Subjective and objective indicators of socioeconomic status and self-rated health in Korean adolescents

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<Abstract>
Objectives: The purpose of this study was to examine the associations among self-rated health and socioeconomic status. **Methods:** Analyses were conducted based on cross-sectional data obtained from the Korea Youth Risk Behavior Web-based Survey. A total of 79,202 students aged 12 to 18 years participated in the study and there was a response rate of 95.5%. Separate logistic regression analyses were performed on each gender group based on a set of independent variables. Those being: the level of parental education level; family affluence scale; subjective household economic status; and subjective school achievement with SRH as the dependent variable. **Results:** Multivariate analyses revealed significant associations between each SES and adolescent SRH after controlling for other covariates. However, in the models that included all SES indicators, subjective household economic status and subjective school achievement remained significant in boys and girls. **Conclusions:** The findings demonstrated that subjective SES indicators are more closely related to adolescent SRH when compared with objective indicators.

Key words: socioeconomic status, self-rated health, adolescents.

Ⅰ. Introduction

Socioeconomic status (SES) is a multidimensional construct (Chen & Paterson, 2006), and is usually derived from information on education, occupational status, and income. In adolescence, SES is conventionally constituted by parental occupation, levels of income and education and material deprivation. In other words, parental SES has been considered to determine adolescent SES, because adolescents typically have no job and no income. However, such data can be problematic when the participants are adolescents. Previous studies have shown not only inaccuracies but also that a significant amount of data remains absent in adolescent self-reporting of the level of parental education, occupation, and income (Ensminger et al., 2000; Goodman, Huang, Schafer-Kalkhoff, & Adler, 2007; Wardle, Robb, & Johnson, 2002). Such inaccuracies and

information gaps could stem from the fact that a significant proportion of adolescents might not know the actual SES of their parents, or simply that they do not wish to accurately report on these indicators. Therefore, these SES may not be appropriate for adolescents' SES (Wardle et al., 2002). To overcome these flaws and assess the SES of adolescents, the Family Affluence Scale (FAS; Currie et al., 2008), subjective social status (Quon & McGrath, 2014) have been proposed. FAS is composed of four questions, all easily answerable, that may reflect the level of affluence or material deprivation of adolescents (Torsheim et al., 2004; Wardle et al., 2002). FAS, therefore, may be a useful alternative approach in the study of SES in adolescent health because it is less vulnerable to non-responses and inaccurate reporting. Some studies have measured the subjective social status of adolescents such as subjective household economic status and subjective school achievement (Goodman et al., 2007;

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Lemeshow et al., 2008; Piko & Fitzpatrick, 2007; Richer, Moor, & van Lenthe, 2012). Subjective household economic status was used to measure the perceived SES of the family in society by simply asking them their perceived family wealth using a 5-point scale (Piko & Fitzpatrick, 2007; Richer et al., 2012) or by using a 10-point self-anchoring scale (Goodman et al., 2007). The 10-point self-anchoring scale is presented as a ladder representing American society; adolescents are asked to choose the rung on the ladder that they think best represents their family's position in American society. Subjective school achievement was used to measure the personal social position in school (Koivusilta, Rimpelä, & Kautiainenk, 2006; Lemeshow et al., 2008). Different SES indicators may have different implications for health (Chen, Matthews, & Boyce, 2002), and there is no single best indicator of SES that can be applied equally across all health outcomes and age groups (Iversen & Holsen, 2008). Understanding which SES indicators are associated with adolescents' health is critical for introducing effective interventions that can reduce health disparities. Thus, different types of SES indicators should be used to understand the broader impact of SES (Chen & Paterson, 2006).

While many studies have investigated the relationship between SES and the health outcomes of adolescents (Barros et al., 2009; Chen & Paterson, 2006; Koivusilta et al., 2006; Vingilis, Wade, & Silly, 2002), studies of Korean adolescents in this regard are generally problematic since they have depended on unrepresentative samples (An & Kim, 2013), or limited samples (examining only certain age groups) (Khang, Cho, Yang, & Lee, 2005), and/or include only a few conventional SES indicators in their analyses (An & Kim, 2013). Therefore, the aim of this study is to assess the relative contribution of various SES to adolescents' health (as measured by SRH) of adolescents utilizing a nationally representative sample dataset.

Ⅱ. Methods

1. The Korea Youth Risk Behavior Web-based Survey

The present study drew on data from the Korea Youth Risk Behavior Web-based Survey [KYRBWS] -Ⅶ conducted by the Korean Centers for Disease Control and Prevention (KCDCP). KYRBWS has been carried every year by the Korean Center for Disease Control with the purpose of calculating representative and confidential public health index information related to the health-related behavior of Korea's adolescents. KYRBWS includes questions related to the following: tobacco, alcohol, and drug use; eating habits, obesity, and weight control; physical activity; injury prevention; sexual behavior; mental health; dental health; and individual hygiene. KYRBWS is an anonymous, internet-based, self-administered, structured questionnaire that uses a stratified three-stage clustering design on the basis of geographic area, school size, and grade level. The KCDCP have reported all data collection procedures utilized for the KYRBWS-Ⅶ. After determining the sampling, participants were randomly assigned identification numbers. Upon accessing the survey webpage using their ID numbers, the participants were asked to respond to a question about their willingness to participate. If they chose not to participate by "disagreeing", they did not progress any further. A total of 79,202 students in grade 7-12 from 400 middle schools and 400 high schools completed the web-based survey with guidance from trained teachers, the response rate was 95.5% (N=75,643). However, those students who did not answer important questions such as whether they lived together with their parents, the level of parental education were excluded from the present study. Accordingly, data from 74,936 students aged 12 to 18 years were analyzed. The characteristics of the participating students are shown in Table 1.

2. Instruments

SES in this study included FAS, level of parental education, subjective household economic status, and subjective academic achievement. To adjust for the effects of other associated factors, health-related behavioral (smoking, alcohol consumption, physical activity, consumption of breakfast) and psychological factors (depression, perceived stress, body weight perception) were included (Boardman, 2006; Breidablik, Meland, & Lydersen, 2008; Heshmat et al., 2015; Moor et al., 2014; Page & Suwanteerangkul, 2009; Piko, 2007; Vingilis et al., 2002)

<Table 1> Overview of instruments

Variables	Operationalisation
Socioeconomic	
Family structure	Possible responses were having both parents, having father or mother, having father or mother, having father or mother with step-parent, having no parents (orphaned or living with other relatives).
The level of parental education	the level of parental education was categorized as (1) college or higher, (2) high school, (3) middle school or less, and (4) do not know.
Family Affluence Scale (FAS)	FAS consists of four items: family car ownership, whether the student shared a bedroom, the number of computers at home, and time spent on holiday in the past 12 months. The composite FAS score was calculated by summing the responses to these four questions, the results of which were categorized of low (0-3), middle (4-5), or high (6-7) group.
Subjective family economic status	Participants were asked of their perception of their household's economic status. Possible responses from low to high.
Subjective academic achievement	Participants were asked of their perception of the grades' at school over the past 12months. Possible responses from low to high.
Psychological	
Perceived stress	Participants were asked how much stress they usually felt using a 5-item scale. Adolescents who felt stressed were placed in the perceived stress group.
Experience of depression	This was measured with a question if they had ever experienced sadness or despair to the extent that it had interrupted their everyday life for more than two weeks at a time over the past 12 months (dichotomized: yes/no).
Body weight perception	Participants were asked of subjective evaluation of their own body weight. The responses were classified of very underweight, normal, and overweight.
Behavioral	
Lifetime smoking experience	This was measured using dichotomized (yes/no) questions inquiring into lifetime smoking experience, lifetime drinking experience.
Lifetime drinking experience	
Frequency of Breakfast consumption	This was assessed with a question inquiring into the frequency of having breakfast during the previous week (less than 2 times a week/ 3-4 times a week/ more than 5 times a week).
Level of physical activity	Activity was assessed by a single question pertaining to the number of days on which they engaged in vigorous physical activity during the previous week ($\geq$5 days, 1–4 days, or 0 days).
Self-rated health	Adolescents' perception of their health. The responses were then dichotomized into unhealthy (very poor, poor, fair) and healthy (good, very good) for the analysis.

3. Data analysis

Analyses were separately conducted for male and female adolescents. Sampling weights which have been described in detail by the KCDCP (KCDCP, 2011) were used to report on estimates representative of the Korean adolescent population and the complex sampling design of the survey. The complex sampling design took into account stratification, clustering and multi-stage sampling to obtain the variances. Multivariate logistic regression analysis was carried out in order to evaluate the relationship between various SES and SRH after adjusting for covariates such as health-related behavioral and psychological factors. In model 1, the level of parental education was included as a SES indicator. In model 2, FAS was included. subjective household economic status comprised model 3, and subjective academic achievement model 4, while all SES indicators were included model 5 in sequence. All models were adjusted for school grade, health-related behavioral and psychological factors. All data were analyzed using SPSS 18.0.

<Table 2> Self−rated health according to selected socioeconomic characteristics by sex

Characteristics	Categories	Total population		Male (N=37,414)		Female (N=37,522)	
		N	EV %	Poor/fair (N/EV %)	SE	Poor/fair (NEV /%)	SE
Grade of School	Middle school	38,025	50.7	5224 (46.4)	1.1	7060 (46.1)	1.1
	High school	36,911	49.3	5397 (53.6)	1.1	8230 (53.9)	1.1
Family structure	Having both parents	68,493	92.1	34,113 (91.7)	0.2	34,380 (92.5)	0.1
	Having father or mother	4,225	5.2	2,175 (5.6)	0.1	2,050 (4.9)	0.1
	Having father or mother with new spouse	1,133	1.4	462 (1.2)	0.1	671 (1.6)	0.1
	No parents	1,085	1.3	664 (1.6)	0.1	421 (1.0)	0.1
Family Affluence Scale	High	20,724	27.7	2545 (24.1)	0.5	3700 (25.3)	0.5
	Middle	33,371	44.5	4740 (45.1)	0.5	6866 (45.5)	0.4
	Low	20,841	27.8	3336 (30.8)	0.5	4724 (29.2)	0.5
Subjective household economic status	High	22,197	29.6	12,391 (33.1)	0.2	9,806 (26.1)	0.2
	Middle	35,490	47.4	16,757 (44.8)	0.5	18,733 (49.9)	0.5
	Low	17,249	23.0	8,266 (22.1)	0.3	8,983 (23.9)	0.2
Paternal education	College or higher	32,298	43.1	4278 (42.2)	0.7	6003 (42.8)	0.8
	High school	26,355	35.2	3552 (32.8)	0.6	5802 (36.2)	0.6
	Middle school or less	3,733	5.0	599 (5.3)	0.2	878 (4.9)	0.2
	Unknown	12,550	16.7	2192 (19.7)	0.5	2607 (16.1)	0.4
Maternal education	College or higher	24,565	32.8	3238 (31.6)	0.7	4513 (32.1)	0.7
	High school	34,359	45.8	4523 (42.9)	0.6	7555 (48.6)	0.6
	Middle school or less	3,737	5.0	547 (4.7)	0.2	919 (5.3)	0.2
	Unknown	12,275	16.4	2313 (20.8)	0.5	2303 (14.0)	0.4
Subjective academic achievement	High	13,459	35.2	13,459 (36.0)	0.2	12,920 (34.4)	0.2
	Middle	20,202	27.0	9,941 (26.6)	0.3	10,261 (27.3)	0.3
	Low	28,355	37.8	14,014 (37.5)	0.2	14,341 (38.2)	0.3
Perceived stress	Stressed	63,037	83.9	29,854 (79.9)	0.2	33,183 (88.4)	0.2
	Unstressed	11,899	16.1	7,560 (20.1)	0.2	4,339 (11.6)	0.2
Experience of depression	No	50,056	67.3	26,956 (72.1)	0.3	23,100 (61.9)	0.3
	Yes	24,880	32.7	10,458 (27.9)	0.3	14,422 (38.1)	0.3
Experiences of lifetime smoking	No	55,511	73.9	24,715 (65.8)	0.4	30,796 (82.8)	0.3
	Yes	19,425	26.1	12,699 (34.2)	0.4	6,726 (17.2)	0.3
Experiences of lifetime alcohol consumption	No	36,655	49.0	17,446 (46.2)	0.4	19,209 (52.1)	0.4
	Yes	38,281	51.0	19,968 (53.8)	0.4	18,313 (47.9)	0.4
Level of physical activity	None	31,636	41.2	11,030 (29.3)	0.3	20,606 (54.6)	0.4
	1-4days/a week	36,058	48.0	20,861 (55.0)	0.3	15,197 (40.1)	0.4
	5days over/a week	7,949	10.8	5,982 (15.7)	0.3	1,967 (5.3)	0.1
Frequency of breakfast consumption	More than 5 times a week	46,802	62.6	23,445 (62.4)	0.4	23,357 (62.9)	0.4
	3-4 times a week	9,896	13.1	4,628 (12.5)	0.2	5,268 (13.8)	0.2
	Less than 2 times a week	18,238	24.3	9,341 (25.2)	0.3	8,897 (23.3)	0.3
Body weight perception	Standard weight	25,206	33.5	11,640 (31.0)	0.3	13,566 (36.2)	0.3
	Overweight	28,592	37.6	12,429 (33.0)	0.3	16,163 (42.7)	0.3
	Underweight	21,138	28.9	13,345 (36.0)	0.2	7,793 (21.1)	0.2

EV; estimated value, SE; standatrd error, To reflect the stratified cluster sampling design of the 2011 Korea Youth Risk Behavior Web-based Survey, frequencies were calculated by using the "survey frequency procedure" of SPSS.

Ⅲ. Results

1. General characteristics of the participants

Table 1 details the characteristics of the participants in this study. A total of 74,936 students participated, of which 49.9% were male adolescents. The overall percentage of participants who rated their health as poor was 34.6%. Specifically, 40.2% of female adolescents and 28.3% of male adolescents rated themselves as having poor health. Compared to male adolescents, female adolescents were more likely to evaluate their health negatively. 50.7% of the participants were middle school students, and 92.1% of adolescents lived with both parents. 44.5% of the participants had middle FAS grade. Approximately 47.4% of the students rated their own socioeconomic status as being in the middle. With regard to the level of parental education, more than one third of respondents reported that their father had graduated from college or higher, while a smaller proportion (32.8%) had mothers with that level of education. About 37.8% of the adolescents reported that their school achievement was low, while 35.2% rated their school achievement as high. Nearly 83.9% of participants reported they were stressed, and 32.7% reported they experienced depression. 26.1% said they smoked, 51.0% said they consumed alcohol, while 41.2% reported they did no physical activity. More than half of participants had breakfast more than 5 times a week, and 33.5% stated that their weight was normal.

<Table 3> Estimated odds ratios of the association of SES on the likelihood of poor/fair self-rated health among Korean male adolescents (n=37,414)

Characteristics	Model 1[a] OR(95% CI)	Model 2[b] OR(95% CI)	Model 3[c] OR(95% CI)	Model 4[d] OR(95% CI)	Model 5[e] OR(95% CI)
Paternal Education					
College or Higher	1				1
High School	1.08 (1.01-1.15)				.99 (.93-1.07)
Middle School or less	1.27 (1.11-1.45)				1.13 (.98-1.29)
Unknown	1.11 (1.11-1.33)				1.07 (.97-1.17)
Maternal Education					
College or Higher	1				1
High School	1.09 (1.03-1.17)				1.02 (.96-1.09)
Middle School or less	1.08 (.95-1.23)				.95 (.84-1.09)
Unknown	1.29 (1.18-1.41)				1.10 (.99-1.29)
Family Affluence Scale					
High		1			1
Middle		1.21 (1.32-1.51)			1.14 (0.99-1.13)
Low		1.14 (1.16-1.32)			1.12 (0.89-1.19)
Subjective Family Economic Status					
High			1		1
Middle			1.41 (1.33-1.50)		1.31 (1.23-1.39)
Low			1.84 (1.71-1.97)		1.59 (1.47-1.72)
Subjective Academic Achievement					
High				1	1
Middle				1.12 (1.05-1.19)	1.04 (.97-1.11)
Low				1.44 (1.35-1.19)	1.24 (1.17-1.32)

OR: odds ratio, CI: confidence interval.

* All models were adjusted for other covariates (family structure, grade of school, perceived stress, experience of depression, experiences of lifetime smoking/drinking, breakfast consumption, level of physical activity, body weight perception)
[a] Including Including paternal and maternal education as a SES variable [b] FAS (family affluence scale) as a SES variable
[c] Including Including subjective family economic status as a SES variable [d] subjective academic achievement as a SES variable
[e] Including Including all SES variables.

2. Associations of socioeconomic status with self-rated health among male adolescents

The calculated odds ratios (ORs) that show the relationship between SES and SRH in male adolescents are presented in Table 2. In all models except for the full model, when school grade, psychological and health-related behavioral factors were adjusted for, all SES were significantly associated with the reported fair/poor perceptions of health. Parent(s) with high school or less educational attainment, lower FAS scores, lower subjective academic achievement and household economic status were significantly correlated with a higher prevalence of poor self-rated health in each model. In model 5, the full model, subjective household economic status (middle, OR; 1.31, 95% CI; 1.23-1.39; low, OR; 1.59, 95% CI; 1.47-1.72), as well as subjective academic achievement (low, OR 1.24, 1.17-1.32) remained significant.

<Table 4> Estimated odds ratios of the association of SES on the likelihood of poor/fair self-rated health among Korean female adolescents

Characteristics	Model 1[a] OR(95% CI)	Model 2[b] OR(95% CI)	Model 3[c] OR(95% CI)	Model 4[d] OR(95% CI)	Model 5[e] OR(95% CI)
Paternal Education					
College or Higher	1				1
High School	1.05 (.99-1.11)				.99 (.93-1.06)
Middle School or less	1.18 (1.05-1.33)				1.07 (.95-1.21)
Unknown	1.19 (1.10-1.29)				1.08 (.99-1.18)
Maternal Education					
College or Higher	1				1
High School	1.04 (.98-1.09)				.98 (.92-1.04)
Middle School or less	1.15 (1.03-1.29)				1.05 (.93-1.18)
Unknown	1.12 (1.02-1.23)				1.04 (.94-1.14)
Family Affluence Scale					
High		1			1
Middle		1.26 (1.19-1.33)			1.04 (.98-1.10)
Low		1.12 (1.06-1.18)			1.06 (.99-1.13)
Subjective Family Economic Status					
High			1		1
Middle			1.36 (1.28-1.44)		1.30 (1.23-1.39)
Low			1.60 (1.50-1.71)		1.49 (1.39-1.60)
Subjective Academic Achievement					
High				1	1
Middle				1.13 (1.07-1.19)	1.07 (1.01-1.13)
Low				1.25 (1.19-1.33)	1.13 (1.07-1.20)

OR: odds ratio, CI: confidence interval.
* All models were adjusted for other covariates (family structure, grade of school, perceived stress, experience of depression, experiences of lifetime smoking/drinking, breakfast consumption, level of physical activity, body weight perception)
[a] Including Including paternal and maternal education as a SES variable 　[b] FAS (family affluence scale) as a SES variable
[c] Including Including subjective family economic status as a SES variable 　[d] subjective academic achievement as a SES variable
[e] Including Including all SES variables.

3. Associations of socioeconomic status with self-rated health among female adolescents

Table 3 shows the calculated ORs for the relationship between SES and SRH in female adolescents with respect to grade of school, psychological and behavioral factors. In female adolescents, like male adolescents, having parent with high school or less educational attainment, lower FAS scores, lower subjective academic achievement, and household economic status were significantly correlated with a higher prevalence of poor self-rated health in each model. In the full model (model 5), subjective household economic status (middle, OR; 1.30, 95% CI; 1.23-1.39; low, OR; 1.49, 95% CI; 1.39-1.60), and subjective academic achievement (middle, OR; 1.07, 95% CI; 1.01-1.13; low, OR; 1.13, 95% CI; 1.07-1.20) remained significant.

Ⅳ. Discussion

The aim of this study was to explore the relationship between various SES indicators and SRH among Korean adolescents. Based on previous research, the hypothesis in this study was that FAS and subjective social status indicators including subjective household economic status and subjective academic achievement would be significantly associated with SRH, even after controlling for covariates. In this study, all SES were associated with the odds ratio of poor SRH in separate multivariate logistic models adjusted for behavioral and psychological factors. However, in the full models that combined subjective and objective indicators of SES, only subjective social status indicators maintained their independent association to SRH. These results support previous research that showed higher subjective household economic status as being protective against a poor perception of health as compared with objective indicators, and adolescent's social position as indicated by school achievement is closely related with SRH (Hagquist, 2006; Koivusilta et al., 2006; Piko & Fitzpatrick, 2001). This is also in agreement with the assumption that as young people increasingly gain

independence, the influence of parental SES is reduced and peers become a more important reference group (Torsheim et al., 2004). Adolescents' perception of SRH may contribute to the relationship between school achievement and SRH. Whereas SRH among adults is characterized as both an enduring self-concept and a spontaneous health assessment, SRH among adolescents is deemed to be an enduring self-concept (Bailis, Segall, & Chipperfield., 2003). This is because adolescents do not usually have serious illnesses or consequent symptoms. For this reason, adolescents are more likely than adults to assess their health in terms of competence (Mechanic & Hansell, 1987). The self-identities of adolescents are less stable and require more external corroboration. Accordingly, social feedback reflecting consensually based norms and expectations may influence the self-rated health of adolescents (Mechanic & Hansell, 1987). School achievement is a good indicator of competence in adolescents, in that it mirrors strong parent-oriented norms and expectations.

In previous studies, adolescents with low FAS scores had a higher risk of reporting poor SRH (Moor et al., 2014; Torsheim et al., 2004; Richer et al., 2012). In this study, FAS was significantly associated with boys and girls' SRH in separate multivariate logistic regression models, but showed no association in full models that combine all SES indicators. One plausible reason for this result is that items of FAS may be not sensitive when measuring family affluence in Korean adolescents. The rate computer possession in this study was 96.8%, and 75.5% of adolescents reported they had their own room. It is worth remembering that Korea has one of the highest rates of computer possession at home (Korea National Statistical Office, 2012), and Korea's declining birthrates over the past two decades have meant that most families have only child or two children (Korea National Statistical Office, 2013). The items that reflect family vary across countries and culture, more specific items is needed to improve the sensitivity of FAS.

In this study, the level of parental education was not significantly correlated with SRH in both boys and girls. The evidence for correspondence between levels of parental

education and SRH in adolescence is somewhat inconsistent (Duarte-Salles et al. 2011; Hagquist, 2006; West, 1997). Given the literature review, the level of parental education has both direct and indirect effects on adolescents' SRH (Duarte-Salles et al. 2011; Hagquist, 2006; West, 1997). The findings in this study may be partially influenced by high expectations amongst parents for good grades for their children. The pressure for academic achievement may cause adolescents' psychological discomfort including stress and depression, which are reported to be associated with adolescents' poor SRH (Piko, 2007; Tremblay, Dahinten, & Kohen, 2003; Vingilis et al., 2002). Adolescents' psychological discomfort may accentuate the effect of level of parental education on adolescents' SRH.

Several limitations should be considered when interpreting these findings. First, this study used a cross-sectional design, which makes it impossible to make conclusive statements about causality. Longitudinal studies must be performed to confirm such statements. Another limitation is that this study excluded those students who did not answer the question as to whether they lived together with their parents (0.9%). This shortcoming could be attributed to the KYRBWS. A 2008 Korean society index showed a school enrollment rate of 95.5%. Therefore, the relationship between SRH and SES for excluded or unenrolled students could not be determined. Lastly, some variables such as depressed mood and stress perception were measured by only one question for each, neither of which was standardized or validated. As a result, there may be concerns as to whether confounding factors were adequately and correctly considered.

Ⅴ. Conclusion

The results of the present study indicate that subjective indicators of SES are significantly associated with SRH, while objective indicators such as FAS and levels of parental education show no such association. To assess family affluence more precisely and prevent exclusion of adolescents who fail to

correlate with conventional SES, the specific items of FAS need to be replaced with more country-specific elements. Moreover, subjective social status indicators proved to be reliable indicators that can be used to assess adolescents' SES, and link it to SRH as a health outcome. Findings in this study underline the fact that adolescent-specific indicators should be used when assessing adolescents' SES. Identifying vulnerable adolescent populations could make for effective health promotion and preventive interventions and reduce health disparities.

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