**Supplement 1**

**Sleep disorders:** The Athens Insomnia Scale (AIS) is an 8-item instrument that was used to evaluate risk of moderate to severe insomnia (sensitivity 0.93, specificity 0.85), defined in this study as a score of ≥10 on the AIS (Range 0 to 24) (Soldatos *et al.* 2003). The Berlin Questionnaire consists of three categories related to the risk of having OSA (i.e., snoring; daytime sleepiness; history of hypertension and/or BMI >30 kg/m2). In this study, participants were identified as having a high risk of OSA if they had at least two of the three OSA symptom categories on this tool(sensitivity 0.86, specificity 0.77) (Netzer *et al.* 1999). The AIS (Jeong *et al.* 2015) and Berlin Questionnaire (Rajaratnam *et al.* 2011) have both been used and validated in other studies in emergency personnel. The Restless Legs Syndrome (RLS) Epidemiology, Symptoms and Treatment questionnaire was used to determine presence of RLS (sensitivity 0.82, specificity 0.90) (Allen *et al.* 2005). The RLS Epidemiology, Symptoms and Treatment questionnaire has 10 items that include diagnostic questions for RLS, questions on the frequency of RLS symptoms, and level of distress associated with these symptoms (Allen *et al.* 2005). SWD was assessed using a tool previously used in emergency personnel (Rajaratnam *et al.* 2011) which is based on The International Classification of Sleep Disorders-2 diagnostic criteria(American Academy of Sleep Medicine, 2017. This tool assessed SWD risk by examining excessive sleepiness levels (based on the ESS) and insomnia symptoms (based on AIS) in firefighters during overnight work and during vacation/days off/day work. Using this tool, a positive screening for SWD in this study was defined as having excessive sleepiness and symptoms of insomnia during overnight work but not on vacation/days off/day work. Daytime sleepiness was assessed using the Epworth Sleepiness Scale (ESS; range 0 to 24), which assesses participants likelihood of falling asleep in 8 different situations. In the present study, excessive sleepiness in firefighters was defined as an ESS score ≥11 (sensitivity 93%, specificity 100%) (Johns 2000).

**Burnout:** The 22-item MBI–Human Services Survey (MBI–HSS) (Maslach *et al.* 1996) was used to assess burnout across three dimensions including; EE, (9 items), DP (5 items), and PA (8 items). Cronbach’s alpha for these dimensions were between 0.76 to 0.90, aligning with prior studies (Katsavouni *et al.* 2016; Metlaine *et al.* 2017). Participants rated the frequency of each item on a 7-point Likert scale (0=never; 6=everyday).

**Analysis**

An analysis was conducted with sleep disorder and self-reported mental health condition simultaneously in the model to examine their main effects on burnout. An interaction term was also applied to this model to examine whether sleep disorder had an interaction effect with mental health condition on burnout. This analysis revealed Any Sleep Disorder and Any Mental Health Condition had an independent effect on high EE (Any Sleep Disorder P<0.0001; Any Mental Health Condition P<0.0001), DP (Any Sleep Disorder P<0.0001; Any Mental Health Condition P<0.0001) and a High Degree of burnout (Any Sleep Disorder P<0.0001; Any Mental Health Condition P=0.007). Any Sleep Disorder also increased the risk of low PA in this model (P<0.0001), but Any Mental Health Condition was not related to this dimension. Finally, there was no significant interaction effect of the Any Sleep Disorder × Any Mental Health Condition term on EE (P=0.428), DP (P=0.958), PA (P=0.457) or High Degree of burnout (P=0.671; Table S.1).

**Table S.1.** High burnout associated with Any Sleep Disorder, Any Mental health Condition and an Any Sleep Disorder by Any Mental health Condition interaction term

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Burnout****Outcomea, *n*b** | **Included Variables** | **B (SE)** | **OR** | **95% CI** | ***P* Value** |
| EE | Constant | -2.729 (0.069) |  |  |  |
| Any Sleep Disorderc | 1.106 (0.091) | 3.022 | 2.528-3.613 | <0.0001 |
| Any Mental Health Conditionc | 1.158 (0.206) | 3.183 | 2.125-4.767 | <0.0001 |
| Any Sleep Disorderc by Any Mental Health Conditionc | -0.193 (0.243) | 0.825 | 0.512-1.328 | 0.428 |
| DP | Constant | -1.911 (0.049) |  |  |  |
| Any Sleep Disorderc | 0.700 (0.072) | 2.013 | 1.747-2.320 | <0.0001 |
| Any Mental Health Conditionc | 0.662 (0.184) | 1.938 | 1.352-2.779 | <0.0001 |
| Any Sleep Disorderc by Any Mental Health Conditionc | 0.012 (0.222) | 1.012 | 0.655-1.564 | 0.958 |
| PA | Constant | -0.624 (0.035) |  |  |  |
| Any Sleep Disorderc | 0.300 (0.057) | 1.350 | 1.208-1.509 | <0.0001 |
| Any Mental Health Conditionc | 0.173 (0.155) | 1.189 | 0.878-1.610 | 0.264 |
| Any Sleep Disorderc by Any Mental Health Conditionc | 0.145 (0.194) | 1.156 | 0.790-1.691 | 0.457 |
| High Degree | Constant | -3.952 (0.122) |  |  |  |
| Any Sleep Disorder | 1.133 (0.155) | 3.104 | 2.289-4.210 | <0.0001 |
| Any Mental Health Conditionc | 0.985 (0.363) | 2.677 | 1.315-5.451 | 0.007 |
| Any Sleep Disorderc by Any Mental Health Conditionc | 0.171 (0.404) | 1.187 | 0.538-2.618 | 0.671 |

EE, emotional exhaustion; DP, depersonalisation; PA, personal accomplishment; OR, Odds ratio; CI, Confidence interval; aHigh vs. low to moderate score on burnout dimension. bhigh EE, high DP, with low PA. cMissing or not known outcomes not included.

An analysis was also conducted to examine whether self-reported mental health conditions mediate the effects of sleep duration when working an overnight shift on burnout. The mediator variable in this analysis was Any Mental Health Condition, which was categorical. Therefore, it was not possible to use PROCESS with SPSS. Instead, the method developed by Mackinnon and Dwyer 1993 was applied, which is suitable for examining dichotomous mediator variables. Based on the Sobel tests from this analysis, self-reporting any mental health condition mediated the effect of sleep duration during an overnight shift on EE (Z = -7.7835, P<0.0001), DP (Z = -3.532, p = 0.0004) and PA (Z = 2.2880, P = 0.0221; Table S.2).

**Table S.2.** Indirect effects of sleep duration when working an overnight shift on EE, DP and PA though self-reporting *any mental health condition* (i.e., PTSD, Depression, Anxiety)*.*

|  |  |
| --- | --- |
| **Predictor** | **Indirect effect through Any Mental Health Condition** |
| ***Sobel Z*** | ***SE*** | ***P*** | ***% of effect mediated*** |
| *EE* |  |  |  |  |
| Sleep duration when working an overnight shift | -7.7835 | 1.5415 | <0.0001 | 0.4401 |
| *DP* |  |  |  |  |
| Sleep duration when working an overnight shift | -3.5321 | 0.1043 | 0.0004 | 0.0702 |
| *PA* |  |  |  |  |
| Sleep duration when working an overnight shift | 2.2880 | 0.0832 | 0.0221 | -0.0988 |

EE, emotional exhaustion; DP, depersonalisation; PA, personal accomplishment; SE, Standard Error.

To further investigate potential relationships between sleep characteristics and burnout independent of risk of mental health conditions, we conducted a logistic regression analysis when removing those firefighters who reported a mental health condition. This analysis revealed that in firefighters without a mental health condition, short sleep during an overnight shift and when working a day shift was associated with an increased risk of high EE, high DP and a high Degree of burnout (Table S.3). In this sub-sample, short sleep after an overnight shift was also associated with a greater risk of each of the dimensions of burnout (Table S.3.). Finally, in firefighters without a mental health condition, short sleep after more than two days off from work was associated with a greater risk of EE (Table S.3).

**Table S.3.** Highburnout associated with sleep duration in participants who did not report any mental health condition (n=6121)

|  |  |  |
| --- | --- | --- |
| **Burnout Outcomea** | **Unadjusted** | **Adjustedd** |
| **OR** | **95% CI** | ***P*****Value** | **OR** | **95% CI** | ***P*****Value** |
| Sleep when working overnightc |
| EE | 2.21 | 1.80-2.70 | <0.0001 | 2.08 | 1.68-2.58 | <0.0001 |
|  |  |  |  |  |  |  |
| DP | 2.06 | 1.77-2.40 | <0.0001 | 2.05 | 1.74-2.36 | <0.0001 |
|  |  |  |  |  |  |  |
| PA | 0.96 | 0.86-1.08 | 0.509 | Not sig in final model |
|  |  |  |  |  |  |  |
| High Degreeb | 2.34 | 1.68-3.27 | <0.0001 | 2.33 | 1.67-3.26 | <0.0001 |
|  |  |  |  |  |
| Sleep *after* working overnightc |
| EE | 2.03 | 1.68-2.45 | <0.0001 | 2.03 | 1.68-2.46 | <0.0001 |
|  |  |  |  |  |  |  |
| DP | 1.35 | 1.16-1.56 | <0.0001 | 1.37 | 1.18-1.59 | <0.0001 |
|  |  |  |  |  |  |  |
| PA | 1.17 | 1.04-1.31 | 0.010 | 1.16 | 1.02-1.32 | 0.020 |
|  |  |  |  |  |  |
| High Degreeb | 1.97 | 1.46-2.67 | <0.0001 | 1.97 | 1.45-2.66 | <0.0001 |
|  |  |  |  |  |  |
| Sleep when working a day shiftc |
| EE | 2.00 | 1.56-2.58 | <0.0001 | 2.14 | 1.64-2.78 | <0.0001 |
|  |  |  |  |  |  |
| DP | 1.50 | 1.21-1.85 | <0.0001 | 1.49 | 1.19-1.86 | 0.001 |
|  |  |  |  |  |  |
| PA | 0.99 | 0.84-1.15 | 0.851 | Not sig in final model |
|  |  |  |  |  |  |
| High Degreeb | 1.86 | 1.15-3.00 | 0.012 | 1.86 | 1.15-3.00 | 0.012 |
|  |  |  |  |  |  |
| Sleep following ≥2 days offc |
| EE | 1.53 | 1.24-1.90 | <0.0001 | 1.50 | 1.21-1.87 | <0.0001 |
|  |  |  |  |  |  |  |
| DP | 1.14 | 0.95-1.37 | 0.158 | Not sig in final model |
|  |  |  |  |  |  |  |
| PA | 1.12 | 0.97-1.29 | 0.127 | Not sig in final model |
|  |  |  |  |  |  |  |
| High Degreeb | 1.15 | 0.78-1.69 | 0.471 | Not sig in final model |
|  |  |  |  |  |  |  |

EE, emotional exhaustion; DP, depersonalisation; PA, personal accomplishment; OR, Odds ratio; CI, Confidence interval; *n*, number. aHigh vs. low to moderate score on burnout dimension. bhigh EE, high DP, with low PA. cMissing or not known outcomes not included. dAdjusted for age, gender, body mass index, cigarette smoking, alcohol consumption, second job and mean weekly work hours. Variables included in each model are in Table S.7.

**References for above sleep disorders, burnout and analysis sections**

American Academy of Sleep Medicine. International classification of sleep disorders, revised: diagnostic and coding manual. 2nd ed. Westchester, IL: American Academy of Sleep Medicine, 2005.

Allen R. P., Walters A. S., Montplaisir J., et al. Restless legs syndrome prevalence and impact: REST general population study. *Arch Intern Med,* 2005*,* 165: 1286-92.

Jeong H. S., Jeon Y., Ma J., et al. Validation of the Athens Insomnia Scale for screening insomnia in South Korean firefighters and rescue workers. *Qual Life Res,* 2015*,* 24: 2391-5.

Johns M. W. Sensitivity and specificity of the multiple sleep latency test (MSLT), the maintenance of wakefulness test and the epworth sleepiness scale: failure of the MSLT as a gold standard. *J Sleep Res,* 2000*,* 9: 5-11.

Katsavouni F., Bebetsos E., Malliou P., Beneka A. The relationship between burnout, PTSD symptoms and injuries in firefighters. *Occup Med,* 2016*,* 66: 32-7.

MacKinnon D. P., Dwyer J. H. Estimating mediated effects in prevention studies. Evaluation Review, 1993, 17: 144-158

Maslach C., Jackson S. E. (1996) Maslach Burnout Inventory - Human Services Survey (MBI-HSS). In: C M, S.e. Jackson, & M.P. Leiter (ed) MBI Manual. 3rd edn. Consulting Psychologists Press, Palo Alto, CA

Metlaine A., Sauvet F., Gomez-Merino D., et al. Association between insomnia symptoms, job strain and burnout syndrome: a cross-sectional survey of 1300 financial workers. *BMJ Open,* 2017*,* 7: e012816.

Netzer N. C., Stoohs R. A., Netzer C. M., Clark K., Strohl K. P. Using the Berlin Questionnaire to identify patients at risk for the sleep apnea syndrome. *Ann Intern Med,* 1999*,* 131: 485-91.

Rajaratnam S. M., Barger L. K., Lockley S. W., et al. Sleep disorders, health, and safety in police officers. *JAMA,* 2011*,* 306: 2567-2578.

Soldatos C. R., Dikeos D. G., Paparrigopoulos T. J. The diagnostic validity of the Athens Insomnia Scale. *J Psychosom Res,* 2003*,* 55: 263-7.

**Table S.4** Variables included in the models used to examine associations between burnout outcomes and positive sleep disorder screening

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Burnout** **Outcome** | **Insomnia** | **OSA** | **SWD** | **RLS** | **Any Sleep Disorder** |
| EE | Age,Gender,Cigarette smoking | Gender,BMIb,Cigarette smoking | Age,Gender,Cigarette smoking,Second job | Age,Gender,Cigarette smoking | Gender |
| *n* | 6083 | 6066 | 4706 | 6066 | 6184 |
| DP | Age, Alcohol consumption | Age,BMIb,Alcohol consumption | Age,Alcohol consumption | Age,Alcohol consumption | Age,BMIb,Alcohol consumption |
| *n* | 6159 | 6107 | 5186 | 6145 | 6204 |
|  PA | BMIb,Cigarette smoking | BMIb,Cigarette smoking | BMIb,Cigarette smoking | BMIb,Cigarette smoking | Cigarette smoking |
| *n* | 6120 | 6156 | 5222 | 6194 | 6255 |
| High Degreea | Cigarette smoking | Gender, BMIb, Cigarette smoking | Gender, Cigarette smoking | Cigarette smoking | BMIb, Cigarette smoking |
| *n* | 6195 | 6026 | 5118 | 6179 | 6240 |

EE, emotional exhaustion; DP, depersonalisation; PA, personal accomplishment; OSA, obstructive sleep apnea; SWD, shift work disorder; RLS, restless legs syndrome; BMI, body mass index. aDefined as high EE and high DP, and low PA. bBMI was a categorical variable.

**Table S.5** Variables included in the models used to examine associations between burnout outcomes and mental health conditions.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Burnout Outcome** | **Depression** | **PTSD** | **Anxiety** | **Any MH condition** |
| EE | Age, Gender, Cigarette smoking | Age, Gender, Cigarette smoking | Age, Gender, Cigarette smoking | Age, Gender |
| *n* | 6033 | 6137 | 6140 | 6078 |
| DP | Age, Alcohol consumption, Work hours | Age, Alcohol consumption, Work hours | Age, Alcohol consumption | Age, Alcohol consumption, Mean Work hours |
| *n* | 5515 | 5506 | 6104 | 5535 |
| PA | BMIb, Cigarette smoking, Work hours | BMIb, Cigarette smoking, Work hours | BMIb, Cigarette smoking, Work hours | BMIb, Cigarette smoking, Work hours |
| *n* | 5549 | 5541 | 5542 | 5570 |
| HighDegreea | Cigarette smoking | Cigarette smoking | Cigarette smoking | Cigarette smoking |
| *n* | 6143 | 6133 | 6137 | 6170 |

EE, emotional exhaustion; DP, depersonalisation; PA, personal accomplishment; PTSD, post-traumatic stress disorder; BMI, body mass index; MH, mental health.

aDefined as high EE and high DP, and low PA.

bBMI was a categorical variable.

**Table S.6** Variables included in the models used to examine associations between burnout and sleep duration in all participants and participants who did not screen positive for a sleep disorder (i.e., *Low-risk sleep disorder participants*)

|  |  |  |
| --- | --- | --- |
|  | **All participants** | **Low-risk sleep disorder participants** |
| **Burnout Outcome** | **Sleep during an overnight shift** | **Sleep after an overnight shift** | **Sleep after day shift** | **Sleep after two days off work** | **Sleep during an overnight shift** | **Sleep after an overnight shift** | **Sleep after day shift** | **Sleep after two days off work** |
| EE | Age, Gender, Second job | Age, Gender | Age, Gender, BMIb  | Age, Gender,Cigarette smoking | Gender, BMIb | Gender | Age,Gender | Age, Gender |
| *n* | 5201 | 5683 | 2877 | 5453 | 3542 | 3550 | 1170 | 3371 |
| DP | Age, Alcohol consumption | Age, Alcohol consumption | - | Age, Alcohol consumption | Age, Alcohol consumption | Age, Alcohol consumption | Alcohol consumption | Age, Gender, Alcohol consumption |
| *n* | 5785 | 5769 | 2936 | 5536 | 3604 | 3575 | 1798 | 3342 |
| PA | BMIb Cigarette smoking, Work hours | BMIb, Cigarette smoking | BMIb | BMIb, Cigarette smoking | BMIb, Cigarette smoking | BMIb, Cigarette smoking | BMIb, Cigarette smoking | BMIb, Cigarette smoking |
| *n* | 5237 | 5805 | 2942 | 5574 | 3604 | 3593 | 1804 | 3429 |
| High Degreea | Cigarette smoking | Cigarette smoking | - | Gender, Cigarette smoking | Gender | Gender | - | Gender |
| *n* | 5814 | 5795 | 2935 | 5455 | 3544 | 3533 | 1804 | 3368 |

EE, emotional exhaustion; DP, depersonalisation; PA, personal accomplishment; BMI, body mass index.

aDefined as high EE and DP, and low PA.

bBMI was a categorical variable.

**Table S.7** Variables included in the models used to examine associations between burnout and sleep duration in participants who did not report a mental health condition

|  |  |
| --- | --- |
|  | participants who did not report a mental health condition |
| **Burnout Outcome** | **Sleep during an overnight shift** | **Sleep after an overnight shift** | **Sleep after day shift** | **Sleep after two days off work** |
| EE | BMIb, Gender | Age, Gender | BMIb, Age, Gender | BMIb, Age, Gender |
| *n* | 4719 | 4892 | 2601 | 4936 |
| DP | Alcohol, Age | Alcohol, Age | Second Job | Alcohol, Age |
| *n* | 5238 | 5225 | 2443 | 5012 |
| PA | Work Hours, BMIb | BMIb | Work hours | BMIb |
| *n* | 4671 | 4662 | 2364 | 4963 |
| High Degreea | Smoke | Smoke | - | Smoke |
| *n* | 5266 | 5037 | 2655 | 5038 |

EE, emotional exhaustion; DP, depersonalisation; PA, personal accomplishment; BMI, body mass index.

aDefined as high EE and DP, and low PA.

bBMI was a categorical variable.

**Table S.8** Variables included in the models used to examine associations between burnout and sleep deficit and sleepiness in all participants and participants who did not screen positive for a sleep disorder (i.e., *Low-risk sleep disorder participants*)

|  |  |  |
| --- | --- | --- |
|  | **All participants** | **Low-risk sleep disorder participants** |
| **Burnout Outcome** | **Sleep after an overnight shift minus sleep required to feel well rested** | **Daytime sleepiness** | **Sleep after an overnight shift minus sleep required to feel well rested** | **Daytime sleepiness** |
| EE | Age, Gender, Second Job | Age, Gender, Cigarette smoking | Gender, BMIb | Age, Gender |
| *n* | 5170 | 5987 | 3539 | 3721 |
| DP | Age, Alcohol consumption | Age, Alcohol consumption | Age, Alcohol consumption | Age, Alcohol consumption |
| *n* | 5752 | 6062 | 3563 | 3753 |
| PA | BMIb, Cigarette smoking | BMIb, Cigarette smoking | BMIb, Cigarette smoking | BMIb, Cigarette smoking |
| *n* | 5787 | 6108 | 3580 | 3780 |
| High degreea | Cigarette smoking | Cigarette smoking | Gender | Gender |
| *n* | 5526 | 6093 | 3522 | 3714 |

 EE, emotional exhaustion; DP, depersonalisation; PA, personal accomplishment; BMI, body mass index.

aDefined as high EE and high DP, and low PA.

bBMI was a categorical variable.

**Table S.9** Direct effect regressions

|  |  |  |  |
| --- | --- | --- | --- |
| **Variable** | **EE Scores** | **DP Scores** | **PA Scores** |
| **Coefficient (SE)** | ***P*****value** | **St. Beta** | **Coefficient (SE)** | ***P*****value** | **St. Beta** | **Coefficient (SE)** | ***P*****value** | **St. Beta** |
| Constant | 10.278 (0.804) | <0.001 | . | 6.824 (0.501) | <0.001 | . | 34.209 (0.881) | <0.001 | - |
| Any sleep disorder | 5.873 (0.285) | <0.001 | 0.285 | 2.412 (0.177) | <0.001 | 0.195 | -1.472 (0.312) | <0.001 | -0.070 |
| Any mental health condition  | 5.711 (0.470) | <0.001 | 0.159 | 2.457 (0.292) | <0.001 | 0.115 | -1.082 (0.514) | 0.035 | -0.029 |
| Cigarette smoking | 0.220 (0.647) | 0.734 | 0.004 | 0.344 (0.401) | 0.391 | 0.012 | -0.829 (0.707) | 0.241 | -0.016 |
| Gender | 3.193 (0.552) | <0.001 | 0.075 | 0.064 (0.344) | 0.852 | 0.012 | 0.412 (0.605) | 0.496 | 0.014 |
| Age | 0.023 (0.015) | 0.111 | 0.029 | -0.045 (0.009) | <0.001 | -0.066 | 0.016 (0.016) | 0.321 | 0.013 |
| BMI | -0.586 (0.172) | 0.001 | -0.047 | -0.177 (0.107) | 0.098 | -0.024 | -0.307 (0.188) | 0.102 | -0.024 |
| Alcohol consumption | -0.117 (0.273) | 0.668 | -0.006 | 0.704 (0.170) | <0.001 | 0.056 | 0.310 (0.298) | 0.300 | 0.014 |
| Work hours per week | -0.003 (0.007) | 0.997 | 0.000 | 0.007 (0.004) | 0.081 | 0.023 | -0.013 (0.007) | 0.085 | -0.024 |
| Second job | 0.788 (0.263) | 0.003 | 0.039 | 0.188 (0.163) | 0.249 | 0.015 | 0.217 (0.287) | 0.449 | 0.010 |
| R-squared | 0.126 |  |  | 0.062 |  |  | 0.009 |  |  |

EE, emotional exhaustion; DP, depersonalisation; PA, personal accomplishment; BMI, body mass index; SE, standard error.

**Table S.10** Indirect effects of screening positive for a sleep disorder (i.e., insomnia, OSA, SWD, RLS) on EE, DP and PA through *Sleep duration when working an overnight shift.*

|  |  |
| --- | --- |
| **Predictor** | **Indirect effect through Sleep duration when working an overnight shift** |
| **Effect** | **SE** | **95% CI** |
| *EE* |  |
| Any Sleep Disorder | 0.5190 | 0.0727 | 0.3858 to 0.6674 |
| *DP* |  |  |
| Any Sleep Disorder | 0.2836 | 0.0372 | 0.2154 to 0.3625 |
| *PA* |
| Any Sleep Disorder | 0.1383 | 0.0478 | 0.0512 to 0.2382 |

EE, emotional exhaustion; DP, depersonalisation; PA, personal accomplishment; SE, standard error; CI, confidence interval.

**Table S.11** Model coefficients (a, b, c′) and summary information of regression analyses for the single mediator model examining sleep disorder risk and burnout. Analyses performed separately forEE, DP and PA.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Predictor** | **M1: Sleep duration when working overnight** | **Y: EE Scores** |  |  |
|  | **Coef** | **SE** | **P-value** |  | **Coef** | **SE** | **P-value** |
| ***EE*** |  |  |  |  |  |  |  |  |
| X: Any Sleep Disorder | a1 | -0.4223 | 0.0438 | <0.0001 | c′ | 5.9109 | 0.2795 | <0.0001 |
| M1: Sleep duration when working an overnight shift |  |  |  |  | b1 | -1.2289 | 0.0875 | <0.0001 |
|  |  | R2 = 0.0242 |  |  | R2 = 0.1351 |  |
| *Final model controlled for: Gender, BMI, Second job* |  |  |  |  |  |
| ***DP*** |  |  |  |  | **Y: DP Scores** |  |  |
| X: Any Sleep Disorder | a1 | -0.4268 | 0.0400 | <0.0001 | c′ | 2.3111 | 0.1593 | <0.0001 |
| M1: Sleep duration when working an overnight shift |  |  |  |  | b1 | -0.6645 | 0.0519 | <0.0001 |
|  |  | R2 = 0.0257 |  |  | R2 = 0.0750 |  |
| *Final model controlled for: Age, Alcohol consumption* |  |  |  |  |  |
| ***PA*** |  |  |  |  | **Y: PA Scores** |  |  |
| X: Any Sleep Disorder | a1 | -0.3901 | 0.0405 | <0.0001 | c′ | -1.6772 | 0.2868 | <0.0001 |
| M1: Sleep duration when working an overnight shift |  |  |  |  | b1 | -0.3546 | 0.0920 | <0.0001 |
|  |  | R2 = 0.0157 |  |  | R2 = 0.0075 |  |

 EE, emotional exhaustion; DP, depersonalisation; PA, personal accomplishment; BMI, body mass index; SE, standard error; M, mediator; X, independent variable; Y, dependent variable; Coef, coefficient.



**Figure S.1** Simplified models showing indirect effects of positive screening for any sleep disorder on Emotional Exhaustion (A), Depersonilisation (B) and Personal Accomplishment (C) through the mediators *Sleep – Overnight work (i.e., sleep duration when working an overnight shift), Sleep – After overnight (i.e., sleep duration after working an overnight shift), Sleep – Day work (i.e., sleep duration when working a day shift) and Sleep – Following days off (i.e., sleep duration following ≥2 days off from work).* Path coefficients (95% confidence interval) are shown. Long dashed red lines indicate statistically significant direct effect paths. Solid red lines indicate statistically significant indirect effect paths and dotted black lines indicate non-significant indirect paths. For further indirect effect details see Appendices Table A.8. Adjusted for age, gender, body mass index, cigarette smoking, alcohol consumption, second job and mean work hours per week. For full details of the multiple mediator model and variables included in the multiple mediator model see Appendices Table A.9.

**Table S.12** Indirect effects of screening positive for a sleep disorder (i.e., insomnia, OSA, SWD, RLS) on EE, DP and PA through *Sleep duration when working an overnight shift*, *Sleep duration after working an overnight shift, Sleep duration when working a day shift and Sleep duration following ≥2 days off from work* (i.e., parallel mediator variables)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Predictor** | **Indirect effect through Sleep duration when working an overnight shift** | **Indirect effect through Sleep duration after working an overnight shift** | **Indirect effect through Sleep duration when working a day shift** | **Indirect effect through sleep duration following ≥2 days off work** |
| Effect | SE | 95% CI | Effect | SE | 95% CI | Effect | SE | 95% CI | Effect | SE | 95% CI |
| EE |  |  |  |  |  |  |  |  |  |  |  |  |
| Any Sleep Disorder | 0.6575 | 0.1314 | 0.4113 to 0.9215 a, b, c | 0.0159 | 0.0221 | -0.0094 to 0.0881 d | -0.0170 | 0.0381 | -0.0996 to 0.0538 | -0.0387 | 0.0288 | -0.1213 to -0.0004 |
| DP |  |  |  |  |  |  |  |  |  |  |  |  |
| Any Sleep Disorder | 0.3530 | 0.0565 | 0.2531 to 0.4743 a, b, c | 0.0148 | 0.0164 | -0.0113 to 0.0565 | 0.0249 | 0.0210 | -0.0101 to 0.0743 | -0.0075 | 0.0144 | -0.0461 to 0.0145 |
| PA |  |  |  |  |  |  |  |  |  |  |  |  |
| Any Sleep Disorder | 0.3304 | 0.0951 | 0.1591 to 0.5358 a, b, c | -0.0205 | 0.0318 | -0.0984 to 0.0311 | -0.0409 | 0.0358 | -0.1256 to 0.0183 | 0.0089 | 0.0303 | -0.0465 to 0.0786 |

EE, emotional exhaustion; DP, depersonalisation; PA, personal accomplishment; SE, standard error; CI, confidence interval.

aSignificant difference in size of indirect effect through *Sleep duration when working an overnight shift* compared to *Sleep duration after working an overnight shift* determined by pairwise contrasts.

bSignificant difference in size of indirect effect through *Sleep duration when working an overnight shift* compared to *Sleep duration when working a day shift* determined by pairwise contrasts.

cSignificant difference in size of indirect effect through *Sleep duration when working an overnight shift* compared to *Sleep duration following ≥2 days off from work* determined by pairwise contrasts.

dSignificant difference in size of indirect effect through *Sleep duration after working an overnight shift* compared to *Sleep duration following ≥2 days off from work* determined by pairwise contrasts.

**Table S.13** Model coefficients (a, b, c′) and summary information of regression analyses for the multiple mediator model examining sleep disorder risk and burnout. Analyses performed separately forEE, DP and PA.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Predictors** | **M1: Sleep when working overnight** | **M2: Sleep after working overnight** | **M3: Sleep when working a day shift** | **M4: Sleep following ≥2 days off work** | **Y:****EE Scores** |
|  | Coef | SE | P-value |  | Coef | SE | P-value |  | Coef | SE | P |  | Coef | SE | P-value |  | Coef | SE | P-value |
| ***EE*** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| X: Any Sleep Disorder | a1 | -0.5061 | 0.0683 | <0.0001 | a2 | -0.1592 | 0.0953 | 0.0952 | a3 | -0.4269 | 0.1113 | 0.0001 | a4 | -0.1725 | 0.0796 | 0.0304 | c′ | 6.1557 | 0.4214 | <0.0001 |
| M1: Sleep when working overnight |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | b1 | -1.2992 | 0.1307 | <0.0001 |
| M2: Sleep after working overnight |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | b2 | -0.0997 | 0.0952 | <0.0001 |
| M3: Sleep when working a day shift |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | b3 | 0.0398 | 0.0812 | 0.6243 |
| M4: Sleep following ≥2 days off work |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | b4 | 0.2244 | 0.1104 | 0.0421 |
|  |  | R=0.0338 |  |  | R2 = 0.0158 |  |  | R2 = 0.0077 |  | R2 = 0.0083 |  |  | R=0.1539 |  |
| *Final model controlled for: Gender, BMI, Second job* |
| ***DP*** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | **Y: DP Scores** |  |
| X: Any Sleep Disorder | a1 | -0.5691 | 0.0618 | <0.0001 | a2 | -0.2549 | 0.0877 | 0.0037 | a3 | -0.3954 | 0.1012 | 0.0001 |  | -0.1777 | 0.0729 | 0.0149 | c′ | 2.3680 | 0.2374 | <0.0001 |
| M1: Sleep when working overnight |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | b1 | -0.6202 | 0.0771 | <0.0001 |
| M2: Sleep after working overnight |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | b2 | -0.0579 | 0.0556 | 0.2976 |
| M3: Sleep when working a day shift |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | b3 | -0.0631 | 0.0477 | 0.1865 |
| M4: Sleep following ≥2 days off work |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 0.0424 | 0.0648 | 0.5131 |
|  |  | R2 = 0.0385 |  |  | R2 = 0.0040 |  |  | R2 = 0.0076 |  | R=0.0104 |  |  | R=0.0816 |  |
| *Final model controlled for: Age, Alcohol consumption* |

**Table S.13** *Continued.*

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Predictors** | **M1: Sleep when working overnight** | **M2: Sleep after working overnight** | **M3: Sleep when working a day shift** | **M4: Sleep following ≥2 days off work** | **Y: PA Scores** |
|  | Coef | SE | P-value |  | Coef | SE | P-value |  | Coef | SE | P-value |  | Coef | SE | P-value | Coef | SE | P-value |
| ***PA*** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| X: Any Sleep Disorder | a1 | -0.5054 | 0.0638 | <0.0001 | a2 | -0.2620 | 0.0875 | 0.0028 | a3 | -0.3826 | 0.1002 | 0.0001 | a4 | -0.2037 | 0.0730 | 0.0053 | c′ | -1.0178 | 0.4455 | 0.0224 |
| M1: Sleep duration when working an overnight shift |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | b1 | -0.6537 | 0.1403 | <0.0001 |
| M2: Sleep duration after working an overnight shift |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | b2 | 0.0781 | 0.1048 | 0.4566 |
| M3: Sleep duration when working a day shift |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | b3 | 0.1070 | 0.0904 | 0.2369 |
| M4: Sleep following ≥2 days off work |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | b4 | -0.0439 | 0.1218 | 0.7188 |
|  |  | R2 = 0.0234 |  |  | R2 = 0.0034 |  |  | R2 = 0.0055 |  | R2=0.0030 |  |  | R2=0.0095 |  |

 EE, emotional exhaustion; DP, depersonalisation; PA, personal accomplishment; BMI, body mass index; SE, standard error; M, mediator;

X, independent variable; Y, dependent variable; Coef, coefficient.

**Table S.14** Indirect effects of self-reporting any mental health condition (i.e., PTSD, Depression, Anxiety) on EE, DP and PA through *Sleep duration when working an overnight shift.*

|  |  |
| --- | --- |
| **Predictor** | **Indirect effect through Sleep duration when working an overnight shift** |
| **Effect** | **SE** | **95% CI** |
| *EE* |  |
| Any Mental Health Condition | 0.3124 | 0.0982 | 0.1272 to 0.5152 |
| *DP* |  |  |
| Any Mental Health Condition | 0.2191 | 0.0502 | 0.1233 to 0.3210 |
| *PA* |
| Any Mental Health Condition | 0.0784 | 0.0363 | 0.0216 to 0.1666 |

EE, emotional exhaustion; DP, depersonalisation; PA, personal accomplishment; SE, standard error; CI, confidence interval.

**Table S.15** Model coefficients (a, b, c′) and summary information of regression analyses for the single mediator model examining mental health condition and burnout. Analyses performed separately forEE, DP and PA.

|  |  |  |
| --- | --- | --- |
| **Predictor** | **M1: Sleep duration when working an overnight shift** | **Y: EE Scores** |
|  | **Coef** | **SE** | **P-value** |  | **Coef** | **SE** | **P-value** |
| ***EE*** |  |  |  |  |  |  |  |  |
| X: Any Mental Health Condition | a1 | -0.2238 | 0.0733 | 0.0023 | c′ | 6.8285 | 0.4684 | <0.0001 |
| M1: Sleep duration when working an overnight shift |  |  |  |  | b1 | -1.3959 | 0.0887 | <0.0001 |
|  |  | R2 = 0.0085 |  |  | R2 = 0.0973 |  |
| *Final model controlled for: Gender, BMI, Second job* |  |  |  |  |  |
| ***DP*** |  |  |  |  | **Y: DP Scores** |  |  |
| X: Any Mental Health Condition | a1 | -0.2987 | 0.0703 | <0.0001 | c′ | 2.7712 | 0.2771 | <0.0001 |
| M1: Sleep duration when working an overnight shift |  |  |  |  | b1 | -0.7337 | 0.0520 | <0.0001 |
|  |  | R2 = 0.0094 |  |  | R2 = 0.0575 |  |
| *Final model controlled for: Age, Alcohol consumption* |  |  |  |  |  |
| ***PA*** |  |  |  |  | **Y: PA Scores** |  |  |
| X: Any Mental Health Condition | a1 | -0.2669 | 0.0715 | 0.0002 | c′ | -1.3160 | 0.5005 | 0.0086 |
| M1: Sleep duration when working an overnight shift |  |  |  |  | b1 | -0.2936 | 0.0920 | 0.0014 |
|  |  | R2 = 0.0024 |  |  | R2 = 0.0028 |  |

EE, emotional exhaustion; DP, depersonalisation; PA, personal accomplishment; BMI, body mass index; SE, standard error; M, mediator; X, independent variable; Y, dependent variable; Coef, coefficient.



**Figure S.2** Simplified models showing indirect effects of self-reporting a current diagnosis of any mental health condition on Emotional Exhaustion (A), Depersonilisation (B) and Personal Accomplishment (C) through the mediators *Sleep – Overnight work (i.e., sleep duration when working an overnight shift), Sleep – After overnight (i.e., sleep duration after working an overnight shift), Sleep – Day work (i.e., sleep duration when working a day shift) and Sleep – Following days off (i.e., Sleep duration following ≥2 days off from work).* Path coefficients (95% confidence interval) are shown. Long dashed red lines indicate statistically significant direct effect paths. Solid red lines indicate statistically significant indirect effect paths and dotted black lines indicate non-significant indirect paths. For further indirect effect details see Appendices Table A.12. Adjusted for age, gender, body mass index, cigarette smoking, alcohol consumption, second job and mean total work hours per week. For full details of the multiple mediator model and variables included in the model see Appendices Table A.13.

**Table S.16** Indirect effects of self-reporting a current diagnosis of any mental health condition (i.e., PTSD, Depression, Anxiety) on EE, DP and PA through *Sleep duration when working an overnight shift*, *Sleep duration after working an overnight shift, Sleep duration when working a day shift* and *Sleep duration following ≥2 days off from work* (i.e., parallel mediator variables).

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Predictor** | **Indirect effect through Sleep duration when working an overnight shift** | **Indirect effect through Sleep duration after working an overnight shift** | **Indirect effect through Sleep duration when working a day shift** | **Indirect effect through sleep following ≥2 days off work** |
|  | Effect | SE | 95% CI | Effect | SE | 95% CI | Effect | SE | 95% CI | Effect | SE | 95% CI |
| EE |  |  |  |  |  |  |  |  |  |  |  |  |
| Any Mental Health Condition | 0.4254 | 0.1606 | 0.1373 to 0.7748 a, b, c | -0.0046 | 0.0231 | -0.0859 to 0.0234 | 0.0001 | 0.0148 | -0.0284 to 0.0354 | 0.0212 | 0.0349 | -0.0175 to 0.1438 |
| DP |  |  |  |  |  |  |  |  |  |  |  |  |
| Any Mental Health Condition | 0.2930 | 0.0769 | 0.1562 to 0.4600 a, b, c | 0.0011 | 0.0127 | -0.0199 to 0.0367 | 0.0039 | 0.0156 | -0.0187 to 0.0495 | 0.0030 | 0.0164 | -0.0199 to 0.0540 |
| PA |  |  |  |  |  |  |  |  |  |  |  |  |
| Any Mental Health Condition | 0.2346 | 0.0912 | 0.0891 to 0.4481 a, b, c | -0.0019 | 0.0208 | -0.0669 to 0.0283 | -0.0035 | 0.0245 | -0.0704 to 0.0359 | -0.0036 | 0.0268 | -0.0931 to 0.0311 |

EE, emotional exhaustion; DP, depersonalisation; PA, personal accomplishment; SE, standard error; CI, confidence interval.

aSignificant difference in size of indirect effect through *Sleep duration when working an overnight shift* compared to *Sleep duration after working an overnight shift* determined by pairwise contrasts.

bSignificant difference in size of indirect effect through *Sleep duration when working an overnight shift* compared to *Sleep duration when working a day shift* determined by pairwise contrasts.

cSignificant difference in size of indirect effect through *Sleep duration when working an overnight shift* compared to *Sleep duration following ≥2 days off from work* determined by pairwise contrasts.

**Table S.17** Model coefficients (a, b, c′) and summary information of regression analyses for the multiple mediator model examining mental health condition and burnout. Analyses performed separately forEE, DP and PA.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Predictors** | **M1: Sleep duration when working an overnight shift** | **M2: Sleep duration after working an overnight shift** | **M3: Sleep duration when working a day shift** | **M4: Sleep following ≥2 days off work** | **Y:****EE Scores** |
|  | Coef | SE | P-value |  | Coef | SE | P-value |  | Coef | SE | P-value |  | Coef | SE | P-value |  | Coef | SE | P-value |
| ***EE*** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| X: Any Mental Health | a1 | -0.2904 | 0.1147 | 0.0114 | a2 | 0.0527 | 0.1580 | 0.7386 | a3 | -0.0130 | 0.1856 | 0.9441 | a4 | 0.1337 | 0.1325 | 0.3131 | c′ | 7.2024 | 0.7045 | <0.0001 |
| M1: Sleep when working overnight |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | b1 | -1.4651 | 0.1326 | <0.0001 |
| M2: Sleep after working overnight |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | b2 | -0.0879 | 0.0975 | 0.3677 |
| M3: Sleep when working a day shift |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | b3 | -0.0093 | 0.0829 | 0.9110 |
| M4: Sleep following ≥2 days off work |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | b4 | 0.1589 | 0.1127 | 0.1387 |
|  |  | R2 = 0.0142 |  |  | R2 = 0.0142 |  |  | R2 = 0.0017 |  | R2=0.0067 |  | R2=0.1167 |  |
| *Final model controlled for: Gender, BMI, Second job* |
| ***DP*** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | **Y: DP Scores** |  |
| X: Any Mental Health | a1 | -0.4216 | 0.1107 | 0.0001 | a2 | -0.0188 | 0.1548 | 0.9031 | a3 | -0.0503 | 0.1793 | 0.7789 | a4 | 0.1661 | 0.1291 | 0.1984 | c′ | 2.8244 | 0.4147 | <0.0001 |
| M1: Sleep when working overnight |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | b1 | -0.6951 | 0.0769 | <0.0001 |
| M2: Sleep after working overnight |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | b2 | -0.0571 | 0.0560 | 0.3079 |
| M3: Sleep when working a day shift |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | b3 | -0.0776 | 0.0481 | 0.1066 |
| M4: Sleep following ≥2 days off work |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | b4 | 0.0182 | 0.0652 | 0.7797 |
|  |  | R2 = 0.0123 |  |  | R2 = 0.0008 |  |  | R2 = 0.0019 |  | R2=0.0086 |  | R2=0.0629 |  |
| *Final model controlled for: Age, Alcohol consumption* |

**Table S.17** *Continued.*

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Predictors** | **M1: Sleep duration when working an overnight shift** | **M2: Sleep duration after working an overnight shift** | **M3: Sleep duration when working a day shift** | **M4: Sleep following ≥2 days off work** | **Y: PA Scores** |
|  | Coef | SE | P-value |  | Coef | SE | P-value |  | Coef | SE | P-value |  | Coef | SE | P-value |  | Coef | SE | P-value |
| *PA* |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| X: Any Mental Health Condition | a1 | -0.3774 | 0.1144 | 0.0010 | a2 | -0.0269 | 0.1551 | 0.8621 | a3 | -0.0299 | 0.1786 | 0.8670 | a4 | 0.1179 | 0.1297 | 0.3636 | c′ | -0.6333 | 0.7828 | 0.4186 |
| M1: Sleep duration when working an overnight shift |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | b1 | -0.6217 | 0.1402 | <0.0001 |
| M2: Sleep duration after working an overnight shift |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | b2 | 0.0713 | 0.1056 | 0.4997 |
| M3: M3: Sleep duration when working a day shift |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | b3 | 0.1159 | 0.0909 | 0.2023 |
| M4: Sleep following ≥2 days off work |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | b4 | -0.0305 | 0.1224 | 0.8035 |
|  |  | R2 = 0.0042 |  |  | R2 = 0.0000 |  |  | R2 = 0.0000 |  | R2=0.0003 |  | R2=0.0078 |  |

EE, emotional exhaustion; DP, depersonalisation; PA, personal accomplishment; BMI, body mass index; SE, standard error; M, mediator;

X, independent variable; Y, dependent variable; Coef, coefficient.

**Table S.18** Firefighters in Positive OSA Screening Group (n=1830) Reporting Diagnosis and Treatment

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Sleep Disorder | Firefighters in positive OSA screening group reporting That they have never been diagnosed with OSA, n (%) | Firefighters in positive OSA screening group reporting that they have been diagnosed with OSA in the past, but do not have it now, n (%) | Firefighters in positive OSA screening group reporting that they have been diagnosed with OSA, but do not regularly take medications or receive treatment, n (%) | Firefighters in positive OSA screening group reporting that they have been diagnosed with OSA and am regularly taking medications or receiving treatment, n (%) | Missing, n (%) |
| Positive OSA Screening (n=1830) | 1427 (77.98%) | 31 (1.69%) | 142 (7.76%) | 199 (10.87%) | 31 (1.69%) |

OSA, Obstructive Sleep Apnoea

**Table S.19** Multicollinearity Statistics for Predictor Variables Included in Multiple Logistic Regression Analysis

|  |  |
| --- | --- |
| **Predictor variable** | **Multicollinearity Statistics** |
| **Tolerance** | Variance Inflation Factor |
| ***Emotional Exhaustion*** |  |  |
| Insomnia | 0.882 | 1.133 |
| Obstructive Sleep Apnea | 0.898 | 1.114 |
| Restless Leg Syndrome | 0.986 | 1.015 |
| Shift Work Disorder | 0.941 | 1.063 |
| Depression | 0.809 | 1.236 |
| Post-Traumatic Stress Disorder | 0.886 | 1.128 |
| Anxiety | 0.808 | 1.238 |
| Sleepiness | 0.904 | 1.106 |
| Sleep after overnight work minus sleep required to feel well rested | 0.646 | 1.548 |
| Sleep when working a day shift | 0.685 | 1.460 |
| Sleep after working overnight | 0.468 | 2.139 |
| Sleep when working overnight | 0.921 | 1.086 |
| Sleep following two days off | 0.658 | 1.519 |
| ***Depersonalisation*** |  |  |
| Insomnia | 0.882 | 1.134 |
| Obstructive Sleep Apnea | 0.897 | 1.114 |
| Restless Leg Syndrome | 0.986 | 1.015 |
| Shift Work Disorder | 0.940 | 1.064 |
| Depression | 0.809 | 1.235 |
| Post-Traumatic Stress Disorder | 0.886 | 1.128 |
| Anxiety | 0.808 | 1.238 |
| Sleepiness | 0.903 | 1.107 |
| Sleep after overnight work minus sleep required to feel well rested | 0.643 | 1.555 |
| Sleep when working a day shift | 0.687 | 1.456 |
| Sleep after working overnight | 0.467 | 2.140 |
| Sleep when working overnight | 0.921 | 1.086 |
| Sleep following two days off | 0.660 | 1.514 |
| ***Personal Accomplishment*** |  |  |
| Insomnia | 0.882 | 1.133 |
| Obstructive Sleep Apnea | 0.897 | 1.115 |
| Restless Leg Syndrome | 0.986 | 1.015 |
| Shift Work Disorder | 0.941 | 1.063 |
| Depression | 0.809 | 1.236 |
| Post-Traumatic Stress Disorder | 0.886 | 1.128 |
| Anxiety | 0.808 | 1.238 |
| Sleepiness | 0.903 | 1.107 |
| Sleep after overnight work minus sleep required to feel well rested | 0.644 | 1.552 |
| Sleep when working a day shift | 0.686 | 1.458 |
| Sleep after working overnight | 0.467 | 2.140 |
| Sleep when working overnight | 0.921 | 1.086 |
| Sleep following two days off | 0.660 | 1.516 |