의 불평등 연구는 주로 계층화의 구조와 과정에 관한 것이었고, 계층화의 결과에 대해서는 연구가 미약한 실정이다. 이런 의미에서 이 연구는 불평등 연구의 지평을 확장하는 데에 기여하리라고 본다.

이 연구의 과제는 다음과 같다.

1. 건강의 계층별 차이가 연령에 따라 달라지는 유형이 한국과 서구와 서로 다른가?

2. 전통적 변수(교육 및 가구소득)외에 유동적 자산의 소유 정도, 자가소유여부, 부동산 소유 여부 등의 영향은 어떠한가?

3. 건강의 계층별 차이가 연령에 따라 달라지는 유형이 성별로 다른가?

분석의 내용은 이 과제에 대한 충분한 답을 내리고 있다고 판단된다.

그러나 이 연구가 좀더 충실해지기 위해서는 다음과 같은 문제를 고려하여야 한다고 판단된다.

첫째, 건강의 계층별 차이가 연령에 따라 달라지는 유형이 서구와 한국에서 서로 다르다면, 그 이유는 무엇인가?
둘째, 남성의 경우와 여성의 경우 건강의 계층별 차이가 연령에 따라 다른 유형을 띠고 있는 바, 그 이유는 무엇인가?
셋째, 남성의 경우와 여성의 경우 건강상태를 규정하는 하는 요인이 서로 다르다. 그 이유는 무엇인가?

이외에도 비록 지엽적이기는 하지만, 다음과 같은 문제도 고려하였으면 한다.

이 연구에서 종속변수는 건강상태에 대한 자기보고이다. 그런데 이 변수는 명목변수 또는 서열변수의 성격을 띠고 있다. 종속변수가 연속변수가 아닐 경우에는 설령, 그것이 정상분포의 형태를 띠고 있다 하더라도, 통상의 OLS 회귀로 분석하는 것은 약간의 문제를 낳을 수 있다. 물론 이 OLS 가 큰 문제를 야기했을 것이라고 보이지는 않는다. 하지만 그런 문제가 있을 가능성을 충분히 고려하여야 한다고 판단된다. 가중최소제곱(WLS)방법을 사용한 회귀분석이나 기타 다른 분석방법이 동일한 결과를 낳는지를 검토해 보는 것이 좋겠다.