Long Commute Time and Sleep Problems with Gender Difference in Work–Life Balance: A Cross-sectional Study of More than 25,000 Workers

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Abstract

Background: There is a lack of statistical analysis investigating the relationship between sleep problems and commute time in Korea. We aimed to analyze the association between representative health symptoms, sleep disturbances, and commute time according to working hours in Korea.

Methods: The 4th Korean Working Conditions Survey data were used for analysis, and unpaid family workers and workers who work fewer than three days in a week were excluded. Commute time, working hours, and sleep hours were assessed using self-reported questionnaires. Odds ratios (ORs) with 95% confidence intervals (CIs) for sleep problems were calculated using a multivariate logistic regression model with ≤10 min commute time as the reference group.

Results: Among a total of 28,804 workers (men = 14,945, women = 13,859), 2.6% of men and 3.2% of women experienced sleep problems. In both sexes, long commute time (51–60 minutes and >60 minutes) showed an increased OR [men, 2.03 (CI = 1.32–3.13) and 2.05 (CI = 1.33–3.17); women, 1.58 (CI = 1.05–2.39) and 1.63 (CI = 1.06–2.50), respectively]. In stratification analysis of working hours, long commute time (51–60 and >60 minutes) showed an increased OR in men working >40 hours/week [2.08 (CI = 1.16–3.71) and 1.92 (CI = 1.08–3.41), respectively]. Furthermore, long commute time (41–50, 51–60, and >60 minutes) showed an increased OR in women working >40 hours/week [2.40 (CI = 1.27–4.55), 2.28 (CI = 1.25–4.16), and 2.19 (CI = 1.17–4.16), respectively]. Moreover, commute time >60 minutes showed an increased OR in women working >40 hours/week [1.96 (CI = 1.06–3.62)].

Conclusion: This large cross-sectional study highlights that long commute time is related to sleep problems in both sexes. Shorter commute times and decreased working hours are needed to prevent sleep problems in workers.

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1. Introduction

Occupation is an essential social role and provides the opportunity to obtain the goods needed to maintain quality of life. However, specific work environments can disrupt health; such environments entail long working hours [1,2], shift work [3,4], and hazardous chemical exposure [5,6]. Sleep problems are a representative health problem that can be caused by the occupational environment; sleep problems may also reduce worker productivity and can result in fatal outcomes in specific occupations such as drivers [7,8].

Previous studies have indicated that commute time is highly related to some subjective health problems of workers. For instance, long commute time negatively affects adequate sleep, resulting in sleep problems [9–11]; those might relate to the work–life balance [12]. In addition, long commute time results in chronic
fatigue and may be related to cardiovascular disease [13]. In addition to commute time, long working hours and shift work are risk factors for sleep disturbances [14,15]. There is a gender-specific study regarding gender differences in relation to occupational environment and sleep problems [16]. However, more comprehensive studies are needed to clarify the association between sleep problems and commute time with gender difference.

Moreover, there is a specific lack of comprehensive study in Asia, but cultural differences such as authority of work schedule for family life and traditional family roles are important issues for work–life balance. Therefore, we aimed to analyze the association between representative health symptoms, sleep disturbances, and commute time according to working hours in the Asian population with discussion of the work–life balance concept. Herein, to better understand the relationship between the work environment and sleep problems, we provide a comprehensive, gender-specific analysis, including work characteristics such as income, authority to self-determine a work schedule, commute time, and working hours.

2. Materials and methods

2.1. Participant data

The 4th Korean Working Conditions Survey (KWCS) was used for data analysis. The KWCS was administered to workers aged 15 years or older, using multistage random sampling according to the structure of the Korean census data set. Among a total of 50,007 workers, we excluded 9,189 participants who had missing variables regarding the following data in the questionnaire: sleep problems, commute time, working hours, period of employment, company size, job satisfaction, authority to self-determine a working schedule, shift work, regularity of commute, income, and health problems.

All economic active populations including self-employed and paid workers were enrolled in the present study, but unpaid family workers and workers who worked fewer than three days weekly were excluded (n = 12,014). Finally, data of 28,804 workers were analyzed.

All participants of the KWCS provided written informed consent, and all information of participants was deleted before data analyses. The Institutional Review Board of the Yonsei University Health System approved this study (Y-2017-0035).

Self-reported commute time was divided into seven groups: ≤10, 11–20, 21–30, 31–40, 41–50, 51–60, and >60 minutes. That commute time covered a round trip per day. As a 40-hour workweek is considered typical in Korea, working hours were divided into two groups: ≤40 hours/week and >40 hours/week. Period of employment contracts was categorized as >1 year, 1 month–1 year, and <1 month. The existence of sleep problems was defined as “yes” or “no” based on responses, indicating the worker reported sleep problems during the last 12 months.

Authority to self-determine a working schedule was divided into fully possible, possible, impossible, and fully impossible. We classified the four choices into two groups: “yes” for fully possible and possible and “no” for impossible and fully impossible. Work shift and regularity of the commute were divided into groups of “yes” and “no.” Income was divided into four groups: ≤12, ≤20 and >12, ≤30 and >20, and >30 million won (KRW). Company size was divided into four groups according to the number of employees: 1–10, 11–50, 51–100, and >100 employees.

2.2. Statistical analysis

Chi-square tests were used to examine gender stratification of sleep problems according to study participant characteristics. Odds ratios (ORs) with 95% confidence intervals (CIs) for the existence of subjective sleep problems were calculated using a multivariate logistic regression model. The ≤10-minute commute time group was categorized as the reference group for sleep problems in both men and women. The P-values less than 0.05 were regarded as statistically significant. All analyses were conducted using R version 3.5.3 [19].

3. Results

The basic occupational characteristics of men and women are shown in Table 1. Data of 28,804 workers (men = 14,945, women = 13,859) were analyzed. The mean age of men and women was 48.1 years and 47.1 years, respectively. In men, 2.6% reported sleep problems, and in women, 3.2% reported sleep problems. Moreover, 14.2% of men and 14.2% of women reported a commute time of ≤10 minutes, whereas 12.4% of men and 8.3% of women reported a commute time of >60 minutes. A higher proportion of men worked overtime (>40 hours) compared with that of women.

| Table 1 |
| --- |
| **Basic characteristics** |
| **Men** | **Women** |
| N = 14945 | % | N = 13859 | % |
| Sleep problems | Yes | 386 | 2.6 | 449 | 3.2 |
|  | No | 14593 | 97.4 | 13410 | 96.8 |
| Commuting time | ≤10 | 2124 | 14.2 | 1962 | 14.2 |
|  | 11–20 | 2987 | 19.9 | 3281 | 23.7 |
|  | 21–30 | 2974 | 19.9 | 2986 | 21.5 |
|  | 31–40 | 2490 | 16.6 | 2335 | 16.8 |
|  | 41–50 | 950 | 6.3 | 851 | 6.1 |
|  | 51–60 | 1601 | 10.7 | 1297 | 9.4 |
|  | >60 | 1853 | 12.4 | 1147 | 8.3 |
| Working hours (h) | ≤40 hours | 6104 | 40.8 | 6727 | 48.5 |
|  | >40 hours | 8875 | 59.2 | 7132 | 51.5 |
| Period of employment | >1 year | 4162 | 27.8 | 3568 | 25.7 |
|  | 1 month–1 year | 1177 | 7.9 | 674 | 4.9 |
|  | <1 month | 9640 | 64.4 | 9617 | 69.4 |
| Company size | <10 workers | 8428 | 56.3 | 8824 | 63.7 |
|  | 11–50 workers | 4347 | 29.0 | 4036 | 29.1 |
|  | 51–100 workers | 1345 | 9.0 | 741 | 5.3 |
|  | >100 workers | 859 | 5.7 | 258 | 1.9 |
| Job satisfaction | Possible | 11015 | 73.5 | 10438 | 75.3 |
|  | No | 3964 | 26.5 | 3421 | 24.7 |
| Authority to working schedule | Yes | 8659 | 57.8 | 7558 | 54.5 |
|  | No | 6320 | 42.2 | 6301 | 45.5 |
| Shift work | Yes | 1315 | 8.8 | 801 | 5.8 |
|  | No | 13664 | 91.2 | 13058 | 94.2 |
| Regularity of the commute | Yes | 10902 | 72.8 | 10872 | 78.4 |
|  | No | 4077 | 27.2 | 2987 | 21.6 |
| Income (million, KRW) | ≤12 | 2499 | 16.7 | 4645 | 33.5 |
|  | ≤20 and >12 | 3993 | 26.3 | 5652 | 40.8 |
|  | ≤30 and >20 | 4733 | 31.6 | 2514 | 18.1 |
|  | >30 | 3808 | 25.4 | 1048 | 7.6 |
(59.2% vs. 51.5%, respectively). More than half of men (64.6%) and women (69.4%) had a contract of employment for less than one month. Furthermore, 56.3% of men and 63.7% of women reported working at a company with <10 workers. Most workers were satisfied with their job (73.5% in men and 75.3% in women). More men (25.4%) than women (7.6%) reported a salary of more than 30 million won (KRW).

Differences between men and women with and without sleep problems are shown in Table 2. Commute time, job satisfaction, and shift work were significantly associated with sleep problems in both men and women, as analyzed by the Chi-square test (men: P = 0.012, <0.001, and <0.001; women: P = 0.028, <0.001, and 0.013, respectively). In addition, in men, working hours (P = 0.025) and income (P = 0.017) were significantly related to sleep problems, whereas in women, lack of authority to self-determine a working schedule was associated with sleep problems (P = 0.002).

Table 3 shows ORs and 95% CIs of the multivariate logistic regression model for sleep problems and occupational characteristics in men and women. In both genders, long commute time (51–60 and > 60 minutes) showed an increased OR [men, 2.03 (CI = 1.32–3.13) and 2.05 (CI = 1.33–3.17); women, 1.58 (CI = 1.05–2.39) and 1.63 (CI = 1.06–2.50), respectively]. In men, long working hours showed an increased OR [1.41 (CI = 1.08–1.83)]. Workers expressing dissatisfaction with their job had a higher OR [men, 1.97 (CI = 1.58–2.46); women, 1.39 (CI = 1.12–1.72)] than those who expressed satisfaction. In addition, shift workers had a higher OR in both men [1.87 (CI = 1.37–2.56)] and women [1.46 (CI = 1.03–2.09)].

Lack of authority to working schedule for family life (individual life) is related to sleep problems in women, but not in men (OR = 1.35, 95% CI = 1.10–1.66 in women).

Fig. 1 displays the ORs and 95% CIs for commute time according to working hours (<40 and > 40 hours/week). In men, long commute time (51–60 and > 60 minutes) showed an increased OR when working hours were >40 hours/week [2.08 (CI = 1.16–3.71) and 1.92 (CI = 1.08–3.41), respectively]. In addition, in women, long

### Table 2

Sex stratification of sleep problems according to study participant characteristics

| Basic characteristics | Men with sleep problems | Women with sleep problems |
|-----------------------|-------------------------|---------------------------|
|                       | No | %  | Yes | %  | P-value | No | %  | Yes | %  | P-value |
| Commuting time        |    |    |     |    |         |    |    |     |    |         |
| <10                   | 2075 | 97.7 | 49 | 2.3 | 0.012 | 1901 | 96.9 | 61 | 3.1 | 0.028 |
| 11–20                 | 2918 | 97.7 | 69 | 2.3 |       | 3175 | 96.8 | 106 | 3.2 |       |
| 21–30                 | 2910 | 97.8 | 64 | 2.2 |       | 2903 | 97.2 | 83 | 2.8 |       |
| 31–40                 | 2433 | 97.7 | 57 | 2.3 |       | 2273 | 97.3 | 62 | 2.7 |       |
| 41–50                 | 924  | 97.3 | 26 | 2.7 |       | 819  | 96.2 | 32 | 3.8 |       |
| 51–60                 | 1544 | 96.4 | 57 | 3.6 |       | 1242 | 95.8 | 55 | 4.2 |       |
| >60                   | 1789 | 96.5 | 64 | 3.5 |       | 1097 | 95.6 | 50 | 4.4 |       |
| Working hours (h)     |    |    |     |    | 0.025 |    |    |     |    | 0.069 |
| <40 hours             | 5968 | 97.8 | 136 | 2.2 |       | 6528 | 97  | 199 | 3.0 |       |
| >40 hours             | 8625 | 97.2 | 250 | 2.8 |       | 6882 | 96.5 | 250 | 3.5 |       |
| Period of employment  |    |    |     |    | 0.097 |    |    |     |    | 0.286 |
| >1 year               | 4052 | 97.4 | 110 | 2.6 |       | 3447 | 96.6 | 121 | 3.4 |       |
| 1 month–1 year        | 1136 | 96.5 | 41  | 3.5 |       | 646  | 95.8 | 28  | 4.2 |       |
| <1 month              | 9405 | 97.6 | 235 | 2.4 |       | 9317 | 96.9 | 300 | 3.1 |       |
| Company size          |    |    |     |    | 0.600 |    |    |     |    | 0.161 |
| <10 workers           | 8223 | 97.6 | 205 | 2.4 |       | 8560 | 97.0 | 264 | 3.0 |       |
| 11–50 workers         | 4230 | 97.3 | 117 | 2.7 |       | 3885 | 96.3 | 151 | 3.7 |       |
| 51–100 workers        | 1306 | 97.1 | 39  | 2.9 |       | 715  | 96.5 | 26  | 3.5 |       |
| ≥100 workers          | 834  | 97.1 | 25  | 2.9 |       | 250  | 96.9 | 8  | 3.1 |       |
| Job satisfaction      |    |    |     |    | <0.001 |    |    |     |    | <0.001 |
| Yes                   | 10800 | 98.0 | 215 | 2.0 |       | 10149 | 97.2 | 289 | 2.8 |       |
| No                    | 3793  | 95.7 | 171 | 4.3 |       | 3261 | 95.3 | 160 | 4.7 |       |
| Authority to working schedule for family life (individual life) |    |    |     |    | 0.522 |    |    |     |    | 0.002 |
| Possible              | 8442 | 97.5 | 217 | 2.5 |       | 7346 | 97.2 | 212 | 2.8 |       |
| Impossible            | 6151 | 97.3 | 169 | 2.7 |       | 6064 | 96.2 | 237 | 3.8 |       |
| Shift work            |    |    |     |    | <0.001 |    |    |     |    | 0.013 |
| Yes                   | 1253 | 95.3 | 62  | 4.7 |       | 12647 | 96.9 | 411 | 3.1 |       |
| No                    | 13340 | 97.6 | 324 | 2.4 |       | 763  | 95.3 | 38  | 4.7 |       |
| Regularity of the commute |    |    |     |    | 0.250 |    |    |     |    | 0.233 |
| Yes                   | 10631 | 97.5 | 271 | 2.5 |       | 10530 | 96.9 | 342 | 3.1 |       |
| No                    | 3962  | 97.2 | 115 | 2.8 |       | 2880 | 96.4 | 107 | 3.6 |       |
| Income (million, KRW) |    |    |     |    | 0.017 |    |    |     |    | 0.205 |
| <12                   | 2423 | 97.0 | 76  | 3.0 |       | 4484 | 96.5 | 161 | 3.5 |       |
| <20 and > 12          | 3838 | 97.4 | 101 | 2.6 |       | 5487 | 97.1 | 165 | 2.9 |       |
| <30 and > 20          | 4637 | 98.0 | 96  | 2.0 |       | 2433 | 96.8 | 81  | 3.2 |       |
| >30                   | 3695 | 97.0 | 113 | 3.0 |       | 1006 | 96.0 | 42  | 4.0 |       |

* P-value based on Chi-square tests.
Table 3
Odds ratios and 95% confidence intervals for sleep problems according to occupational characteristics in men and women

| Basic characteristics                      | Men          | Women        |
|-------------------------------------------|--------------|--------------|
|                                           | OR 95% CI    | OR 95% CI    |
| Commuting time                            |              |              |
| <10                                       | 1.00 reference| 1.00 reference|
| 11–20                                     | 1.21 0.82–1.77| 1.16 0.83–1.61|
| 21–30                                     | 1.21 0.80–1.81| 1.05 0.73–1.50|
| 31–40                                     | 1.35 0.88–2.08| 1.00 0.68–1.48|
| 41–50                                     | 1.57 0.93–2.64| 1.45 0.91–2.32|
| 51–60                                     | 2.03 1.32–3.13| 1.58 1.05–2.39|
| >60                                       | 2.05 1.33–3.17| 1.63 1.06–2.50|
| Working hours (h)                         |              |              |
| <40 hours                                 | 1 reference 1.08–1.83| 1.25 0.97–1.61|
| >40 hours                                 | 1.41 1.08–2.81| 1.65 1.29–2.11|
| Period of employment                      |              |              |
| >1 year                                   | 1.00 reference| 1.00 reference|
| 1 month–1 year                            | 1.31 0.86–2.00| 1.32 0.83–2.11|
| <1 month                                  | 0.64 0.43–0.94| 0.86 0.61–1.19|
| Company size                              |              |              |
| <10 workers                                | 1.00 reference| 1.00 reference|
| 11–50 workers                              | 1.42 1.03–1.95| 1.58 1.22–2.05|
| 51–100 workers                             | 1.65 1.07–2.54| 1.41 0.90–2.20|
| >100 workers                               | 1.6 0.96–2.66| 1.19 0.56–2.52|
| Job satisfaction                           |              |              |
| Yes                                       | 1.00 reference| 1.00 reference|
| No                                        | 1.97 1.58–2.46| 1.39 1.12–1.72|
| Authority to working schedule for family life (individual life) |              |              |
| Possible                                   | 1.00 reference| 1.00 reference|
| Impossible                                 | 1.01 0.80–1.26| 1.35 1.10–1.66|
| Shift work                                |              |              |
| Yes                                       | 1.00 reference| 1.00 reference|
| No                                        | 1.87 1.37–2.56| 1.46 1.03–2.09|
| Regularity of the commute                 |              |              |
| Yes                                       | 1.00 reference| 1.00 reference|
| No                                        | 0.94 0.71–1.23| 0.91 0.69–1.19|
| Income (million, KRW)                     |              |              |
| ≤12                                       | 1.00 reference| 1.00 reference|
| >20 and ≤12                               | 1.07 0.76–1.51| 0.94 0.72–1.22|
| >30 and >20                               | 0.88 0.61–1.28| 1.07 0.77–1.48|
| >50                                       | 1.28 0.87–1.87| 1.31 0.87–1.96|

OR, odds ratio; 95% CI, 95% confidence interval.

Compared with the sleep habits of other workers, workers with a long commute time of >60 minutes or overtime work (>40 hours/week) tend to sleep less on weekdays; consequently, sleep deprivation affects their activities on the following day [20]. Moreover, a study from the US suggests that workers spending more than 3 hours a day on commute time are more likely to exhibit fewer health-related problems [9]. Consequently, the work–life balance can be disrupted by long commute time. In the present study, commute times of Korean workers that were related to health problems were less than those reported in a US study. However, in the 2000s, annual working hours in the US ranged from 1762 to 1811, whereas those in Korea ranged from 2024 to 2209. Accordingly, the relationship of relatively shorter commute times with health problems in the present study may result from the longer working hours of Korean workers compared with those of US workers. Based on these points, it can be surmised that long commute time causes sleep deprivation, which in turn causes various health-related problems and a reduction in work productivity.

Nonetheless, previous studies [9,20] were insufficient to analyze the causes of sleep problems as they neither considered tandem variables such as working hours and commute time nor stratified results by gender. Hence, the current results provide new scientific evidence that can be used to prevent sleep problems resulting from a long commute time. Moreover, studies have investigated working hours and sleep problems but not the relationship between commute time and sleep problems in Korea.

Both men and women experience sleep problems with a long commute time of >50 minutes/day. However, the present study also shows a gender-specific difference: in workers working >40 hours/week, sleep problems occurred with a commute time of >50 minutes in men and >40 minutes in women; moreover, in workers working ≤40 hours/week, commute time was only a significant factor in women. This may be due to the traditional family role wherein women spend more time caring for family or engaging in household chores than men. Although there were dramatic changes in gender roles in family, women still have been assumed as primarily responsible for household chores [21]. Such a traditional gender role also affects the psychological problem such as depressive symptoms and suicidality. Family-care job is dependent more on women than on men in the Asian country. A study shows that long working hours of female spouses were linked to male spouses’ psychological symptoms, but that relationship was weaker for male spouses’ long working hours [22].

Long working hours may distribute time allocation, and such work-related schedules make workers hard to handle their own life; consequently, the so-called work–life balance is disrupted [17]. Work–life balance is associated with job and life satisfaction that is related to mental health [18]. In the same context, long commute time may relate to sleep disturbance in the present study, and it might explain the disrupted work–life balance.

Furthermore, the lack of authority to self-determine a working schedule was only related to sleep problems in women; this further supports our supposition of a traditional role of women influencing the relationship between working characteristics and sleep problems. However, owing to lack of information, we were unable to investigate this specific hypothesis. In addition, the current results suggest that if women are unable to adjust their working schedule to promote family life, they are more likely to experience sleep problems than men. In contrary, sleep problems in men, but not in women, were related to low income. Therefore, we considered that income is not a significant factor affecting sleep problems because sleep problems are mainly caused by physical fatigue such as long commute time rather than psychological effects caused by income. These results suggest that traditional gender roles in the family...

commute time (41–50, 51–60, and >60 minutes) showed an increased OR when working >40 hours/week [2.40 (CI = 1.27–4.55), 2.28 (CI = 1.25–4.16), and 2.19 (CI = 1.17–4.16), respectively]. Moreover, in women, long commute time (>60 minutes) showed an increased OR when working ≤40 hours/week [1.96 (CI = 1.06–3.62)].

4. Discussion

This large cross-sectional study highlights that long commute time is significantly associated with sleep problems in both genders. In addition, long commute time in association with long working hours increased the risk of sleep problems after adjustment for other work characteristics including employment period, company size, job satisfaction, authority to self-determine working schedule, shift work, regularity of commute, and income. In addition, gender-specific differences such as lack of authority to working schedule for family life (individual life) were investigated in relationship with working characteristics and sleep problems.

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exist in Korea, and this contributes to different sources of stress in men and women [24]. Nevertheless, job satisfaction and shift work were closely related to sleep problems in both genders. For shift work, the sleep disturbance such as difficulty to sleep and shortened sleep occurs owing to circadian interferences [25].

The relationship between long commute time and sleep problems can be explained as a result of the psychological and physiological stress mechanism. First, long commute time reduces quality of life by decreasing leisure activities, interactions with family or friends, and engagement in hobbies [9]; consequently, there is a decreased opportunity to recover from daily stress: daytime distress and impairment are also related to sleep problems [26].

The main system modulating or continuing sleep is the hypothalamo–pituitary–adrenal (HPA) axis; therefore, impairments of this axis can promote various sleep problems [27,28]. Typically, stress can result in increase in cortisol levels and hyperactivity of the HPA axis and inhibit sleep. For workers, waking up early owing to a long commute time might be a stress source, resulting in sleep problems. In addition, the commute time to work may also contribute to physiological stress; for instance, although workers may be unaware, daytime traffic noise can be a stress source [29]. Moreover, daytime noise or vibration exposure initiates hyperarousal, which is linked to the HPA axis; such disruptions lead to difficulties in falling asleep, staying asleep, or experiencing non-restorative sleep [30–32]. In light of the present results, workers with long commute time and long working hours do not sleep well.

Our present study has some limitations. First, causality cannot be determined because of the nature of the cross-sectional design. In addition, there is a lack of mechanisms by which commute time may affect sleep. There are many risk factors related to sleep problems, such as obesity, obstructive sleep apnea, childcare, caffeine drinking in daytime, household environment, job stress of job demand, authority and social support, and noise [23].

We did not control those well-known risk factors of sleep problems, so the independent causality may be not discussed in the present study. Nonetheless, the dose–response relationship of commute time with sleep problems supports the concept that longer commute time aggravates sleep problems. Second, we used a self-reported questionnaire to define sleep problems. Although subjective health problems are an important public health issue, sleep problems are not well defined by other outpatient data or inpatient data; accordingly, a more objective study design is needed to clarify the relevance of subjective sleep problems. Third, there are various types of sleep problems, but this study only analyzed the presence or absence of sleep problems; therefore, there is a lack of insight into the association of commute time and working hours with specific sleep problems. Our data also have healthy work survival effect that workers who suffer from severe sleep problems may quit or retire from the workplace. Hence, that healthy worker survival effect makes our analysis move toward null association, thus the so-called underestimation problem might occur. Furthermore, the relationship between commute time and sleep problems has been analyzed without considering how to
commute. Therefore, a lack of insight might occur because not only the commute time but also how to commute might be significant factors associated with sleep problems.

In summary, this study highlights that long commute time is related to sleep problems in both genders. In addition, gender-specific differences such as lack of authority to working schedule for family life (individual life) and interaction to long working hours are associated with sleep problems. Improved commute time and shorter working hours in the concept of work–life balance are needed to prevent sleep problems in workers.

Declarations

Ethical approval and consent to participate

The data used in this study did not have any personal information.

Availability of data and material

The data sets analyzed during the present study are publicly available on the website after request. The URL is https://www.kosha.or.kr.

Conflicts of interest

The authors declare that there is no conflict of interest.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.shaw.2019.08.001.

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