

# Effects of Socioeconomic Deprivation in Middle- and Old-Aged People with Disabilities on Depression in Korea

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***Abstract---** Despite continuous economic growth, inequality in mental health in Korea is expected to deepen because of socioeconomic polarization and income inequality. This study aimed to identify the diverse types and patterns of socioeconomic deprivation that people with disability experience and the relationship between poverty and depression. . Data from waves 3 (2007)-13 (2017) of the KoWePS (Korean Welfare Panel Study) were extracted for 12,295 people with disability aged 45 or older. For longitudinal data analysis, a Generalized Least Square-fixed model was adopted and performed by fuzzy set theory. Socioeconomic deprivation was examined in six dimensions; Deprivation in dietary life, social needs, and health/medicine had major effects on mental health. Socioeconomic deprivation and depression tended to decrease over time. Age, subjective health, and socioeconomic deprivation affected depression changes The study proposed policy and practical intervention plans to build a multidimensional social safety net and enhance mental health.*

***Keywords---** depression; mental health; people with disability; poverty; socioeconomic deprivation*

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## I. INTRODUCTION

South Korea is becoming a super-aged society at the highest speed in the world. According to OECD statistics, the aging rate of South Korea is four times faster than the average rate of OECD member states. This aging of the population is especially prominent among people with disabilities. Of registered people with disabilities, approximately 2.14 million (86.2%) were middle- and old-aged people aged 40 or older, which indicates that aging was a serious issue among them compared with the general population. Their rate of aging was also two or three times faster than that of the general population (KIHSA 2014). People with disabilities often experience considerable exclusion and discrimination in social and economic participation, and are thus readily prone to economic vulnerability and psychosocial crises. In this context, depression has been the subject of policy and academic interest as middle- and old-aged people with disabilities are more likely to experience depression at a serious level than old people with no disabilities. People with disabilities deal with a social system structured around people with no disabilities and experience social bias and discrimination, which can lead to experiencing various types of frustration and depression (Lenze et al. 2001). In middle- and old-aged people with disabilities, depression can be explained as an issue related to the social structure/social environment rather than a simple outcome of personal and biological factors. People with disabilities have no self-confidence in their performance because of their functional limitations and are excluded from social and economic participation because they are considered to

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have little of value to contribute in society whether they want to work or not (Lee 2009). Many studies have reported that such social exclusion is connected to low socioeconomic status, which leads to higher levels and prevalence of depression (S. R. Lee and S. A. Lee 2010; Kwon 2012; Murali and Oyeboode 2004). That is, there are comparatively clear causal relations between socioeconomic status and depression. Previous studies, however, have clear limitations as they define socioeconomic status around income poverty based on productivity. When socioeconomic status is defined only based on the income level, it cannot fully reflect economic living standards and encompass multidimensional socioeconomic deficiencies that people experience (Kim, You, and Song, 2015). There is another approach to measuring socioeconomic elements beyond the traditional concept of poverty called “socioeconomic deprivation.” This concept is based on consumption and indicates the state of not being able to enjoy the living standard available to a majority of members of society, and having a deficiency of resources to achieve a basic lifestyle because of social stratification (Salmond et al. 2006). Socioeconomic deprivation measures the relative deficiency and living standard of middle- and old-aged people with disabilities by examining more multidimensional deficiencies, including but not limited to income deficiency, and reflecting their actual state of experiences, thus helping to determine their economic difficulties more specifically (Townsend 1979). Understanding the multidimensionality of deprivation can contribute to various practical solutions for depression. It is thus necessary to understand depression in middle- and old-aged people with disabilities based on the concept of socioeconomic deprivation rather than simple income poverty.

Internationally, research has investigated relations between socioeconomic deprivation and depression. In South Korea, such research has been very limited to the general population of all ages or the elderly (Kim, You, and Song 2015; Heo, Cho, and Kwon 2010; Yum and Moon 2017; Kim, Heo, and Chang 2018), and most of these studies have used cross-sectional data and had limitations with tracking depression trends longitudinally and identifying factors that influence depression over time. They have also measured socioeconomic deprivation only through the presence or absence of deprivation experiences, failing to reflect the concept of socioeconomic deprivation in terms of relative poverty. Socioeconomic deprivation should be measured in terms of its level rather than whether it is present or not.

This study set out to investigate relations between depression and socioeconomic deprivation in middle- and old-aged people with disabilities, who have been neglected in academic and policy considerations, from a longitudinal perspective. It measured socioeconomic deprivation quantitatively based on fuzzy set theory, examining the dynamics of socioeconomic deprivation over time and providing clearer explanations of its longitudinal effects on depression. The findings of the study can provide basic data about the characteristics of socioeconomic deprivation and depression in middle- and old-aged people with disabilities, and ultimately serve as grounds for policy and practical plans to promote their mental health.

## **II. MATERIALS AND METHODS**

### *Data for Analysis*

The purpose of the present study was to investigate the effects of socioeconomic deprivation on depression in middle- and old-aged people with disabilities. For this purpose, the study built the research model.

### **III. DATA COLLECTION**

For analysis, the study used pooled data from the third year (2007) to the 13th year (2017) of the Korea Welfare Panel Study and identified individuals with disabilities aged 45 or older. The Korea Welfare Panel provides the nation's largest panel data for household units and represents the entire nation with data that has continued to be accumulated since 2005. The Korea Welfare Panel, in particular, includes various data to measure socioeconomic deprivation including economic activities, labor market, consumption behavior, education and vocational training, and social activities, as well as simple income level and collects information about the mental health of household members systematically. In addition, the panel tracks the same households over and over again, thus providing appropriate data to analyze their socioeconomic deprivation and depression changes. Cases that provided no responses to major variables were excluded, and the final analysis used the data of a total of 12,295 household members.

### **IV. MEASUREMENT**

#### *Dependent variable: Depression*

It is necessary to organize indicators for each dimension and define methods of measurement based on the indicators to measure socioeconomic deprivation based on the analysis data of the Korea Welfare Panel, which measures depression level with the "CESD-11" inventory. Comprised of a total of 11 items that ask about feelings and states during the previous week, the inventory uses a 4-point Likert scale (1 = very rare, 2 = sometimes, 3 = often, and 4 = mostly) to measure each item. The scores of all items are summed for measurement. Higher scores indicate higher levels of depression. In the study, Cronbach's Alpha was .875.

#### *Independent variable: Socioeconomic deprivation*

Based on previous studies, the present study classified socioeconomic deprivation into six dimensions including dietary life, housing, social security, economy/employment, social needs, and health and medicine, and organized indicators for each dimension with the items to figure out the socioeconomic deprivation level based on the content examined in the Korea Welfare Panel. Fuzzy set theory was used for the numerical measurement of multidimensional deprivation indicators. Fuzzy set theory, which measures poverty/deprivation multidimensional, was adopted publicly by the European Bureau of Statistics in 2002. Weights were added to the indicators measured with 13 items based on fuzzy set theory with the indicators being converted to standard scores. The deprivation scores of each dimension were in the range of 0–1, which means that the maximum addition of scores across the six dimensions was 6. Total socioeconomic deprivation scores were in the range of 0–1. Higher scores indicate higher degrees of socioeconomic deprivation.

Previous studies reported that depression was influenced by such factors as gender, age, educational background, region, type of disability, subjective state of health, and equalized household median disposable income. The present study predicted that these factors would have similar effects on depression in middle- and old-aged people with disabilities and thus controlled them.

## **V. METHODS OF ANALYSIS**

The present study conducted frequency and descriptive statistics analysis with STATA ver. 14.0 program and obtained Pearson's correlation coefficients to determine correlations among the sub-variables. In addition, panel regression analysis was performed based on Generalized Least Squares (GLS) to analyze the effects of socioeconomic deprivation changes over time on depression. The panel data of 2007–2017 were used. The panel data combined cross-sectional and time series data examined at certain points, having a high probability of violating the homoscedasticity assumption of error terms or finding autocorrelations in error terms. When merged panel data were estimated with pooled Ordinary Least Squares (OLS), they would not be consistent estimators. In pooled OLS, the variables excluded from a research model cannot be found in error terms. When such factors interact with explanatory variables, they have effects on dependent variables and cause convenience in estimation (Wooldridge 2006). It is thus necessary to use a model based on the assumption of heteroscedasticity between panel groups or autocorrelations within a group. In general, the most popular models are the fixed effects model of GLS and the random effects model of GLS. While the former is a method of estimation based on within-group variance, the latter is a method of estimation based on between-group variance. If there are correlations between them, the fixed effects model will be a valid choice (Kennedy 2003). The present study estimated a more appropriate model among pooled OLS, fixed effects, and random effects models through F-tests, Hausman Tests, and Brush-Pagan tests.

## **VI. RESULTS**

### ***General characteristics of the subjects***

The details about the general characteristics of the subjects of the analysis in a biennial cycle. As for gender, there were similar proportions between men and women at all points. The age group of 65–79 represented the highest proportion at all points with a mean age in the range of 64.04–70.07. As for educational backgrounds, those who graduated from elementary school or no school at all represented the highest proportion at about 50% at all points of observation. Those who lived in urban areas were three times more common than those who lived in rural areas. As for the type of disability, disabilities in external organs represented the highest proportion at approximately 88%–90%, being followed by mental disabilities and disabilities in internal organs in that order. Their subjective health scored a mean of 2.36–2.71 points on a 5-point scale, which was just below the median score and was on a steady rise. Reflecting the number of household members, equalized household disposable income continued to rise, but low-income households under 60% of the median income accounted for about 60% at all points.

The mean scores of depression were in the range of 9.03–12.13 and continued to drop overall. The subjects were classified into depression groups on a 16-point depression scale, and about 27% belonged to the group with depression symptoms.

### ***Actual state of socioeconomic deprivation***

As mentioned earlier, the present study organized the indicators of socioeconomic deprivation and applied fuzzy set theory to measure them quantitatively. The overall socioeconomic deprivation level dropped from 0.803 in 2007 to 0.423 in 2017. The degree of socioeconomic deprivation was examined by the dimension. Deprivation in

economic and employment respects were overwhelmingly the highest at all points, being followed by deprivation in dietary life, social needs, health and medicine, housing, and social security in that order.

### ***Longitudinal effects of socioeconomic deprivation on depression in middle- and old-aged people with disabilities***

The analysis results are shown in F-tests, Hausman tests, and Brush-Pagan tests were carried out to check the fitness of each model. The results showed that the fixed effects model was the fittest for both models.

Model 1 analyzed the effects of total socioeconomic deprivation scores based on the fuzzy set theory on depression. Of the control variables, gender and subjective health were significant. For each year that participants aged, their depression decreased significantly by 0.13. For each 1-unit increase in their subjective health, their depression decreased by 0.76. For each 1-unit increase in their total socioeconomic deprivation scores, their depression increased by 7.86.

Model 2 analyzed socioeconomic deprivation in each dimension. Of the control variables, only age reduced their depression by a significant amount. Of the dimensions of socioeconomic deprivation, deprivation in dietary life, social needs, and health and medicine had effects on increases in depression. Deprivation in dietary life had the biggest relative influence on depression. For each 1-unit increase in deprivation scores in dietary life over time, their depression increased by 3.53. Increasing scores of deprivation in social needs and health and medicine led to significant increases in depression by 1.02 and 1.18, respectively.

## **VII. DISCUSSION AND CONCLUSION**

The present study conducted a test with a fixed effects model based on GLS to investigate the longitudinal effects of socioeconomic deprivation on depression in middle- and old-aged people with disabilities. The data of the third to 13th Korea Welfare Panel Survey was used in the analysis. The major analysis results and their points of discussion follow.

First, the study examined changes in participants depression over time and found that it continued to decrease over time, except for 2013. This finding is similar to those of previous studies on people with disabilities (Cho and Seo 2012; Jeon and Kahng 2013).

Second, age and subjective health, two general characteristics of middle- and old-aged people with disabilities, had effects on changes in their depression. The older they became, the less depressed they were. These findings support a study (Jorm 2000) that reported the symptoms of depression decreased in super-aged people and other studies (Jorm et al. 2005; Blazer et al. 1991) that reported depression and anxiety reduced in elderly groups with various risk factors controlled. These findings can be interpreted in that psychological immunity in dealing with the effects of psychosocial risk factors increases as people get older and that their emotional reactivity decreases (Jorm et al. 2005). There is another possible interpretation that their depression symptoms have been somatized and underestimated instead of actual reducing. The more positive they were about their subjective health, the lower their depression level became, which is in line with the findings of a study (Park and Heo 2016) reporting negative relations between changes in subjective health perception and changes in depression, and another study (Yeom

2013) reporting lower subjective health perceptions and higher depression scores over time. These findings raise a need to provide middle- and old-aged people with disabilities who perceive their health as poor with proper medical services in the community and support in improving their physical and mental health through health education and programs related to mental health. The present study found that income had no effects on depression, which is because the income of middle- and old-aged people with disabilities is not large enough to cause significant changes to their quality of life.

Third, experiences with socioeconomic deprivation had direct effects on depression changes. Higher levels of deprivation led to higher levels of depression. These findings are in line with those of some previous studies (Kim, You, and Song 2015; Kang and Kim 2018; Kang 2019; Ko, Jeong, and Shin 2018) that identified experiences with socioeconomic deprivation as a risk factor for depression among the elderly.

Finally, the study divided socioeconomic deprivation into different dimensions for the analysis and found that deprivation in dietary life, social needs, and health and medicine had effects on increases in their depression, which implies that there should be multilateral interventions based on the deprivation experiences of middle- and old-aged people with disabilities. There are very poor policies for the dietary life of people with disabilities. The Korea National Health and Nutrition Examination Survey is conducted every year, but the national nutrition management plan by the Ministry of Health and Welfare contains no elements related to people with disabilities.

The study found that deprivation of social needs had effects on depression, which supports findings of a study (Kim and You 2019) reporting that those who had overdue payments for utility bills and health insurance premiums had suicidal ideation three times higher and 18 times more suicide attempts than those who did not. Utility bills impose a burden even on general families and can be a bigger burden for middle- and old-aged people with disabilities whose income level is relatively low. The current reduction system for utility bills applies different discount rates according to the disability grade. The disability grade system was abolished in July 2019, which means that the reduction system for utility bills will be reorganized.

It is also necessary to provide policies to support medical expenses for middle- and old-aged people with disabilities. Individuals with disabilities have a high likelihood of experiencing early aging faster than those with no disabilities and also developing a secondary disability after their primary disability. Considering that approximately 60% of the subjects belonged to a poor household, it is very likely that the households of middle- and old-aged people with disabilities will suffer from excessive burdens with medical bills. A study analyzed the medical expenses of elderly households with disabilities and reported that about 40% were likely to experience excessive burdens with medical bills. This was considerably higher than the percentage among the general population (Roh 2012). These findings imply that income inequality may lead to health inequality in the households of middle- and old-aged people with disabilities. It is also necessary to take into consideration the equity of health and medical expense burdens according to the characteristics of households of middle- and old-aged people with disabilities. There should be discussions about the expansion of public medical care including the adjustment of indirect taxes in their structure and tax rates in relation to health and medical services, improvement of the billing system for health insurance premiums, differential application of out-of-pocket payment for its reduction, and systematization of the

family doctor system. It is also important to develop and provide health support services in the community for middle- and old-aged people with disabilities and improve access to the service through connections between welfare, health, and medical resources and welfare service resources in the community.

The study, however, has its share of limitations: as there was no standardized scale to measure socioeconomic deprivation, the study organized a scale based on the socioeconomic deprivation index used by many researchers in previous studies. It also failed to consider variables that could influence depression at the community level as it considered variables only at the individual level to examine their causal relations with depression.

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