

Individual, lifestyle, and psychosocial factors related to insomnia among Norwegian musicians

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In our study of full-time musicians, psychological distress, higher scores on extraversion and neuroticism, less social support, and more work-related demands were related to insomnia, write Ingvild Saksvik-Lehouillier and colleagues.

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Musicians face a variety of health issues, work demands, and stressors ([Bellis et al., 2007](#); [Sternbach, 1995](#)). Musicians also experience high rates of musculoskeletal pain ([Ackermann, Kenny, O'Brien, & Driscoll, 2014](#); [Berque, Gray, & McFadyen, 2016](#); [Steinmetz, Scheffer, Esmer, Delank, & Peroz, 2015](#)), hearing loss ([Schmidt et al., 2014](#); [Ackermann et al., 2014](#)), problems related to anxiety and depression ([Kenny, Driscoll, & Ackermann, 2012](#); [Vaag, Bjørngaard, & Bjerkeset, 2015](#)) as well as sleep problems ([Vaag, Saksvik-Lehouillier, Bjørngaard, & Bjerkeset, 2016](#)). In regard to sleep problems, we previously reported that Norwegian musicians have a higher prevalence of insomnia symptoms compared with a representative community sample (Prevalence Difference 6.9, 95% Confidence Interval (CI) 3.9–10.0) ([Vaag et al., 2016](#)). Criteria for insomnia are (i) difficulty initiating or maintaining sleep or having nonrestorative sleep or waking up too early for at least one month and (ii) clinically significant distress in social, occupational, or other important areas of functioning ([American Psychiatric Association, 2013](#)).

Several reasons exist for why insomnia is so common among musicians. First, the work pattern of many musicians closely resembles shift work ([Kenny & Ackermann, 2009](#)), which is related to poor health, especially due to circadian disruption and sleep problems ([Costa, 2016](#)). Also, the workload of musicians is generally demanding, both mentally and physically ([Sternbach, 1995](#)). Working long hours predicts poor sleep ([Bannai & Tamakoshi, 2014](#)). In particular, it causes shorter sleep durations and problems with falling asleep ([Virtanen et al., 2009](#)), both of which are key components of insomnia. Still, this group of workers has rarely been studied in an occupational health framework that focuses on the balance between work and sleep. More knowledge about sleep in musicians is important because sleep disturbance is a widespread, common feature in many psychological and physical disorders, and it can be prevented and treated ([Harvey, 2009](#)).

We have previously shown that symptoms of anxiety and depression are more prevalent among musicians than in a general workforce sample ([Vaag et al., 2015](#)). In general and across one's lifespan, a relationship between insomnia and symptoms of anxiety and depression has been well established ([Alvaro, Roberts, & Harris, 2013](#)). Underlying psychological characteristics, such as personality traits, consistently overlap with symptoms of anxiety and depression as well as sleep problems in working populations ([Saksvik-Lehouillier et al., 2013](#); [Thun et al., 2014](#)). However, less is known regarding the link between personality traits and insomnia in musicians.

In general populations, some relationships have been found between the personality traits of the Big 5 model (extraversion, openness to experience, neuroticism, agreeableness, and conscientiousness), especially regarding neuroticism. The prevalence of neuroticism, perfectionism, and related traits seems to be relatively high among insomnia patients ([van de Laar, Verbeek, Pevernagie, Aldenkamp, & Overeem, 2010](#)). Insomnia also seems to be more prevalent in introverts than extraverts ([LeBlanc et al., 2009](#)). In the studies of Van De Laar et al. and Le Blanc et al., the researchers found no relation between insomnia and agreeableness, openness to experience, or conscientiousness. A recent Croatian study of 249 male musicians found that they reported higher scores on extraversion, agreeableness, and intellect/imagination than a representative sample of the general population ([Butkovic & Rancic Dopudj, 2016](#)). However, a Norwegian study in which our sample of full-time musicians was included showed that musicians ($n = 1,600$) score higher on openness to experience and neuroticism compared with the general workforce ($n = 6,327$) ([Vaag, Sund, & Bjerkeset, 2017](#)).

A number of psychosocial variables that are often studied within the field of organizational psychology may also be associated with insomnia among musicians. Psychosocial work characteristics, especially high demands and low control, also predict poor sleep quality in longitudinal studies ([Van Laethem, Beckers, Kompier, Dijksterhuis, & Geurts, 2013](#)). Research has shown that strain induced by imbalance in demand, control, and support as well as imbalance in effort-reward are associated with increased insomnia symptoms in a sample of middle-aged workers ([Ota et al., 2009](#)). Musicians seem to perceive a more negative psychosocial work environment, with higher work demands, low influence, and low social support. Thus, they exhibit more symptoms of stress compared with the general workforce ([Holst, Paarup, & Baelum,](#)

2012). To our knowledge, no previous studies have investigated how these psychosocial factors are related to general sleep among musicians.

A variety of lifestyle factors are known to be related to insomnia. A recent review confirms the role of acute and chronic use of alcohol, cocaine, cannabis, and opiates in developing sleep problems (Angarita, Emadi, Hodges, & Morgan, 2016). Bellis et al. (2007) also pointed to the link between the stressful environment many musicians experience, especially famous pop and rock musicians, where alcohol and drug misuse is abundant and leads to health problems. In shift workers, alcohol consumption and sedentary lifestyle predict insomnia (Härmä, Tenkanen, Sjöblom, Alikoski, & Heinsalmi, 1998). Physical activity is often related to less performance anxiety among music students (Rocha, Marocolo, Correa, Morato, & da Mota, 2014) and fewer musculoskeletal disorders among young musicians (Nawrocka et al., 2014).

The aim of the study is to investigate possible individual, work-related, and lifestyle factors associated with insomnia among musicians.

The hypothesis is: Musicians' insomnia is multifactorial and is associated with individual factors, work, and lifestyle.

Methods

Sample

A sample of 4,168 members of the Norwegian Musician's Union was invited to participate in the online questionnaire study. According to the Union, about 80% to 90% of all Norwegian professional performing musicians are members. Both full-time musicians and teachers working part time as musicians were invited. A total of 2,121 individuals responded to the questionnaire (response rate 51%), of which 1,607 confirmed they were working as professional musicians. Of these, 656 (40.8%) stated they worked full time with music-related work. This work status was determined with the question "How much of your total work time is concerned with music related work?" These 656 musicians comprise the sample in our study. They ranged from 24 to 79 years of age (mean = 42.9, SD = 9.8). Of the total, 286 were women (43.6%) and 370 were men. In this sample of full-time musicians, 193 (29.4%) were employed either full time or part time, while 159 (24.2) were freelance/self-employed. Also, 304 (46.3%) musicians reported a combination of the two. Regarding salary, 39.8% of the sample indicated that they made 400,000 NOK (about 4,300 Euro) or less last year, while 60.2% made more than 400,000 NOK last year. A total of 149 (22.7%) of the musicians listed string instrument as their main

instrument, 106 (16.2%) were singers, 91 (13.9%) played woodwind instruments, 87 (13.3%) played brass, 90 (13.7%) played a key instrument, 88 (13.4%) played bowed strings, 34 (5.2%) played percussion, while 11 (1.7%) musicians indicated that their main instruments was one other than any of the categories listed above. Altogether, 142 (21.6%) of the musicians were soloists or front figures in a band, 230 (35.1%) and performed music mainly as a part of a smaller band or ensemble. Meanwhile, 208 (31.7%) were a part of a larger orchestra.

Procedure

Data collection took place between February and April 2013. The respondents completed online questionnaires. They were also invited to participate through email. Three reminders were sent out at two-week intervals.

Measuring instruments

Insomnia symptoms was measured with the Bergen Insomnia Scale (Pallesen et al., 2008). This instrument measures insomnia symptoms based on the DSM-IV criteria. The respondents indicate how many times per week in the last month they experienced six different insomnia symptoms (0 = no days during a week; 7 = every day over the course of a week). Cronbach's alpha for BIS was .86 in the current study.

In addition to insomnia, we measured demographic variables: personality, quality of life, and health as well as psychosocial variables. All questions, except for the ones measuring personality, were applied to the questionnaire used in the Norwegian survey of level of living (Amdam & Vrålstad, 2012). We included gender and age as demographic control variables. For personality, we assessed the five personality traits of the Five Factor model (FFM), using the Norwegian version of the 20-item version of the Big Five Inventory (Engvik & Clausen, 2011). The BFI-20 consists of 20 different statements, two for each of the traits of the FFM. The respondents indicate from 1 to 7 how well the different statements describe them. According to Engvik and Clausen (2011), the scale has shown acceptable reliability and validity. We constructed indices for traits: extraversion ($a = 0.77$), agreeableness ($a = 0.54$), conscientiousness ($a = 0.61$), neuroticism ($a = 0.78$), and openness to experience ($a = 0.70$), which show similar alpha values in the validation of BFI-20. However, because the alphas for agreeableness, conscientiousness, and openness to experience were rather low, these traits were omitted from further analysis.

We measured alcohol use with four questions regarding experiences in relation to alcohol consumption (response options: yes or no), based on CAGE (Craving, Annoying, Guilt, and Eye-opener) (Ewing,

1984). CAGE is designed to identify severe alcohol dependence. It has shown itself to be less sensitive to hazardous drinking but with higher specificity in relation to alcohol dependence (Williams, 2014). Further, lifestyle variables such as consumption of units of alcohol, amount of physical exercise (never / < 1 day a week / > 1 day a week), smoking status (never / sometimes / daily), use of cannabis (during last year), and drugs (during last year) were also included.

Psychosocial variables were also measured in the Norwegian questionnaire survey of living: job demands, job control, effort-reward imbalance, and general social support. Demands, control, and support were measured with items based on the Demands-Control-Support model of Karasek and Theorell (1990). All items were measured on a 5-point Likert scale. Five items measured job demands ($\alpha = 0.79$) and four assessed job control ($\alpha = 0.90$). We utilized two items from Siegrist's effort-reward imbalance model (Siegrist, 2001) to measure experienced effort-reward balance. The respondents were asked to state how much they agreed or disagreed with these questions on a scale from 1 to 5. In addition, we applied the 3-Item Oslo Social Support Scale to measure social support in general (Meltzer, 2003). This instrument includes three questions about the possibility of receiving social support from individuals outside of work. Originally, we also measured social support at work and work/family conflict, but because these concepts were measured with only one question, they were not utilized in further analyses.

Statistical analyses

We undertook all analyses using IBM SPSS Statistics, version 24. After initial correlation analysis, including all assessed variables, we performed a stepwise hierarchical regression analysis with insomnia as a continuous, dependent variable. The demographic variables for age and work hours per week were entered in Step 1 of the analysis. In Step 2, we included the personality traits extraversion and neuroticism. The psychosocial variables were job demands, job control, social support, and effort-reward balance, which were in Step 3. Lifestyle variables were alcohol use, physical activity, use of marijuana, and smoking, which were in Step 4. No major violations of the assumptions of regression analysis for homogeneity, serial correlation, normality, linearity, homoscedasticity, and outliers were found.

Results

Mean scores on all variables, standard deviations, and correlations are shown in Table 1. Neuroticism, high demands, high alcohol use, and female gender were positively correlated, while good social support, control, effort-reward balance, and increasing age were

negatively correlated with insomnia. We did not find statistical evidence that work hours per week, extraversion, physical activity, use of marijuana, or smoking were associated with insomnia in the correlation analysis.

TABLE 1: Correlational table of personality factors, insomnia, and covariates ($n = 544-656$).

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	15
<i>Demographic variables:</i>														
1. Gender	-													
2. Age	-.16**	-												
3. Work hours	-.12**	-.01	-											
<i>Personality variables:</i>														
4. Extraversion	.18**	-.04	.05	-										
5. Neuroticism	.15**	-.13**	-.08*	-.22**	-									
<i>Psychosocial variables:</i>														
6. Demands	.02	-.12**	.44**	.01	.17**	-								
7. Control	-.12**	.01	.11**	.15**	-.25**	.01	-							
8. Support	.05	-.07	.14**	.34**	-.23**	-.02	.27**	-						
9. Reward Effort	-.06	.03	-.07	.05	-.13**	-.25**	.16**	.23**	-					
<i>Lifestyle variables:</i>														
10. Alcohol	-.17**	-.02	.07	-.09*	.17**	.12**	.01	-.01	-.08*	-				
11. Physical Activity	.07	.07	.07	.06	-.01	-.04	-.04	.07	.02	.00	-			
12. Marijuana	.10*	.12**	-.06	.03	-.01	-.03	-.08*	-.01	.01	-.21**	.03	-		
13. Smoking	.14**	.01	-.05	-.07	.04	-.04	-.09*	.02	-.09*	-.26**	.08*	.20**	-	
<i>Dependent variable:</i>														
14. Insomnia	.08*	-.08*	-.00	-.01	.39**	.25**	-.13**	-.20**	-.17**	.15**	-.02	-.07	.02	-

* < .05 / ** < .01; n for gender, age, work hours, personality demands, control, reward effort, alcohol, physical exercise, and marijuana use = 656; n for smoking = 656; n for social support = 544

Results of the hierarchical regression analysis examining the relation between demographics, personality, work-related and lifestyle variables, and insomnia are shown in Table 2. In Model 1, we found no statistical evidence of an association between insomnia and demographic variables ($F(3, 538) = 2.01, p = ns$). In Model 2, including demographic and personality variables, neuroticism was positively related to insomnia ($F(5, 538) = 20.38, p < 0.001$), explaining 16% of the variance in insomnia. In Model 3, controlling for psychosocial variables, neuroticism still remained positively related to insomnia ($F(9, 538) = 16.50, p < 0.001$). Extraversion had a positive association to insomnia, while demands were positively related and social support was negatively related to the insomnia score. This model explained 22% of the variance in insomnia. In Model 4, including lifestyle factors, the same relations as in Model 3 remained in addition to alcohol use. These factors were positively related to insomnia, explaining 23% of the variance in the insomnia score ($F(13, 538) = 12.25, p < 0.05$). We did not find statistical evidence for age, work hours per week, job control, effort-reward balance, physical activity, use of marijuana, or smoking related to insomnia in the final model.

TABLE 2: Multivariate linear regression for insomnia in the full sample ($n = 544-656$).

Model	1	2	3	4
	β	β	β	β
Gender	.07	.00	-.00	.01
Age	-.07	-.03	-.02	-.01
Workhours per week	.00	.03	-.05	-.06
Extraversion		.07	.11**	.12*
Neuroticism		.41**	.33**	.31**
Demands			.20**	.20**
Control			-.02	-.02
Social support			-.14**	-.15*
Reward-effort balance			-.05	-.03
Alcohol use				.09*
Physical activity				-.01
Marijuana use				-.06
Smoking				.06

* $< .05$ / ** $< .01$; see table 1 for explanations about n .

Discussion

In our final model, the findings from this study of 656 full-time musicians indicate that those who have higher scores of neuroticism and extraversion and also experience a higher degree of job demands and little social support were those with the highest scores on insomnia. We did not find a relationship between smoking and marijuana or level of physical activity with insomnia.

Our results indicate that musicians with high scores on extraversion and neuroticism are more likely to suffer from insomnia than musicians with low scores when social support is low and demands and psychological distress are high. The findings for neuroticism are not surprising since high scores on neuroticism imply high sensitivity, feelings of anxiety, depression, hostility, and impulsivity (McCrae & Costa, 1987), all factors that are likely to affect sleep negatively, for example through rumination at bedtime. Although the relationship is complex, neuroticism seems to have some connection to perception of poor health in general (Friedman & Kern, 2014), which may also

affect sleep negatively. Furthermore, the findings support previous research from other populations ([Harvey, Gehrman, & Espie, 2014](#); [van de Laar et al., 2010](#)).

Our finding of a positive relationship between extraversion and insomnia, however, contradicts what has been found in a general population where insomnia has been reported to be more common in introverts than extroverts ([LeBlanc et al., 2009](#)). In our study, extraversion was only related to insomnia after adding the work environment variables to the model, specifically social support and demands. Because extraversion had a correlation only with social support but not with demands, there may be an interaction effect between extraversion and social support. This tendency would explain why extraversion is related to more insomnia symptoms in our study. Previous research has investigated interaction effects of personality and psychosocial variables on sleep-related variables and has found that social support and personality were the only interaction that was related to the outcomes ([Saksvik-Lehouillier, Bjorvatn, Magerøy, & Pallesen, 2016](#)). Although this study investigated the personality trait hardiness, one may assume that some of the same mechanisms are present in our study. Also, since there is a large proportion of freelancers in our study, a group of workers with little daily interaction with other colleagues, one may assume that social support outside of work is especially important for this group. Alcohol use was also related to more insomnia symptoms in the final model and may interact with extraversion in the relationship with insomnia. Since extraversion was positively correlated with alcohol use, one may assume that extraverted musicians drink more alcohol and consequently experience poorer sleep. Another explanation for the relationship between high scores on extraversion and more insomnia may be due to a third variable (e.g., a group of instruments and/or genres). In previous studies, we found that vocalists were more extraverted than the general workforce, including some instrumentalists ([Vaag et al., 2017](#)), and that vocalists were among those reporting the highest degrees of insomnia ([Vaag et al., 2016](#)).

More research on performance anxiety, social support, demands, and personality of musicians is needed to discern certain conclusions about extraversion, neuroticism, and insomnia. We must stress that we are unable to state the causal relationship between personality and insomnia based on these data. However, because personality is considered to be a relatively stable disposition (trait) in humans ([McCrae et al., 1999](#)), one may assume that it is more likely that neuroticism and extraversion can lead to insomnia (state) than the opposite. This assumption is also supported in a recent study of shift workers, finding no predictive power of insomnia on the

neuroticism score in longitudinal cross-lag analyses ([Larsgård & Saksvik-Lehouillier, 2016](#)). Still, according to the psycho-bio-behavioral model of vulnerability to insomnia, although genes interact with personality, neuroticism may also be affected by perception of stress, which again may lead to poor sleep ([Harvey et al., 2014](#)).

Work demands and social support were related to insomnia in musicians in this study, which is in line with findings from other workforce samples ([Linton et al., 2015](#)). Linton et al. (2015) and Van de Laethem et al. (2013) also found that less experience of control was related to insomnia across studies of general workforce samples. In contrast, our study indicates that experience of less control may not be related to insomnia for musicians. Musicians seem to have higher scores on openness to experience than the general workforce and population ([Butkovic & Rancic Dopudj, 2016](#)), and they may be better able to handle less control than other groups. We similarly did not find that effort-reward imbalance was related to insomnia among musicians, which is contradictory to what was found in general work samples ([Ota et al., 2009](#)). We did not find a relation between work hours per week and insomnia either. This lack of relation indicates that work hours are not as important regarding the sleep of musicians. In studies of general workforce samples, long working hours seem to be related to sleep problems ([Virtanen et al., 2009](#)). Our results may reflect that having too much work but also getting too few gigs may be negative for sleep. Alternatively, they may indicate that the working schedules are so different for musicians compared to other occupations that the number of working hours does not have the same relation to sleep as it does in other occupations. Future studies should be recommended to examine work patterns and hours in more detail than we could here.

Alcohol use was the only investigated lifestyle variable related to insomnia among musicians in the present study. This lack of significant relationship between lifestyle factors and insomnia is not in line with previous research in non-musician samples ([Angarita et al., 2016](#); [Kredlow, Capozzoli, Hearon, Calkins, & Otto, 2015](#)). Our results suggest that physical activity, use of marijuana, and smoking are unrelated to sleep among musicians. Our finding that alcohol is related to sleep problems is congruent with a previous study assessing shift workers ([Härmä et al., 1998](#)).

Strengths and limitations

This study uses a relatively large representative sample of 656 full-time musicians in Norway. The response rate is also fairly high (51%). In combination, these numerical figures represent a strength regarding generalizability, because the results are more likely to

capture insomnia among a representative sample of musicians. Because we invited all members of the Norwegian Musician's Union, comprising about 80% to 90% of all musicians in Norway, we assume about 40% to 50% of all full-time musicians in Norway participated. Nevertheless, when it comes to predictions, it is a limitation that the study is cross-sectional, and we cannot clarify whether the variables investigated predict or are predicted by insomnia. The cross-sectional design is a cheap and easy way to acquire many data for association in studies that were not previously well described. It was therefore an obvious choice for this study's design. All variables are measured by self-report, which may be a limitation for their validity and may lead to common-method bias. Some of the instruments used are relatively short scales. For example, the measurement of effort-reward imbalance consisted of only two questions. Also, longer, more established instruments could have been used to measure demands, control, and social support. However, the instruments used to measure insomnia ([Pallesen et al., 2008](#)) and personality ([Donnellan, Oswald, Baird, & Lucas, 2006](#); [Engvik & Clausen, 2011](#)) are established and validated measures.

Conclusion

Experience of more psychological distress, higher scores on extraversion and neuroticism, less social support, and more work-related demands were related to insomnia in our study of full-time musicians. The finding that extraversion was related to insomnia marks a difference from other samples. Also of importance is the finding that most of the lifestyle variables, effort-reward imbalance, and work hours per week did not seem to be associated with insomnia among musicians in the present study. It therefore seems as if in addition to the more self-explanatory level of neuroticism, there are some social aspects of being a musician, in terms of extraversion, social support, and external demands, which are intrinsically important for sound sleep in musicians. However, longitudinal studies are needed to clearly state the direction of these associations.

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Abstract

Individual, lifestyle, and psychosocial factors related to insomnia among Norwegian musicians

Musicians report a considerably higher prevalence of insomnia symptoms compared to community samples in the general workforce. The aim of this study was to investigate the association between insomnia and health, work-related, and lifestyle factors among musicians. A total of 645 full-time musicians completed a questionnaire measuring insomnia symptoms: personality, psychosocial factors (perceived job demands, job control, effort-reward imbalance, and general social support), and lifestyle (smoking, marijuana use, alcohol use, and physical activity). Multiple regression analysis showed that higher scores on neuroticism and

extraversion and on perception of greater work demands were positively related to insomnia symptoms. In contrast, the experience of social support was negatively related to insomnia symptoms in the final model. In sum, neuroticism was the single strongest variable associated with insomnia. Extraversion, however, also seemed to add something unique to the explanation of insomnia among full-time musicians when controlling for work environment variables.

Moreover, demands and social support may be more important for musicians' sleep than control and effort-reward imbalance. Given that our study is cross-sectional, longitudinal studies are still needed to clarify the causal relationships among personal, psychosocial, and lifestyle variables and insomnia.

Keywords: arts and health, full-time musicians, personality, sleep problems, well-being.

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