

Poor Sleep, Anxiety, Depression and Other Occupational Health Risks in Seafaring Population

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ABSTRACT: Background: seafaring is an occupation with specific work-related risks, causing increased morbidity and mortality. Nevertheless, the research in the area of marine students 'sleep quality and mental health is lacking in Lithuania, as well as other European countries. The aim was to overview scientific findings, related with occupational health risks in a seafaring population and asses the frequency of poor sleep and the relations among poor sleep, anxiety and depression in the sample of maritime students. **Methods and contingent.** The scientific literature review, based on PubMed sources analysis, related to occupational health risks in seafaring population, was performed. Questionnaire survey was conducted in 2014 at The Lithuanian Maritime Academy, 393 (78.9 % of them males) students participated. Sleep quality was evaluated by Pittsburg Sleep Quality Index. Anxiety and depression were assessed by Hospital Anxiety and Depression scale. Sociodemographic questions were used. The Chi-square test r Fisher exact test was used to estimate association between categorical variables. P- Values less than 0.05 were interpreted as statistically significant. **Results.** Scientific literature review indicate that highly stressful and exhausting working conditions on ships can lead to depression, insomnia, various types of cancer, cardiovascular, communicable, blood-borne and sexually transmitted diseases. Poor sleep was found in 45.0 % of the students. Mild depression was established in 6.9 %, moderate in 2.3 %, Severe in 0.8 % of the students. Mild anxiety was found in 19.1 %, moderate in 14.8 % and Severe in 7.9 % of the students. Depression (score ≥ 8) was significantly more frequent among third (fourth) year students (22.2 %) with poor sleep, as compared to the students demonstrating good sleep (2.7 %). Marine engineering programme students whose sleep was poor more often had depression (22.0 %), as compared to the students whose sleep was good (5.7 %). **Conclusions.** Seafarers have higher hospitalization and mortality rates than age-matched peers, due to exposure to unique occupational health risk factors. Maritime students had poor sleep more than anxiety or depression. Anxiety and depression were more common among the students demonstrating poor sleep rather than good sleep. **Key words:** Maritime students, Sleep quality, Anxiety, Depression, Occupational health.

1 INTRODUCTION

Seafaring is one of the most physically demanding professions in one of the most dangerous work environments (IMHA, January 2012). Difficult working conditions at sea, insufficient qualifications of subordinate crew members, exposure to danger,

high requirements for the seafarers, as well as high pace at work and long period without family, extreme psychosocial problems, all those factors lead to assumption that seafarer's occupation was highly stressful and exhausting (Allen, et al., 2010; Oldenburg, et al., 2010). Merchant shipping was known to be an occupation with a high rate of fatal

accidents caused by maritime disasters and occupational accidents (Hansen et al., 2002). Major causes of mortality in shipping disasters were vessels foundering in typhoons, storms and heavy gales, explosions in cargo holds and collisions due to poor visibility. Rough weather, insufficient awareness of safety, lack of use of personal protective devices as well as inexperience were regarded as the main causes of fatal injuries related to work (Oldenburg, et al., 2010).

Morbidity of maritime employees in the period of globalization was an important issue for occupational health care and the shipping industry (Tomaszunas, 2002). Scientific research results indicated merchant seafaring previously a high-risk occupation for suicides at work, there had been a sharp fall in the suicide rate in the past 40 years, likely reasons for this included reduction over time in long intercontinental voyages and changes of seafarers' lifestyles (Roberts et al., 2010). Risk factors of suicide still remained easy access to a mean of suicide (drowning), long-term separation from family, heavy alcohol consumption and psychoses (Roberts, Marlow, 2005). On the other hand working in the isolated environment could have „salutogenic“ effect because seafarers were isolated from stress and strains of daily life (Sandal et al., 2006). There was an evidence to suggest that seafarers were well trained and prepared for this challenge. Polish seafarers had demonstrated the highest rates in social relationships, environment and psychological functioning quality of life domains, as well as proper openness to new experiences, higher than average conscientiousness and agreeableness (Jeżewska et al., 2013). Maritime students were more vulnerable to stress at work, as compared with merchant marine officers, working minimum 15 years at sea. Stress at sea, experienced by students, was related with social relations, physical onerousness, the lack of control and the lack of support (Jeżewska et al., 2006).

International maritime health research field had largely developed within the spheres of occupational health services and international health problems. In the period of 2000 to 2010 six thematic categories in the scientific literature were identified: health care access, delivery and integration; tele health; non-communicable diseases and physical health problems; communicable diseases; psychological functioning and health; safety-related issues (MacLachlan et al., 2012).

Seafarers experienced occupational risk factors on board, such as time pressure and long working hours, which could be specified as cardiac risk factors (Oldenburg, et al., 2010). Taking into consideration the healthy worker effect, cardiac risk factors occurred slightly more frequently in seafarers than in the general population (Oldenburg, et al., 2010). Seafarers were at high risk of death in case of myocardial infarction on board. The impact of the work environment and work-related factors reduced significantly the chance of survival at sea in the case of sudden cardiac attack (Jaremin, Kotulak, 2003). Occupational factors, such as high work stress, job demand, and lack of support and physical hazards were related with severe and long term fatigue (Wadsworth et al., 2008). Seafarers with temporary/apprentice employment, as compared

with permanent, reported significantly more physical fatigue, mental fatigue and lack of energy. Compared to day shift, those working on the night shift reported significantly more mental fatigue and lack of energy. Negative organizational safety climate was associated with physical, mental fatigue and lack of energy (Hystad et al., 2013).

Fatigue symptoms were associated with a range of occupational and environmental factors, unique to seafaring. Reporting a greater number of risk factors was associated with greater fatigue: OR=2.53 for those with 3-4 risk factors and OR=9.54 for those with ≥ 5 risk factors (Wadsworth et al., 2008). Strong link between fatigue and poorer cognitive and health outcomes was assessed. Seafarers' fatigue could be related with long term ill-health (Wadsworth et al., 2008).

Long working hours (9-12), increased eyestrain. Vibration and noise were related with the occurrence of psychoemotional strain. 87% of the seafarers' experienced fatigue-related lack of energy, 42% made slight mistakes, 29% showed poor judgement. Psychoemotional strain was related to waist and spinal pain, insomnia and depression. 70% of seafarers had poor sleep at sea. Difficulties falling asleep were reported by 24%, wakefulness 44.6%, waking up due to fatigue 6.2%, light sleep 43.4% (Sąlyga, Kušleikaitė, 2011).

Maritime workers on 6-hour shifts reported significantly more sleep problems, as compared with 12-hour shift workers. The 6-hour shift workers were more affected by noise and shift work itself (Hansen, Holmen, 2011).

High stress level on board lead to frequent smoking. Decreased manual workload, a high cholesterol diet increased prevalence of obesity, so the main risk factors of cardiovascular disorders were common in maritime environment (Hansen et al., 1994; Kirkutis et al., 2004). Danish seafarers, especially males, faced an increased overall cancer risk, in particular risk for lung cancer and other tobacco associated cancers (Kaerlev et al., 2005).

Seafarers from the Nordic countries had been reported to have excess cancer morbidity compared with the population on shore. The excess was attributable to lung cancer and alcohol-related cancers. The relative risk of pleural cancer was high in all Nordic countries (Andersen et al., 1999).

Highly physically demanding work in the heat of engine rooms or galleys, exposure to radiant heat from generators and ovens (Bridger, Bennett, 2011).

Exposures to different type of hydrocarbons, carrying oil products and chemicals, exposure to carcinogenic substances, asbestos exposure (Hansen et al., 2005; Roberts and Hansen, 2002) were proved as lung cancer risk factors, polycyclic aromatic hydrocarbons and nitroarenes – possible risk factors. For the mesothelioma cases, former asbestos exposure was considered a causal factor (Forsell et al., 2007; Saarni et al., 2002). Long-term chemical exposures on tankers increased rates of specific types of cancers (Saarni et al., 2002). On average, 55.5% of seafarers were exposed to chemicals, 60% were always using personal protection equipment (Jensen et al., 2005). Chemicals used for different cleaning

tasks on board were the most frequent cause of injury (Hansen, Pedersen, 2001). Occupational exposure to benzene might have contributed to the increased risk of chronic myeloid leukemia (age-standardized cumulative cancer incidence ratios (SIR) 3.15) (Jianguang, Hemminki, 2005). Occupational exposures of deck crews on tankers added to their risk of renal cancer, leukemia and possibly lymphoma (Saarni et al., 2002). Exposure to UV-light from the sun was associated with significantly increased risk of lip cancer (SIR 2.74) and skin cancer among seafarers, working near the equator (the risk is 2-4 times higher, as compared with working in Northern Europe) (Jianguang, Hemminki, 2005).

Noise levels varied considerably (approximately 102-110 dB in the engine room and 75 dB in control rooms) in various areas of vessels and were the highest in the engine rooms. Engine room personnel experienced significantly higher risk of hearing impairment (RR=2.39), as compared with other seafarers (Kaerlev et al., 2008). Deck crew (non-officer) seamen had high standardized incidence ratios for injuries and carpal tunnel ship caused musculoskeletal strain, noise and vibration influenced health (Hansen et al., 2005). Ship motion increased task demands and time to complete tasks and caused loss of balance, sea sickness, sleep disturbances, slips, trips, falls and general tiredness. Seafarers used ladders and hatches daily, sometimes in extremes of temperature (Kaerlev et al., 2008). Life at sea imposed additional physical demands (Bridger, Bennett, 2011).

Seafarers were exposed to a variety of occupational hazards making exposure to biologic agents and the concomitant risk of communicable diseases extremely important within this working group. Seafarers were at risk of contracting infectious diseases at ports of call in different countries (Crossland et al., 2007). Many seafarers were, as a part of the job, international travelers, and were known to have a risk of hepatitis A and B, HIV infection, tuberculosis, chickenpox, measles (Hansen et al., 2005; Rachiotis et al., 2010; Buff et al., 2008). There was an evidence to suggest that international shipping was associated with an increased risk of spreading communicable diseases. According to WHO, most of detected gastrointestinal disease outbreaks, influenza, legionellosis, varicella and rubella were associated with travelling by cruise ships (Mitruka et al., 2012).

Crew members with different susceptibility to infection shared living quarters, common food and water supplies, as well as sanitation and air-conditioning systems, so the working conditions lead to spread of communicable diseases, such as Norovirus (influenza A and B), influenza A H1N1 (WHO, 2013). Malaria, Dengue Fever and Chikungunya Fever occurred among seafarers in the regions at risk of these diseases (Brotherton et al., 2003). Blood-borne and sexually transmitted diseases (hepatitis B, C, HIV) were related with unsafe sex or tattooing (Nikolic et al., 2000).

From 1999 to 2008, 33 imported malaria cases were recorded in Klaipeda, from 1 to 8 cases per year. Among them, there were 28 infections of seafarers, who were probably infected on West Africa, Nigeria,

Cameroon or Angola. Malaria was a work-related health risk among seafarers (Oldenburg et al., 2010).

Relationships among work characteristics, fatigue and ill-health were not clear: fatigue was a common symptom of illness and could result in more negative interpretation and/or coping with work characteristics; or negative work characteristics could lead to fatigue which could result in poor health and well-being (Wadsworth et al., 2008).

Self-rated health decreased by age. The adjusted odds ratio for females compared to males with good health was 2.65 (Scerbaviciene, Pilipavicius, 2009). The seafarers were expected to be at least as healthy as or healthier than the general population due to the minimum health conditions required passing the regular health examination. 93% of the seafarers with very good or good health was on the same level or higher than the general population in four countries: Estonia, Finland, Lithuania and Latvia (Scerbaviciene, Pilipavicius, 2009).

Research show that maritime students already meet some occupational health risks. More than 60% of the USA students studying in the different areas were categorized as poor sleepers, were using medications and reported more physical and psychological health problems as compared to good sleepers (Lund et al., 2010). More than one third (31%) of the medical students at the University of Tartu, evaluated the sleep quality as satisfactory, poor or very poor (Veldi et al., 2005). The prevalence of insomnia among nursing students in Italy increased significantly from 10.3% (<20 years) to 45.5% among older students, and was predicted by the severe depression, headache and poor quality of life (Angelone et al., 2011). The social activities were less frequent and not regular among the college students aged 18-39 years demonstrating poor sleep, as compared to the students having good sleep (Carney et al., 2006).

Poor sleep among the first year students could be related with changed living environment, especially noise and light in residential halls (Sexton-Radek, Hartley, 2013). However alcohol consumption was the significant predictor of worsened sleep quality and poorer academic performance in the randomly selected sample of 236 students (124 women) of an arts college (Van Dongen et al., 2003).

College students are vulnerable to a variety of sleep disorders, which can lead to sleep deprivation and impaired individual cognitive performance (Van Dongen et al., 2003). However the scientific literature critically reviewed the efficacy of relevant behavioral sleep medicine interventions and discussed special considerations for using them with college students who have unique sleep patterns and lifestyles (Kloss et al., 2011).

Insufficient sleep and irregular sleep-wake patterns resulting chronic sleep debt and negative consequences are present at alarming levels among students. The research in the area of students' sleep quality and mood disorders is lacking in Lithuania, as well as other European countries, especially among marine students.

The aim of the survey was to evaluate sleep quality and the state of mental health of maritime

students in the institution of higher education in Lithuania and establish relations between sleep quality and mental health with regard to studying year and study programme.

2 MATERIAL AND METHODS

2.1 Study sample

The survey was conducted in March and April, 2014. The study sample consisted of 393 Lithuanian Maritime Academy students (78.9% males), from 18 to 34 years of age. The first (34.9%), the second (28.0%), the third and fourth (37.1%) year students were involved in the study (Table 1). Mean age of the students was 20.71 (SD=1.971). They were grouped according to the study programmes: Marine Navigation students' group (28.5%), Marine Engineering (37.4%) and the group of students, studying Port and Shipping Management or Finances of Port and Shipping Companies or Maritime Transport Logistics Technologies (34.1%). The grouping was performed in order to ensure the even distribution of the respondents as much as possible. The grouping was also performed according to the age: 18-19 years (22.7%), 20 (26.7%), 21 (25.2%) and ≥ 22 years (24.4%). Frequency of the subjectively perceived sleep quality and anxiety was compared in age groups, studying year groups and study programme groups.

The study was approved by Bioethics Committee of Klaipeda University.

2.2 Questionnaires

Pittsburgh Sleep Quality Index (PSQI) (Buysse et al., 1989) was used for subjective sleep quality evaluation. PSQI is a self-rated questionnaire which assesses sleep quality over one-month time interval. 19 individual items generate seven "component" scores: subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleeping medication, and daytime dysfunction. The sum of scores for these seven components yielded one global score. Total PSQI score < 5 was evaluated as good sleep quality; > 5 – poor sleep.

Hospital Anxiety and Depression (HAD) scale (Zigmond, Snaith, 1983), a self-assessment scale was used to identify states of depression, anxiety and emotional distress among the students of Lithuanian Maritime Academy. The HAD scale has in total 14 items, with responses being scored on a scale of 0-3, with 3 indicating higher symptom frequencies. Score for each subscale (anxiety and depression) ranged from 0-21 with scores categorized as follows: normal (0-7), mild (8-10), moderate (11-14), severe (15-21). Scores for the entire scale (emotional distress) ranged from 0-42, with higher scores indicating more distress. Prior to completing the scale respondents

were asked to "fill it complete in order to reflect how they have been feeling during the past week" (Zigmond, Snaith, 1983).

Additional sociodemographic questions about respondents' age, gender, study programme and year of studying were included in the questionnaire.

2.3 Statistical Analysis

The Chi-square test or Fisher exact test was used to estimate the association between categorical variables. P-values less than 0.05 were interpreted as statistically significant.

3 RESULTS

3.1 Subjective sleep quality and psycho-emotional status of the students

Almost a half (45.0%) of the investigated students had poor sleep, according to PSQI. The third (fourth) year students more often had poor sleep (40.7%), as compared to the second-year students (23.7%), $p < 0.001$ (Table 1).

The students of Marine Engineering programme had a significantly lower mean score (0.52) in the subscale of sleep efficiency, as compared to the students of Marine Navigation programme (0.85) and other programmes (0.82), $p < 0.05$ (Table 2).

Global PSQI score was significantly higher among the students of Marine Navigation programme (6.8) as compared to Marine Engineering (5.09), $p < 0.05$ (Table 3).

Mild depression was established for 6.9%, moderate – 2.3%, severe – 0.8% of the students. Mild anxiety was established for 19.1%, moderate – 14.8%, severe – 7.9% of the students.

Depression score, established by HADS, was higher (4.43) among respondents older than 22 years, as compared to the respondents aged 18-19 years (3.46), $p < 0.05$. Anxiety score was significantly higher among students older than 22 years (8.36), as compared to 18-19 years old respondents (6.42), $p < 0.05$ (Table 3). Anxiety score was higher among persons studying third or fourth year (8.5), as compared to the first year students (6.72), $p < 0.05$ (Table 4).

Depression (score ≥ 8) was more prevalent among the students with poor sleep studying Marine Engineering (22.0%), as compared to sleeping well students (5.7%) studying the same programme (Table 5).

Table 1. Sleep quality according to the PSQI, according to the age, year of studying and study programme

Variables	PSQI diagnosis				P
	Normal sleep (n=216) n (%) 95 % CI		Poor sleep (n=177) n (%) 95 % CI		
Age groups					
18-19	50 (23.2)	17.5 – 28.2	39 (22.0)	15.9 – 28.8	0.7930
20	59 (27.3)	21.3 – 33.3	46 (26.0)	19.5 – 32.5	0.7677
21	54 (25.0)	19.2 – 30.8	45 (25.4)	19.0 – 31.9	0.9234
≥22	53 (24.5)	18.8 – 30.3	47 (26.6)	20.0 – 33.1	0.6482
Year of studying					
First	74 (34.3)	27.9 – 40.6	63 (35.6)	28.5 – 42.7	0.7826
Second	68 (31.4)	25.3 – 37.7	42 (23.7)	17.4 – 30.0	0.0893
Third/Fourth	74 (34.3)	27.9 – 40.6	72 (40.7)**	33.4 – 48.0	0.1909
**p<0.001, as compared to the second year					
Study programmes					
Marine Navigation	50 (23.2)	17.5 – 28.8	62 (35.0)	28.0 – 42.1	0.0098
Marine Engineering	88 (40.7)**	34.2 – 47.3	59 (33.4)	26.3 – 40.3	0.1319
Other ¹	78 (36.1)*	30.0 – 42.6	56 (31.6)	24.7 – 38.5	0.3526

*p<0.05, **p<0.001, as compared to *Marine Navigation*

¹– Programmes of Port and Shipping Management, Finances of Port and Shipping Companies, Maritime Transport Logistics Technologies

Table 2. Means of the PSQI subscales, according to the study programmes.

PSQI subscales	Study programmes			P
	Marine Navigation (n=112) Mean (SD)	Marine Engineering (n=147) Mean (SD)	Other ¹ (n=134) Mean (SD)	
Sleep quality	1.09 (0.72)	0.92 (0.63)	0.93 (0.72)	0.290
Sleep latency	1.46 (0.89)	1.23 (0.92)	1.25 (0.87)	0.225
Sleep duration	0.39 (0.73)	0.27 (0.59)	0.34 (0.67)	0.819
Sleep efficiency	0.85 (1.15)	0.52 (0.89)	0.82 (1.14)	0.018
Sleep disturbance	1.24 (0.56)	1.21 (0.55)	1.32 (0.61)	0.081
Use of sleeping medication	0.1 (0.49)	0.12 (0.45)	0.22 (0.68)	0.328
Daytime dysfunction	0.99 (0.81)	0.82 (0.90)	0.87 (0.79)	0.092

¹– Programmes of Port and Shipping Management, Finances of Port and Shipping Companies, Maritime Transport Logistics Technologies

Table 3. Global PSQI, depression and anxiety scores, according to the age, year of studying and study programme.

Variables	Global PSQI score	Depression score	Anxiety score
	Mean (SD)	Mean (SD)	Mean (SD)
Age groups			
18-19	5.24 (2.28)	3.46 (2.28)	6.42 (3.92)
20	5.57 (2.62)	3.75 (2.68)	7.02 (4.13)
21	5.87 (2.82)	4.06 (2.67)	7.93 (4.69)*
≥22	5.65 (2.89)	4.43 (3.07)*	8.36 (5.19)*
Year of studying			
First	5.55 (2.72)	3.84 (2.81)	6.72(4.682)
Second	5.22 (2.44)	3.67 (2.31)	6.97 (3.62)
Third/Fourth	5.91 (2.77)	4.23 (2.89)	8.5 (4.91)*
Study programme			
<i>Marine Navigation</i>	6.8 (2.54)	4.26 (2.8)	7.54 (4.33)
Marine Engineering	5.09 (2.51)*	3.91 (2.83)	7.16 (4.85)
Other ¹	5.73 (2.86)	3.69 (2.5)	7.7 (4.44)

*p<0.05, as compared to the reference group (*italic*)

¹– Programmes of Port and Shipping Management, Finances of Port and Shipping Companies, Maritime Transport Logistics Technologies

D – Depression

A – Anxiety

¹– Programmes of Port and Shipping Management, Finances of Port and Shipping Companies, Maritime Transport Logistics Technologies

Table 4. Relationship among sleep quality, depression and anxiety according to the year of studying.

HADS	First year (n=137)		Second year (n=110)		Third and fourth year (n=146)	
	Good n=74	Poor n=63	Good n=68	Poor n=42	Good n=74	Poor n=72
	D score ≥8	5 6.8%	8 12.7%	5 7.4%	4 9.5%	2 2.7%
A score ≥8	16 21.6%	32 50.8%**	20 29.4%	22 52.3%*	22 29.7%	52 72.2%**

*p < 0.05, as compared to good sleep

**p < 0.001, as compared to good sleep

D – Depression

A – Anxiety

Table 5. Relationship among sleep quality, depression and anxiety according to the study programme.

HADS	Marine Navigation (n=112)		Marine Engineering (n=147)		Other ¹ (n=147)	
	Good n=50	Poor n=62	Good n=88	Poor n=59	Good n=78	Poor n=56
D score ≥8	5 10.0%	9 14.5%	5 5.7%	13 22.0%*	2 2.6%	6 10.7%
A score ≥8	4 8.0%	35 56.5%*	22 25.0%	34 57.6%**	22 28.2%	37 66.1%**

*p < 0.05, as compared to good sleep

**p < 0.001, as compared to good sleep

First year, second and third (fourth) year students who had poor sleep, demonstrated anxiety (score ≥ 8) more often, as compared to the students who had good sleep, respectively 50.8% vs 21.6%, 52.3% vs 29.4%, 72.2% vs 29.7% (Table 4). Anxiety (score ≥ 8) was more prevalent among Marine Navigation students having poor sleep (56.5%) as compared to the students whose sleep was good (28.0%) (Table 5). Students of the Marine Engineering programme who had poor sleep, demonstrated anxiety more often (57.6%) as compared to sleeping well students of the same study programme (25.0%). Persons studying Port and Shipping Management or Finances of Port and Shipping Companies or Maritime Transport Logistics Technologies who had poor sleep, reported anxiety (66.1%) more often, as compared to the students of the same programme who had good sleep (28.2%), $p < 0.001$ (Table 5).

4 DISCUSSION

The study results demonstrate that poor sleep and anxiety are common among maritime students, especially among the third (fourth) year students, who experience increased work load during the last year of the studies and fully realize the specificity of their future work, stressors at the workplace and possible outcomes. The results of our study are in line with other surveys, which demonstrated that students regarded their future profession as highly burdening and stressing already during the study process and at the beginning of the career. They realized that being a seaman required to collaborate with others, perform complex mental tasks and support co-workers. They also felt that their future job would involve elements of competition and problems related to interpersonal conflicts, and expected that their work would have to be performed under hard psychophysical conditions (Jezewska et al., 2006). Working on board was confirmed as a stressful workplace when the group of 1,578 Polish seafarers was examined and the level of experienced stress among seafarers was stated as an average (Jezewska et al., 2012). On the other hand our findings do not support the results of other studies, because in this study there are no significant sleep quality and anxiety prevalence differences between the first and second-year students. This difference could be due to the differences of the samples and other methodological issues.

Psychological problems which affected people working at sea were pointed out during the 12th International Symposium on Maritime Health held in France, June 6, 2013. The following psychological disorders were listed: suicides (auto-aggression), post-traumatic stress disorder, psychosis and depression, neurosis, personality disorders, addictions and behavioural disorders (Jezewska et al., 2013).

The study results indicate close relations among sleep quality, anxiety and depression, especially among third (fourth) year students and studying in the programmes, where practices were held on ships. Our findings are in line with the study, carried out in the UK and Germany, during which the seafarers

demonstrated poorer psychosocial health, as compared to general population of Germany (Hinz et al., 2010). As for physical health, seafarers reported better health, as compared to the general population of Germany. This can be related with the "healthy worker effect", which is related with the requirement for seafarers to have medical check-ups before joining a ship, as a consequence ill persons may not be allowed to work on-board.

The results of our study demonstrate the necessity to monitor the level of stress experienced while working at sea and teach seafarers how to cope with stressful situations in order to avoid psychological consequences.

5 CONCLUSIONS

- 1 Seafaring is related to physical, emotional, chemical and biological factors, which are modifiable, if the primary and secondary preventive measures for the control of work-related hazards are used.
- 2 Poor sleep was more (45%) prevalent among maritime students than depression of any severity (10%) or anxiety (41.8%).
- 3 Sleep efficiency was significantly lower among students of Marine Engineering programme, as compared with other study programmes
- 4 The third and fourth-year students more often had poor sleep and had higher depression and anxiety scores as compared to the second or first-year students
- 5 Anxiety was more prevalent among the students who had poor sleep, as compared to the students reporting good sleep, independently of studying year or study programme
- 6 Prevalence of depression was significantly higher among the third and fourth-year students or studying Marine Engineering who had poor sleep, as compared to those having good sleep.

ACKNOWLEDGEMENTS

We thank Inga Bartuseviciene, Deputy Director for Academic Affairs at Lithuanian Maritime Academy for help in organizing the questioning of students.

Presented research was carried out in Klaipeda University and funded by a European Social Fund Agency grant for national project "Lithuanian Maritime Sectors' Technologies and Environmental Research Development" (Nb.VP1-3.1-ŠMM-08-K-01-019).

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