

**Supplementary Table 1.** Odds ratios (95% confidence intervals) of insomnia according to work-related variables in age subgroup analysis

	Crude	Model 1 <sup>a</sup>	Model 2 <sup>b</sup>	Model 3 <sup>c</sup>
<b>Age group: 20s</b>				
Monthly number of substitute work <sup>d</sup>				
<1	1 (ref.)	1 (ref.)	1 (ref.)	1 (ref.)
1–2	1.272 (0.779–2.076)	1.301 (0.796–2.128)	1.064 (0.623–1.819)	1.031 (0.588–1.810)
3–5	1.764 (0.837–3.717)	1.754 (0.830–3.707)	1.520 (0.669–3.454)	1.416 (0.595–3.369)
>5	1.026 (0.235–4.475)	1.005 (0.229–4.405)	0.587 (0.117–2.954)	0.910 (0.180–4.592)
Timing of schedule change notification <sup>e</sup>				
No change in schedule or several weeks before	1 (ref.)	1 (ref.)	1 (ref.)	1 (ref.)
Several days before	1.709 (0.833–3.508)	1.618 (0.786–3.331)	1.362 (0.636–2.916)	1.413 (0.660–3.103)
One day before or on the day	4.476 (2.116–9.471)	4.208 (1.982–8.936)	3.237 (1.446–7.249)	3.067 (1.343–7.005)
Irregular notification	2.873 (1.367–6.041)	2.767 (1.313–5.829)	1.851 (0.838–4.088)	1.824 (0.817–4.071)
Work schedule stability <sup>f</sup>				
Good/Good	1 (ref.)	1 (ref.)	1 (ref.)	1 (ref.)
Good/Bad	2.370 (1.451–3.869)	2.347 (1.435–3.837)	1.717 (1.002–2.941)	1.648 (0.955–2.845)
Bad/Good	1.097 (0.379–3.178)	1.096 (0.377–3.182)	0.749 (0.237–2.367)	0.884 (0.278–2.805)
Bad/Bad	3.56 (1.474–7.643)	3.187 (1.392–7.298)	2.839 (1.140–7.068)	2.648 (1.029–6.817)
<b>Age group: 30s</b>				
Monthly number of substitute work <sup>d</sup>				
<1	1 (ref.)	1 (ref.)	1 (ref.)	1 (ref.)
1–2	1.409 (1.077–1.843)	1.411 (1.079–1.846)	1.312 (0.982–1.752)	1.385 (1.027–1.868)
3–5	2.181 (1.494–3.182)	2.194 (1.502–3.205)	1.739 (1.146–2.639)	1.885 (1.227–2.895)
>5	3.040 (1.676–5.516)	3.040 (1.675–5.516)	2.281 (1.176–4.426)	2.407 (1.221–4.744)
Timing of schedule change notification <sup>e</sup>				
No change in schedule or several weeks before	1 (ref.)	1 (ref.)	1 (ref.)	1 (ref.)
Several days before	2.458 (1.641–3.682)	2.456 (1.639–3.679)	2.611 (1.705–4.000)	2.636 (1.714–4.055)
One day before or on the day	3.029 (1.957–4.687)	3.026 (1.955–4.683)	2.644 (1.661–4.208)	2.689 (1.683–4.298)
Irregular notification	3.601 (2.389–5.428)	3.600 (2.388–5.427)	3.087 (1.998–4.771)	3.198 (2.059–4.967)
Work schedule stability <sup>f</sup>				
Good/Good	1 (ref.)	1 (ref.)	1 (ref.)	1 (ref.)
Good/Bad	1.957 (1.506–2.543)	1.956 (1.505–2.541)	1.601 (1.206–2.124)	1.638 (1.231–2.179)
Bad/Good	2.547 (1.637–3.961)	2.557 (1.643–3.978)	1.920 (1.181–3.121)	2.016 (1.233–3.297)
Bad/Bad	2.668 (1.754–4.060)	2.675 (1.758–4.072)	2.016 (1.267–3.206)	2.088 (1.304–3.344)

**Age group: 40s**Monthly number of substitute work<sup>d</sup>

<1	1 (ref.)	1 (ref.)	1 (ref.)	1 (ref.)
1–2	1.636 (1.206–2.219)	1.658 (1.221–2.250)	1.418 (1.012–1.985)	1.491 (1.052–2.113)
3–5	2.431 (1.552–3.808)	2.464 (1.572–3.863)	1.747 (1.052–2.902)	1.851 (1.093–3.133)
>5	2.685 (1.157–6.232)	2.790 (1.200–6.484)	1.389 (0.529–3.651)	1.423 (0.532–3.806)

Timing of schedule change notification<sup>e</sup>

No change in schedule or several weeks before	1 (ref.)	1 (ref.)	1 (ref.)	1 (ref.)
Several days before	1.106 (0.733–1.669)	1.121 (0.742–1.692)	0.953 (0.607–1.497)	0.964 (0.612–1.517)
One day before or on the day	1.641 (1.068–2.522)	1.638 (1.065–2.518)	1.207 (0.750–1.942)	1.193 (0.739–1.924)
Irregular notification	1.716 (1.145–2.571)	1.716 (1.145–2.573)	1.184 (0.756–1.854)	1.188 (0.757–1.865)

Work schedule stability<sup>f</sup>

Good/Good	1 (ref.)	1 (ref.)	1 (ref.)	1 (ref.)
Good/Bad	1.729 (1.281–2.334)	1.713 (1.269–2.312)	1.337 (0.961–1.862)	1.335 (0.957–1.863)
Bad/Good	2.574 (1.521–4.355)	2.593 (1.532–4.389)	1.834 (1.006–3.345)	1.882 (1.023–3.461)
Bad/Bad	2.359 (1.366–4.075)	2.364 (1.368–4.084)	1.387 (0.749–2.578)	1.366 (0.723–2.583)

**Age group: ≥50s**Monthly number of substitute work<sup>d</sup>

<1	1 (ref.)	1 (ref.)	1 (ref.)	1 (ref.)
1–2	1.453 (0.994–2.124)	1.459 (0.997–2.135)	1.180 (0.772–1.805)	1.193 (0.769–1.853)
3–5	2.159 (1.100–4.240)	2.165 (1.100–4.263)	1.996 (0.927–4.295)	2.155 (0.986–4.710)
>5	3.539 (1.243–10.074)	3.651 (1.282–10.402)	3.188 (0.948–10.720)	4.012 (1.148–14.025)

Timing of schedule change notification<sup>e</sup>

No change in schedule or several weeks before	1 (ref.)	1 (ref.)	1 (ref.)	1 (ref.)
Several days before	1.052 (0.634–1.745)	1.050 (0.632–1.744)	0.941 (0.538–1.643)	0.889 (0.505–1.566)
One day before or on the day	1.374 (0.843–2.240)	1.354 (0.829–2.211)	1.109 (0.644–1.910)	1.070 (0.616–1.856)
Irregular notification	1.516 (0.908–2.529)	1.418 (0.885–2.476)	1.323 (0.749–2.336)	1.252 (0.700–2.237)

Work schedule stability<sup>f</sup>

Good/Good	1 (ref.)	1 (ref.)	1 (ref.)	1 (ref.)
Good/Bad	1.422 (0.973–2.079)	1.389 (0.949–2.034)	1.275 (0.836–1.944)	1.267 (0.825–1.945)
Bad/Good	2.352 (1.044–5.299)	2.294 (1.014–5.190)	2.671 (1.079–6.613)	3.265 (1.289–8.269)
Bad/Bad	2.507 (1.155–5.441)	2.549 (1.174–5.534)	2.042 (0.832–5.015)	2.067 (0.833–5.128)

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The adjusted odds ratio was calculated via binomial logistic regression analyses.

<sup>a</sup>Model 1: adjusted for sex; <sup>b</sup>Model 2: adjusted for all variables in Model 1, body mass index, education, smoking

status, alcohol consumption, caffeine intake, exercise, hypertension, dyslipidemia, cardiac disease, skin disease, and depressive symptom; <sup>c</sup>Model 3: adjusted for all variables in model 2, shift type, and job; <sup>d</sup>Monthly number of substitute work was classified with Good or Bad (Good: monthly number <3; Bad: monthly number ≥3); <sup>e</sup>Timing of schedule change notification was classified with Good or Bad (Good: no change or notification several weeks before or several days before; Bad: notification one day before or on the day or irregular notification); <sup>f</sup>Work schedule stability was classified by monthly number of substitute work and timing of schedule change notification.