|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|   |   |   | Univariate |   | Multivariate |
|   |   | N | Crude OR | 95% CI | *p* value  |   | Adjusted OR | 95% CI | *p* value |
| Semester |  |  |  |  |  |  |  |  |  |
|  | 1st semester | 493 | 1.00 (ref.) |  |  |  | 1.00 (ref.) |  |  |
|  | 2nd semester | 977 | 0.898 | 0.72–1.12 | 0.336 |  |  |  | n.s. |
| Sex |  |  |  |  |  |  |  |  |  |
|  | male | 853 | 1.00 (ref.) |  | - |  | 1.00 (ref.) |  | - |
|  | female | 617 | 1.39 | 1.12–1.71 | 0.002 |  | 1.42 | 1.15–1.76 | 0.001 |
| Age, years |  |  |  |  |  |  |  |  |  |
|  | 18 | 425 | 1.00 (ref.) |  | - |  | 1.00 (ref.) |  | - |
|  | 19 | 720 | 1.11 | 0.90–1.37 | 0.319 |  |  |  | n.s. |
|  | 20- | 325 | 0.79 | 0.62–1.02 | 0.066 |  |  |  | n.s. |
| Living situation |  |  |  |  |  |  |  |  |  |
|  | living alone | 595 | 1.00 (ref.) |  | - |  | 1.00 (ref.) |  | - |
|  | living with others | 875 | 1.19 | 0.96–1.46 | 0.109 |  |  |  | n.s. |
| Exercise habits |  |  |  |  |  |  |  |  |  |
|  | no | 1155 | 1.00 (ref.) |  | - |  | 1.00 (ref.) |  | - |
|  | yes | 315 | 1.24 | 0.97–1.60 | 0.092 |  | 1.33 | 1.03–1.73 | 0.032 |
| Commuting time to the university (min) |  |  |  |  |  |  |  |  |  |
|  | < 15 | 207 | 1.00 (ref.) |  | - |  | 1.00 (ref.) |  | - |
|  | 15–< 30 | 326 | 1.02 | 0.79–1.30 | 0.906 |  |  |  | n.s. |
|  | 30–< 60 | 293 | 0.79 | 0.61–1.03 | 0.077 |  |  |  | n.s. |
|  | 60–< 90 | 231 | 0.99 | 0.75–1.32 | 0.951 |  |  |  | n.s. |
|  | ≥ 90 | 413 | 1.33 | 1.06–1.68 | 0.015 |  | 1.28 | 1.00–1.64 | 0.047 |
| Bedtime (h) |  |  |  |  |  |  |  |  |  |
|  | < 24 | 225 | 1.00 (ref.) |  | - |  | 1.00 (ref.) |  | - |
|  | 24–< 1 | 570 | 0.91 | 0.74–1.13 | 0.398 |  |  |  | n.s. |
|  | 1–< 2 | 499 | 1.24 | 1.00–1.54 | 0.055 |  |  |  | n.s. |
|  | ≥ 2 | 176 | 1.4 | 1.01–1.95 | 0.041 |  |  |  | n.s. |
| Wake-up time (h) |  |  |  |  |  |  |  |  |  |
|  | < 7 | 543 | 1.00 (ref.) |  | - |  | 1.00 (ref.) |  | - |
|  | 7–< 8 | 526 | 0.82 | 0.66–1.01 | 0.062 |  |  |  | n.s. |
|  | 8–< 9 | 276 | 1.1 | 0.84–1.43 | 0.487 |  | 1.52 | 1.14–2.03 | 0.004 |
|  | ≥ 9 | 125 | 1.36 | 0.93–1.99 | 0.113 |  | 2.13 | 1.41–3.23 | < 0.001 |
| Sleep duration (min) |  |  |  |  |  |  |  |  |  |
|  | < 300 | 71 | 1.35 | 0.83–2.22 | 0.23 |  |  |  | n.s. |
|  | 300–< 360 | 334 | 1.64 | 1.27–2.11 | < 0.001 |  | 1.49 | 1.13–1.98 | 0.005 |
|  | 360–< 420 | 565 | 1.00 (ref.) |  | - |  | 1.00 (ref.) |  | - |
|   | ≥ 420 | 500 | 0.72 | 0.58–0.90 | 0.004 |   | 0.75 | 0.58–0.96 | 0.024 |

**Table 2 Results of logistic regression analyses**

The odds ratios (ORs) and 95% confidence intervals (95% CIs) were calculated using logistic regression analyses. Separate associations were first examined using univariate logistic regression analysis. Multiple logistic regression analysis was then performed to adjust for the confounding effects of other factors. Based on the results of previous studies, we determined that sleep indicators were essential for the logistic regression analysis model because they were closely correlated with excessive daytime sleepiness. All statistical analyses were performed using SPSS version 25.0 (IBM Corp., Armonk, NY, USA). Data are shown as mean ± standard deviation. Statistical significance was set at a *p* value of < 0.05.