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Abbreviations
ANCOVA: analysis of covariance; aOR:
adjusted odds ratio; BMI: body mass index; CI:
confidence interval; OR: odds ratio; KNHANES:
Korean National Health and Nutrition
Examination Survey; MOGEF: Ministry of
Gender Equality and Family; NIOSH: National
Institute for Occupational Safety and Health;
SE: standard error.

Maternal working hours and smoking and drinking in adolescent children: based on the Korean National Health and Nutrition Examination Survey VI and VII

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ABSTRACT

Background: Adolescent smoking and drinking are influenced by parental supervision. This study aimed to investigate the gap in adolescent smoking and drinking experience rates and age at initiation according to maternal working hours.

Methods: Data from 1,580 adolescents aged 12–18 years and 1,172 working mothers of double-parent or single-mother households were selected from the Korean National Health and Nutrition Examination Survey (KNHANES) VI & VII data. Figures on adolescents' smoking and drinking rates and their ages at imitation were used. Maternal working hours were divided into < 40 hours, 40–52 hours, and > 52 hours to analyze whether smoking and drinking experience rates and age at initiation differ according to maternal working hours and by the child's sex. Maternal age, education level, household income, occupation, shift work, current smoking status, monthly drinking frequency and child's obesity, stress recognition and depressive mood were adjusted for in the statistical analyses.

Results: The odds for adolescents' smoking behavior were significantly higher with increasing maternal working hours in boys but not in girls. The odds for adolescents' drinking behavior were not significantly higher in both boys and girls. Regardless of the child's sex, there were no significant differences in the age of smoking and drinking initiation according to maternal working hours.

Conclusions: Adolescents of mothers who work long hours are at a higher risk of being exposed to smoking. Thus, our society needs to share the burden of raising children, which is concentrated on women, and employers and governments should support policies that can help prevent long working hours.

Keywords: Working hours; Adolescent; Alcohol drinking; Cigarette smoking

BACKGROUND

Alcohol and cigarette use by adolescents has diverse social repercussions and detrimental health effects.[1] Adolescent drinking has several short-term effects on behavior, including drunk driving,[2] homicide, suicide, unintentional injury,[3] sexual violence,[4] vandalism and property damage,[5] as well as long-term harm, including brain injury[6] and elevated risk for alcohol use disorder and alcohol dependence in adulthood.[7,8] Adolescent smokers were

reported to show significantly higher perceived stress rates, prevalence of depression symptoms, suicide planning rates, and suicide attempt rates compared to non-smokers and ex-smokers.[9] Furthermore, smoking rate in adolescents aged 15–19 years was significantly correlated with the incidence of lung cancer in patients aged 40–44 years (male vs. female, r = 0.88 and r = 0.82, respectively).[10] Smoking in adolescence is also associated with mild airway obstruction and diminished lung development.[11] According to the 2019 Youth Risk Behavior Survey published by the Korea Centers for Disease Control and Prevention, the age at smoking initiation is 13.1 ± 0.0 years in boys and 13.6 ± 0.1 years in girls, and the age at drinking initiation is 12.9 ± 0.0 years in boys and 13.5 ± 0.0 years in girls.[12]

An array of parental factors has been reported to predict smoking and drinking in adolescents. Chang et al. reported that parents' education level affects children's drinking rate, while Chung and Lee reported that parental supervision predicts the age of smoking initiation in children.[13,14] According to Urrutia-Pereira et al.,[15] parents' guidance regarding smoking is a factor preventing children's smoking (odds ratio [OR]: 0.67; 95% confidence interval [CI]: 0.45–0.77). A meta-analysis of 17 studies on problem drinking in adolescents observed that problem drinking is negatively correlated with family relationships and parental supervision, where problem drinking declines with more positive and intimate family relationships and higher parental supervision.[16] Pooravari et al.[17] reported that individuals having an unstable attachment with their parents engage in alcohol consumption, substance abuse, and smoking as a means of controlling their emotions.

According to the 2018 Korean National Youth Survey published by the Ministry of Gender Equality and Family (MOGEF), approximately 16.5% of adolescents aged 13–18 years spend at least one hour with their fathers, while 38.6% spend at least one hour with their mothers.[18] The 2016 Survey on Status of Families by the MOGEF reports that adolescents perceive that their mothers, as opposed to fathers, spend more time talking with them, are more intimate, more frequently intervene in their lives, and knows more about their friends.[19] These data support the fact that mothers spend more time with their children and may be more interested in them. The 2020 Statistics Korea report on Time Use Survey shows that in double-income families, husbands spend 15 minutes, while wives spend 36 minutes providing care for their family. In single-income families with husbands as the breadwinner, however, husbands spend 20 minutes while wives spend 1 hour and 36 minutes providing care for their family.[20] These data show that working mothers spend considerably less time on family caregiving. The longer the parents work, the less time they have to spend with their children. Because mothers generally spend comparatively more time with their children, are more intimate with them, and may be more interested in them, we hypothesized that the impact of the mother's absence, due to long working hours, on supervision of the child would be greater than that of the father's absence.

While a previous study showed that maternal employment affects middle school students' smoking and drinking rates,[21] no studies have examined the association between maternal working hours and children's smoking and drinking rates in Korea. Therefore, we investigated whether there is a gap in children's smoking and drinking experience rates and age at initiation according to maternal working hours using Korean National Health and Nutrition Examination Survey (KNHANES) data.

METHODS

Study population

Six years of KNHANES data (KNHANES VI 2013–2015 and KNHANES VII 2016–2018) were used for this study. Of the total 47,217 participants, data of 3,536 adolescents aged 12–18 years were selected. Of these, data of 1,913 adolescents with a working mother were screened, and those who lived with both parents or those who lived with a single mother were chosen. Participants who did not answer the question about drinking and smoking status or responded to it by selecting "I do not know" were excluded. Finally, data of 1,580 children and 1,172 mothers were used for analysis.

Measurement tools

We obtained information about adolescent drinking and smoking from the questionnaire items in KNHANES VI and VII.[22,23] The questions were as follows: "Have you ever smoked a cigarette?" "When was the first time you smoked a cigarette?" Drinking: "Have you ever had at least one alcoholic drink?" "When was the first time you had at least one alcoholic drink?"

Maternal working hours were classified into < 40 hours, 40–52 hours, and > 52 hours. Monthly household income was classified into quartiles based on the reference amount for each year. The 1st, 2nd, and 3rd quartiles of household income for each year were as follows: year 2013: 0.75, 1.5, 2.46 million KRW; year 2014: 0.68, 1.48, 2.5 million KRW; year 2015: 0.76, 1.58, 2.69 million KRW; year 2016: 0.75, 1.5, 2.46 million KRW; year 2017: 0.89, 1.91, 3.10 million KRW; and year 2018: 1.06, 2.02, 3.18 million KRW.[22,23] Maternal education level was divided into elementary school or below, middle school, high school, and college or above. Occupation was divided into 10 categories according to the Korean Standard Classification of Occupations (managers, professionals and related workers, office clerks, service workers, sales workers, skilled agricultural, forestry and fishery workers, crafts and related workers, equipment, machine operating and assembling workers, elementary workers, and military personnel). We divided 10 job classifications into two categories (the former 5 into white-collar jobs and latter 5 into blue-collar jobs) to reflect the difference between them. Work schedule items are classified into day work (06:00–18:00), evening shifts (14:00–24:00), night shifts (21:00–08:00), regular rotating day and night shift, 24-hour rotating shift, split shift (≥ 2 shifts per daily working hours), irregular rotating shift, and others. According to the National Institute for Occupational Safety and Health (NIOSH), shift work is defined as all types of work conditions except for regular day working hours (07:00–18:00).[24] In this study, we set day working hours as day work group and remaining working hours set as shift work group. The maternal monthly drinking rate was divided into two groups: no drink ever or less than one drink per month in the past year and at least one drink per month in the past year. Maternal smoking condition was divided into two groups: ex-smokers or non-smokers and current smokers.

According to previous studies, depression, stress, or obesity are known as personal factors that influence smoking and drinking among adolescents.[9,25] Depending on the 2017 Korea Childhood and Youth Standard Growth Chart percentiles, up to the age of 18, obesity is defined as a body mass index (BMI) greater than or equal to the 95th percentile when considering gender and age. If a BMI is greater than 25.0 kg/m^2, it is defined as obese even if it is less than the 95th percentile. In this data, age is indicated, but the month age is unknown, so we assumed that the month age of each age is 0 months. The average level of perceived stress was judged as "high stress" when responded 'feel greatly' or 'feel a lot' and

"low stress" when responded 'feel a little' or 'hardly feel.' When asked if responder was in a depressive mood for 2 weeks in a row, respondents answered 'yes' or 'no.'

Statistical analysis

The KNHANES VI and VII data were obtained via stratified two-stage cluster sampling; therefore, all statistical analyses were performed using sample weighting. Children's ages at drinking and smoking initiation according to maternal working hours were compared using analysis of covariance (ANCOVA), and children's drinking and smoking rates according to maternal working hours were compared using cross-tabulation analysis. The OR and 95% CI for "lifetime smoking rate" and "lifetime drinking rate" according to maternal working hours were computed using binary logistic regression. All analyses were performed for each sex. We adjusted for the following variables for ANCOVA and logistic regression: maternal age, education level, household income, occupation, shift work, current smoking status, monthly drinking rate and several child's factors-depressive mood, stress and obesity.

All statistical analyses were performed using IBM SPSS Statistics software (IBM Corp., Armonk, NY, USA), version 26.0, and statistical significance was set at $p < 0.05$.

Ethical statement

This study was exempted from review by the Institutional Review Board of Dankook University Hospital (IRB 2021-01-024).

RESULTS

Table 1 shows the general characteristics of mothers. The mean maternal age was 44.69 ± 0.16 years, and most mothers were high school graduates, followed by college graduates or higher. White-collar occupations accounted for 79.3% and blue-collar occupations 20.7%, and there was no significant difference in the proportion of working hours group according to the two occupational categories. Regarding working hours, 46.5% mothers worked less than 40 hours

Table 1. General characteristic of the mothers (n = 1,172) by weekly working hours

Variables	Categories	Working hours			Total	p-value
		< 40	40–52	> 52		
Age (years)		44.89 ± 0.23	44.52 ± 0.24	44.47 ± 0.41	44.69 ± 0.16	0.453
Education	Elementary school	15 (2.7)	9 (1.9)	3 (1.9)	27 (2.3)	< 0.001
	Middle school	13 (2.6)	16 (3.0)	16 (11.1)	45 (3.8)	
	High school	238 (48.6)	232 (48.2)	87 (63.6)	567 (50.4)	
	College or above	265 (46.1)	236 (46.9)	32 (23.4)	533 (43.5)	
Job	White-collar	569 (45.6)	536 (41.2)	151 (13.1)	1,256 (79.3)	0.727
	Blue-collar	158 (48.6)	129 (39.3)	37 (12.0)	324 (20.7)	
Household income[a]	Low	39 (8.3)	35 (7.4)	8 (6.0)	82 (7.6)	0.013
	Middle low	116 (22.5)	104 (22.3)	51 (37.1)	271 (24.3)	
	Middle high	203 (37.4)	168 (33.3)	50 (34.9)	421 (35.4)	
	High	181 (31.7)	186 (37.0)	29 (22.0)	396 (32.6)	
Work schedule	Day work	414 (76.2)	452 (92.6)	121 (86.4)	987 (84.2)	< 0.001
	Shift work	127 (23.8)	41 (7.4)	17 (13.6)	185 (15.8)	
Smoking status	Ex-smoker/Non-smoker	509 (94.5)	467 (95.3)	127 (91.8)	1,103 (94.5)	0.40
	Current smoker	31 (5.5)	24 (4.7)	11 (8.2)	66 (5.5)	
Drinking	Never/less than once a month in the last 1 year	270 (50.7)	231 (48.7)	61 (39.4)	562 (48.4)	0.091
	More than once a month in the last 1 year	270 (49.3)	260 (51.3)	77 (60.6)	607 (51.6)	
Total		541 (100.0)	493 (100.0)	138 (100.0)	1,172 (100.0)	

Values are presented as number of mothers (estimated %) or mean ± standard error. Sample weights were applied to the results.
[a]Low: Q1, middle low: Q2, middle high: Q3, high: Q4.

Table 2. General characteristic of the children by sex (n = 1,580)

Variables	Total	Male	Female	p-value
Total	1,580 (100.0)	820 (100.0)	760 (100.0)	
Smoking				< 0.001
Never	1,374 (85.1)	674 (79.3)	700 (91.2)	
Experienced ever	206 (14.9)	146 (20.7)	60 (8.8)	
Age first started	14.53 ± 0.12	14.46 ± 0.13	14.71 ± 0.21	0.260
Drinking				0.015
Never	1,110 (65.6)	553 (62.2)	557 (69.1)	
Experienced ever	470 (34.4)	267 (37.8)	203 (30.9)	
Age first started	14.99 ± 0.12	14.95 ± 0.15	15.04 ± 0.17	0.693

Values are presented as number (estimated %) or mean ± standard error. Sample weights were applied to the results.

a week, followed by 40–52 hours (40.7%) and more than 52 hours (12.8%). Regarding shift work, 84.2% worked a day shift, while 15.8% worked a rotating shift. A total of 5.5% mothers were current smokers, and 51.7% drank at least one drink per month in the past year (**Table 1**).

Table 2 shows the general characteristics of the children. Approximately 51.2% ± 1.4% were males, and 48.8% ± 1.4% were females. The mean ± SE age was 15.26 ± 0.07 years in males and 15.26 ± 0.08 years in females. There was a statistically significant difference in terms of smoking experience rate between males (20.7%) and females (8.8%) ($p < 0.001$), but not in terms of age at smoking initiation ($p = 0.260$). Drinking experience rate statistically significantly differed between males (37.8%) and females (30.9%) ($p = 0.015$), but age at drinking initiation did not have statistically significant ($p = 0.693$).

ANCOVA was performed to compare the differences in children's age at smoking and drinking initiation according to maternal working hours (**Table 3**), and no significant differences were found.

Table 4 shows the differences in children's smoking and drinking rates according to maternal working hours. In males, smoking experience rates differed significantly according to maternal working hours, namely < 40 hours (16.1%), 40–52 hours (23.1%), and > 52 hours (31.1%) ($p = 0.012$). Drinking rates also significantly differed according to maternal working hours (32.6%, 41.6%, and 45.3%, respectively) ($p = 0.046$). By contrast, in females, smoking experience rates did not differ according to maternal working hours ($p = 0.638$) but drinking rates did ($p = 0.010$).

Logistic regression was performed to calculate the OR for children's smoking and drinking experience rate according to maternal working hours (**Table 5**). In males, the adjusted OR

Table 3. Mean age of adolescents that first started smoking and drinking in their mothers' working hours per week stratified by sex

Sex of adolescent	Mothers' working hours	Age first started smoking		Age first started drinking	
		Mean ± SE	p-value	Mean ± SE	p-value
Male	< 40	13.97 ± 0.57	0.613	14.79 ± 0.45	0.385
	40–52	13.91 ± 0.50		14.65 ± 0.39	
	> 52	13.68 ± 0.57		14.17 ± 0.47	
Female	< 40	15.08 ± 0.55	0.744	15.27 ± 0.42	0.725
	40–52	15.09 ± 0.57		15.01 ± 0.42	
	> 52	14.56 ± 0.57		15.08 ± 0.50	

ANCOVA was adjusted for mothers' age, household income, mothers' education, mothers' smoking and frequency of drinking, occupational categories, shift work, child's obesity, child's stress recognition and depressive mood. Sample weights were applied to the results.
SE: standard error; ANCOVA: analysis of covariance.

Table 4. Rate of adolescents' experience of smoking and drinking in their mothers' working hours per week according to sex

Sex of adolescent	Mothers' working hours	Total	Experience of smoking	p-value	Experience of drinking	p-value
Male (n = 820)	< 40	383 (47.1)	54 (36.6)	0.012	108 (40.7)	0.046
	40–52	350 (41.3)	67 (46.0)		122 (45.5)	
	> 52	87 (11.6)	25 (17.4)		37 (13.9)	
	Total	820 (100.0)	146 (100.0)		267 (100.0)	
Female (n = 760)	< 40	344 (45.3)	26 (7.8)	0.638	93 (30.7)	0.010
	40–52	315 (40.4)	23 (9.0)		72 (26.4)	
	> 52	101 (14.3)	11 (11.2)		38 (44.2)	
	Total	760 (100.0)	60 (100.0)		203 (100.0)	

Values are presented as number of mothers (estimated %). Sample weights were applied to the results.

Table 5. ORs of adolescents' experience of smoking and drinking in their mothers' working hours per week stratified by sex

Sex of adolescents	Mothers' working hours	Experience of smoking		Experience of drinking	
		Crude OR (95% CI)	Adjusted OR (95% CI)	Crude OR (95% CI)	Adjusted OR (95% CI)
Male	< 40	1	1	1	1
	40–52	1.56 (1.04–2.34)	1.55 (1.01–2.36)	1.47 (1.03–2.10)	1.44 (0.99–2.08)
	> 52	2.35 (1.27–4.36)	1.97 (1.04–3.75)	1.71 (0.97–3.01)	1.67 (0.92–3.02)
Female	< 40	1	1	1	1
	40–52	1.16 (0.63–2.14)	1.33 (0.64–2.62)	0.81 (0.55–1.20)	0.85 (0.55–1.32)
	> 52	1.49 (0.64–3.44)	1.01 (0.42–2.44)	1.79 (1.10–2.94)	1.54 (0.91–2.61)

Logistic regression was adjusted for mothers' age, household income, mothers' education, mothers' smoking and frequency of drinking, occupational categories, shift work, child's obesity, child's stress recognition and depressive mood. Sample weights were applied to the results.
CI: confidence interval; OR: odds ratio.

(aOR) for smoking increased to 1.55 (95% CI: 1.01–2.36) and 1.97 (95% CI: 1.04–3.75) with 40–52 hours of work and > 52 hours of work, respectively. On the other hand, in females, the OR for smoking according to maternal working hours did not differ significantly before and after adjustment. OR for drinking was higher for the 40–52 hours in male (OR: 1.47; 95% CI:1.03–2.10) and > 52 hours group in female (OR: 1.79; 95% CI: 1.10–2.94) respectively before adjustment, but after adjustment aOR was not significant in both sex.

DISCUSSION

In this study, the aOR for smoking was significantly higher with longer maternal working hours in boys. In girls, the aOR for smoking increased with 40–52 hours of work and > 52 hours of work compared to < 40 hours of work group but the difference was not statistically significant (**Table 5**). According to an Indian study on the psychosocial factors related to adolescent smoking, smoking is positively correlated with fathers' and friends' smoking behavior and parental conflict, but negatively correlated with perceived care from fathers, receiving help from mothers during times of stress, and adolescents' reporting of how they spend their leisure time with their mothers.[26] Household structure may also have an impact on children's smoking and drinking, where children raised by their biological and married parents are less likely to engage in cigarette and alcohol use compared to children raised by stepparents or single mothers. Further, maternal socialization—socialization by mother's support and control has also been associated with lower odds of children engaging in smoking or drinking behaviors.[27] One study also reported that while parents' authoritative parenting style prevents adolescents smoking or drinking, negative family interactions may serve as a risk factor for these behaviors.[28] One study also argued that full-time maternal employment has no greater impact on children's smoking tendency compared to part-time employment.[29]

The part where the gender difference occurred is the smoking experience rate. Looking at **Table 4**, as the working hours of mothers increased, the smoking experience rate increased

in both male and female, but there was no statistical significance in female. This statistical difference may be because the smoking experience rate of female was 8.8%, which was much lower than that of male, which was 20.7%, so that when the groups were divided according to the mother's working hours, the difference in the smoking experience rate for each group was too small to satisfy the statistical significance for female case. Otherwise, according to Ko et al.,[30] male students whose mothers were employed had more problem behaviors than those whose mothers were unemployed, and female students showed no difference in problem behaviors depending on whether their mothers were employed or not. In terms of self-control, male students excelled in students whose mothers did not have a job. Adolescents perceived parental supervision as high when their mothers were not employed, and the higher the parental supervision, the higher their self-control.[30] In other words, to explain the reason for the difference between males and females in this study, it can be estimated that male students' self-control was lower when mothers worked longer hours than those worked shorter.

Regarding the aOR for adolescent drinking according to maternal working hours, drinking experience rate was not significantly higher with > 52 hours or 40–52 hours of work compared to < 40 hours of work in both sex (**Table 5**). One study reported that parental support and supervision are important predictors of adolescent problem behaviors, such as drinking and delinquency.[31] A study based in the United States that examined the association between maternal employment and child's delinquency found that mother's employment characteristics had little impact on child's delinquency but had a mild and complex indirect impact through "supervision".[32] A significant difference was found in both sexes in the drinking experience rate according to the mother's working hours before the variable was adjusted (**Table 5**). However, in the case of male, after adjusting for adolescent obesity, and in the case of female, after adjusting for depression or stress, it was statistically insignificant. In the case of drinking experience rate, the effect of mother's working hours was insignificant, instead, obesity in male and depression or stress in female are thought to have a greater effect.

In the present study, we observed that mothers' working hours did not affect adolescents' age at smoking and drinking initiation regardless of sex. A review that analyzed 27 prospective studies on adolescent smoking initiation argued that adolescents' smoking initiation was influenced by factors such as low socioeconomic status, low support from peer bonding and family bonding, peer smoking, and poor refusal skills self-efficacy.[33] In addition, a study that identified the risk factors of drinking initiation in adolescents by reviewing relevant longitudinal studies reported that parents' and friends' permission and adolescents' history of involvement in delinquent behaviors were the most consistent risk factors for drinking initiation in adolescence. There is little evidence supporting a gender gap in the risk factors for drinking initiation.[34] Further, studies that shed light on the association between adolescents' age at smoking and drinking initiation and mothers' occupational factors were lacking.

The direction of our study is on the working hours of the mother, but an analysis using the father's working hours is also attached to the **Supplementary Tables 1-5**. The father's working hours had no significant effect on the children's smoking or drinking experience rate, or the starting age. This can support our argument that mothers may have a significant effect on their children's risky health behavior compared to fathers.

This study had several strengths. First, we used reliable, nationally representative data. Because the KNHANES is a survey designed to extract a nationally representative sample from the target population (citizens of the Republic of Korea aged 1 year or older), this study

can be considered nationally representative for using this dataset. Second, we substantiated that long working hours may have an adverse impact not only on the working person but also on their children. Long working hours have been associated with coronary artery disease and stroke,[35] obesity in female workers,[36] and depression symptoms.[37] However, few studies have examined the impact of parents' working hours on adolescent children. In Korea, one study that used the KNHANES data reported that mothers' long working hours were associated with obesity in their adolescent daughters.[38] Further, Ruhm[39] reported in their study that cognitive growth in children aged 10–11 years (although they are not adolescents) can be adversely influenced by mothers' employment in 2008. In a survey of children of welfare-reliant single mothers in a poor neighborhood, mothers' increased working hours had negative effects on children's school absence, achieving higher-than-average academic performance, and parental contact about behavioral problems. In particular, male adolescents were observed to be more sensitive to changes in mothers' working hours.[40]

This study had several limitations. First, the data may be vulnerable to recall bias, as it were collected through a questionnaire survey. However, well-trained interviewers collected the data, so this issue can be addressed to a certain extent. Second, there may be bias due to some factors not considered. Factors affecting smoking and drinking among adolescents are very diverse in addition to the parental factors mentioned in the introduction. In the case of adolescent drinking, having friends who drink frequently, expectations of drinking results, and depression are said to be influencing factors.[41] Smoking intentions, discriminatory association with friends, and grade level are known to influence adolescent smoking.[42] Because it is practically impossible to consider all relevant influencing factors, there were factors that we could not consider in the analysis. As a result, the effect of mother's working hours on children's smoking and drinking behavior may have been overestimated. Nevertheless, we tried to address the bias that could be caused by missing variables. The children's obesity, depressive mood, and stress perception were also considered, and the analyzed data considering the influence of the father was attached to the **Supplementary Tables 1-5**. Third, we could not consider the mothers' past working hours. The conclusion that mothers' long working hours led to increased smoking experience rates in their children because they have less time and ability to supervise their children is only justified under the premise that there were no marked changes in the mother's working hours for several years. This is also a limitation of cross-sectional studies. Thus, this study is limited in that the data do not shed light on cases in which the mother was only recently employed or had a significant change in her working hours compared to the past.

CONCLUSIONS

Taken together, mothers' long working hours seem to leave less time for them to supervise their children, which in turn is associated with increased smoking experience rates in their sons. It can be said that the problem of the double burden of work and home for female workers contributes to this result. Therefore, our society needs to share the burden of raising children, which is concentrated on women, and employers and governments should support policies that can help prevent long working hours. Further, additional cohort studies should be conducted to investigate how mothers' working hours affect future smoking rates in teenagers who have not initiated smoking.

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SUPPLEMENTARY MATERIALS

Six years of Korean National Health and Nutrition Examination Survey (KNHANES) data (KNHANES VI 2013–2015 and KNHANES VII 2016–2018) were used for analysis fathers' case. Of the total 47,217 participants, data of 3,536 adolescents aged 12–18 years were selected. Of these, data of 1,945 adolescents with a working father were screened, and those who lived with both parents or those who lived with a single father were chosen. Participants who did not answer the question about drinking and smoking status or responded to it by selecting "I do not know" were excluded. Finally, data of 1,650 children and 1,240 fathers were used for analysis.

Supplementary Table 1
General characteristic of the fathers (n = 1,240) by weekly working hours

Click here to view

Supplementary Table 2
General characteristic of the children by sex (n = 1,654)

Click here to view

Supplementary Table 3
Mean age of adolescents that first started smoking and drinking in their fathers' working hours per week stratified by sex

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Supplementary Table 4
Rate of adolescents' experience of smoking and drinking in their fathers' working hours per week according to sex

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Supplementary Table 5
ORs of adolescents' experience of smoking and drinking in their fathers' working hours per week stratified by sex

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