A risky occupation? (Un)healthy lifestyle behaviors among Danish seafarers

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SUMMARY
Sedentary working conditions, smoking, unhealthy eating habits and lack of exercise are some of the lifestyle risk factors that form a potentially growing problem for seafarers within certain parts of the maritime sector creating a heightened risk for chronic diseases such as diabetes and cardiovascular disease. Health promotion initiatives to combat this negative development requires as a first step identifying the magnitude of the different risk factors. A survey was conducted in 2007–08 with two Danish shipping companies on seafarers' health, wellbeing, diet, smoking and physical activity. In addition, a health profile was offered to the respondents, consisting of physiological measurements, such as fitness rating, body mass index (BMI), cholesterol measurement and blood pressure. The response rate in the questionnaire study was 57% (n = 360) of which 76% (n = 272) of the respondents received a health profile. Results (males) showed 44% daily smokers compared with 32% in the general Danish adult male population. Twenty-five percent of the seafarers were obese with a BMI > 30 compared with 12% of the Danish adult male population. Fifty-one percent of the respondents were defined as having metabolic syndrome, compared with 20% of the Danish adult male population. Seafaring is a risky occupation when looking at the seafarers’ health and wellbeing. The results of this survey confirm the need for health promotion interventions such as smoking cessation courses, healthy cooking courses and physical exercise programs, etc. that can enable healthier lifestyle. The challenge will be to take into account the special seafaring conditions when implementing the interventions.

Key words: health behavior; worksite; risk factors; lifestyle

INTRODUCTION
Traditionally, the public has tended to perceive of seafaring as a risky business—a view mainly based on the occurrence of shipping accidents and on newly emerging threats such as piracy. In fact, however, particularly in Western industrialized countries mortality rates from shipping disasters and personal accidents have fallen drastically over the last eight decades, even though there still is a substantial disparity between, accident incidence and mortality in maritime as compared with land-based work places (Roberts, 2002; Oldenburg et al., 2010a).

A less straightforward question is whether seafarers are also at heightened risk for chronic, lifestyle-related diseases, such as cancer and coronary heart disease. Evidence in this area is scarce. A recent study based on registry data from several Northern European countries found seafaring among the occupations with the highest standardized incidence rates for all cancers combined (Pukkala et al., 2009), which might be due to various factors, among them exposure to chemicals as well as sunlight but also lifestyle behaviors, such as smoking, alcohol consumption and diet (Pukkala et al., 2009; Oldenburg et al., 2010a). The few existing studies
on cardiovascular disease (CVD)-incidence and mortality in seafarers, however, have reported no major differences compared with males in land-based occupations beyond mortality effects due to less efficient emergency treatment for myocardial infarction (Nyström et al., 1990; Brandt et al., 1994; Jaremin and Kotulak, 2003). A recent study based on registry data from the UK, however, suggested that a closer look might be warranted. While the data revealed a lower rate of CVD for those on board, seafarers ashore actually had higher rates than the general population (Roberts and Jaremin, 2010), a difference which the authors attributed to a healthy worker-effect as the mandatory two-yearly health check for seafarers is likely to contribute to a de-selection of diseased employees from the active workforce. Similar CVD rates in the general population workforce and in seafarers do therefore not necessarily imply that seafarers are not at higher risk.

Recent studies from Poland, France, Norway and Germany have indeed reported that cardiovascular risk factors such as high blood pressure, high triglycerides, diabetes and obesity as well as behavioral risk factors such as smoking and physical inactivity are highly prevalent in seafarers (Filikowski et al., 2003; Geving et al., 2007; Oldenburg et al., 2008; Fort et al., 2009; Oldenburg et al., 2010b). Further evidence is thus needed in this area, in particular studies which take into account mitigating factors. While different occupations within seafaring might share many features which in general set them apart from occupations on land, there are also many crucial differences within the seafaring business. Thus, work places on board differ depending on the general type of vessels, such as cargo and container ships, tankers, coasters, passenger ships, etc. and the work demands they involve, but also the more specific physical and social environments in terms of availability of leisure time facilities including exercise space and equipment, food provisions or smoking regulations. These specific settings are likely to provide dissimilar opportunities or discouragements for healthy or unhealthy lifestyles and thus might create important variance in health risks within the seafaring occupation. Another important differentiating factor might be related to the educational and occupational status of the employees themselves.

CVDs and the risk factors related to them have been found to vary along a social gradient in general populations (Lantz et al., 2010) and thus might also be expected to differ among occupational groups of seafarers such as officers and crew ranks. Evidence in this area is scarce yet, however, a recent study on UK seafarers found higher CVD mortality among the crew than among officers (Roberts and Jaremin, 2010). The work place, especially in the maritime setting, is a valuable arena for studying the need for and ways to enable health promotion initiatives, considering the time spent on duty (as well as off duty).

Following are the aims of the current study:

(i) to identify lifestyle risk factors (defined as smoking, physical activity and eating habits) as well as lifestyle-related risk factors (obesity, waist circumference, physical fitness and metabolic syndrome) among Danish seafarers,

(ii) to investigate differences in these health-related lifestyles and risk factors due to (a) employees’ occupational rank (officers versus non-officers) and due to (b) different types of work settings (seafaring employees of a cargo-shipping company versus seafaring employees of a supply and rescue company).

MATERIALS

The study was initiated by the management of two Danish shipping companies who intended to initiate measures to promote health and wellbeing of their seagoing employees and wanted this health promotion effort accompanied by an evaluation. The study is based on a cross-sectional survey design. Data were collected with the help of a self-administered standardized questionnaire, which was posted end of 2007 to the home address of seafaring employees of two Danish shipping companies. In both companies, the vast majority of seafarers were nationals of Denmark, Greenland and the Faroe Islands. Anthropometric and physiological data were obtained in the course of health profiling conducted among the same groups. All participants gave informed prior consent. The baseline physiological data collection was carried out between October 2007 and December 2008.

STUDY SAMPLE

One of the participating shipping lines was a cargo service company which operated mainly
in the North Atlantic between Aalborg in Denmark and Greenland’s Disco Bay and had \( \approx 190 \) seafaring employees. The offshore period was between four and eight weeks, followed by four and eight weeks at home. The average crew size was between 12 and 15 people. The work focused mainly on cargo management during the port visits and maintenance of the ship. The second company was an offshore rescue and support vessel operator which mainly operated in and around the North Sea, where they circulated offshore installations, keeping watch for accidents, such as oil spill or ‘man overboard’ incidents. The company had \( \approx 440 \) employees. The offshore period was between two and four weeks, followed by two and four weeks off. The crew size varied between 6 and 12 people. Aside from the maintenance of the ship, the crew’s main task was to practice and retain their rescue skills, including a short response time in case of emergency, which means they performed regular rescue and security drills.

The return rate for the postal questionnaire was 57%, while 43% participated in the health profile. Detailed information on participation rates as well as on socio-demographic characteristics has been provided in Table 1. The extremely high percentage of male participants is due to the fact that seafaring has traditionally been and still is a male-dominated occupation with only few women seafarers who are mainly occupied in the galley and catering departments onboard the ships. This was also the case in the present study, where the very small number of female employees was employed as stewardesses. The overall mean age of the male seafarers was 42.52 (SD 10.57); 41.53 (SD 11.10) for the cargo company and 42.89 (SD 10.36) for the support and rescue company.

**MEASUREMENT**

**Standardized questionnaire**

The questionnaire covered seafarers’ self-perceived health, wellbeing and health-related behaviors. It consisted of 1 open and 68 closed questions with standard rating scales. Smoking status was assessed by asking: ‘How many cigarettes do you smoke a day—on average?’ with the following reply options: ‘none’, ‘1–5 cigarettes’, ‘6–10 cigarettes’, ‘11–15 cigarettes’ or ‘>15 cigarettes’. Assessment of physical activity at work and during leisure time was based on four questions: ‘What type of work do you have/How physically active are you in your work?’ Possible responses were: ‘Mostly sedentary work’, ‘Mostly work that I perform standing or walking’, ‘Mostly standing or walking with some lifting or carrying’ and ‘Mostly heavy or fast work which is tiring’. The second question was: ‘How much do you exercise during your home period (e.g. walking and cycling during leisure time and to and from work, cleaning, physically strenuous gardening and physically active play with your children)?’ The reply options were: ‘Less than 30 min daily’, ‘30–60 min daily’ and ‘More than 60 min daily’. The third question was asked for both, time spent at sea and at home: ‘How often do you exercise, so it increases your fitness and/or strengthens muscles?’ Response options were: ‘3 times a week or more’, ‘1–2 times a week’, ‘Less than once a week’ and ‘Never’. In relation to eating habits at sea and at home, one question was asked for frequency of overeating (‘Do you eat more than you need?’) and one for intake of sugared products: (‘Do you eat cake, sweets/drink sugared sodas?’). Possible responses were: ‘5–7 days a week’, ‘3–4 days a week’, ‘1–2 days a week’ and ‘less’.

**Individual health profiles: anthropometric and physiological measurements**

Anthropometric and physiological measurements were taken by a registered nurse and a physiotherapist during the course of individual sessions on board as well as on land. Measurements included a fitness rating, body mass index (BMI), waist circumference, blood pressure, cholesterol (HDL, LDL, total),
triglycerides and blood sugar level. Fitness was assessed from the sub-maximal exercise test using a cycle ergometer and pulse meter to estimate maximal oxygen uptake (VO2max) based on two consecutive workload intervals, divided by body weight in kilogram. Fitness scores were divided into three groups: low, medium and high stratified for age and gender. A BMI-score of 30 and above was used as an index of general obesity (World Health Organization, 1998). Waist circumference was measured between the lowest rib and the top of the person’s hipbone. WHO-recommended circumference of 94 cm for males was chosen as a cutoff to distinguish normal from enlarged sizes (World Health Organization, 2011). Blood pressure was measured in millimeters of mercury (mmHg) with an inflatable cuff on the upper arm ('Omron M7' over-arm devices). All measurements indicating high blood pressure were repeated in the last part of the session to reduce effects of nervousness (white coat hypertension). In cases where the individual claimed the blood pressure to be abnormally high a digital upper arm blood pressure monitor was offered for home testing. Cholesterol and blood sugar were measured using ‘Cholestech LDX’ equipment which is a lipid analyzer providing results after just 5 min. The presence of metabolic syndrome was defined in accordance with the guidelines of the International Diabetes Federation (IDF): Central obesity of ≥94 cm for males is required plus at least two of four other risk factors: Raised triglycerides (≥1.7 mmol/l for males), reduced HDL cholesterol (<1.03 mmol/l for males), raised blood pressure (systolic BP ≥ 130 or diastolic BP ≥ 85 mmHg) and raised fasting plasma glucose (≥5.6 mmol/l) (Alberti et al., 2005). Lipid analyses in this study were not consistently based on fastening blood samples as several seafarers signed up spontaneously, however, all known subjects in this subgroup who were registered as having eaten just before their blood test or were in treatment for lipid abnormalities or high blood pressure were excluded from the subgroup sample (n = 14).

Data analyses
To describe health behaviors and health status indicators, means and standard deviations as well as percentages were used. Comparisons of behaviors at home versus at sea (physical activity and eating) were made with the help of Wilcoxon rank tests. Associations between occupational status and occupational setting with the various health criteria were tested with logistic regression analyses entering both covariates (place of occupation and rank) into the equation simultaneously and adjusting for age. Results are presented as odds ratios (ORs) and 95% confidence intervals (CIs). A level of p < 0.05 was regarded as statistically significant. As the gender distribution was extremely asymmetric, i.e. there were only 17 female employees, all analyses were run for male participants only. All statistical analyses were performed using IBM SPSS version 19.

RESULTS

Smoking
Forty-four percent of the seafarers stated that they were daily smokers. Within this group of daily smokers, 6% were light smokers (1–5 cigarettes), another 8 and 15% each smoked between 6–10 and 11–15 cigarettes a day, while the large majority, i.e. 71%, smoked >15 cigarettes per day, and thus could be considered heavy smokers. The share of daily smokers did not differ between the two companies (45 versus 42%), however, the share of heavy smokers was considerably higher in the supply and rescue company where 78% of the smokers reported to smoke >15 cigarettes daily compared with 53% in the cargo-shipping company. Looking at occupational status, the results showed that non-officers were significantly more likely than officers to be daily smokers (see Table 2).

Physical activity
About one-third of the respondents reported having a largely sedentary occupation, another third that they had a job mostly requiring standing and/or walking, while the last third described their job as involving standing, walking and some lifting or weight bearing. Only a very small minority of ~1% said their job required very hard physical efforts. As for leisure time exercise, 32% claimed to do fitness training three times a week or more at sea versus only 24% at home, however, this difference was not significant (Z = −1.447; p = 0.148). In both settings at home and at sea, nearly one half (49%) exercised less than once a week or never. In the multivariable analysis, frequency of exercise at sea differed between employees in the two shipping
companies, revealing a considerably higher chance for regular activity (thrice a week or more) within the rescue and supply company. Officers were no more likely to be physically active than non-officers (see Table 2). Physical fitness testing revealed that one-third had low physical fitness while 37% fell in the middle range and only 30% were classified as having high physical fitness. Officers and non-officers did not differ in that respect. Neither was there any difference between the two shipping companies.

**Eating behavior**

More seafarers reported a high frequency of overeating ($Z = -2.56; p = 0.01$) as well as consuming sweets, cake and sugared sodas (47 versus 40% for overeating; 52 versus 40% for sweets and sugared sodas) on board compared with the home setting ($Z = -4.65; p = 0.000$). There were no significant differences between professional status groups or work places.

**Weight and metabolic syndrome**

Mean BMI was $M = 27.52$ ($SD = 4.06$). The distribution further showed that only 25% of the seafarers were of normal weight, i.e. had a BMI of under 25, while half (50%) were overweight (BMI between 24.9 and 29.9), and one-fourth were obese (BMI ≥ 30.0). Waist circumference with increased risk of metabolic complications (≥94 cm) was registered for two-thirds of the participants and more than one-third of them (37%) were classified as having a waist circumference ≥102 cm which entails a substantially increased risk of metabolic complications (see Table 3).

As can be seen in Table 3, both indicators of obesity, i.e. a BMI of 30 and above and a waist circumference of 94 and above, were independent of rank. However, a high waist circumference was more common among the employees of the cargo company.

Central obesity (waist circumference ≥94 cm) was found among a majority (66%) of the seafarers and is considered a significant factor for metabolic syndrome when at least two additional risk factors are present, which was the case for almost three-fourths of this subgroup of seafarers, as presented in Table 4. The findings further showed that a majority within this subgroup had raised triglycerides (62%) and almost half (48%) had high blood pressure.

**DISCUSSION**

**Smoking**

There was a high prevalence of daily (44%) and heavy (31%) smokers among the seafarers in this study when compared with the general male adult Danish population where only 32% smoked daily and 19% were heavy daily smokers (Ekholm et al., 2006). Yet, it is also notable that in line with the general decrease in smoking rates in many Western countries during the last 20 years, the subpopulation of seafarers also seems to have reduced smoking. Although the present study is cross-sectional and does not provide time trend data, comparisons with studies from the early 1990s show that the reported rates for daily smokers among seafarers were 23% higher
Table 3: Demographic differences in eating behavior among male seafarers at home and at sea

<table>
<thead>
<tr>
<th></th>
<th>Frequency of overeating 3 days a week or more</th>
<th>Frequency of eating sugared products 3 days a week or more</th>
<th>Obesity</th>
<th>High waist circumference</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>At home (yes = 40%)</td>
<td>At sea (yes = 47%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>n = 325</td>
<td>n = 318</td>
<td></td>
<td></td>
</tr>
<tr>
<td>% OR (CI)</td>
<td>% OR (CI)</td>
<td>% OR (CI)</td>
<td>% OR (CI)</td>
<td>% OR (CI)</td>
</tr>
<tr>
<td>Agea</td>
<td>1.01 (0.98–1.03)</td>
<td>1.00 (0.98–1.02)</td>
<td>0.96 (0.94–0.99)</td>
<td>0.97 (0.95–1.00)</td>
</tr>
<tr>
<td>Shipping company</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Cargo</td>
<td>43 1.00</td>
<td>47 1.00</td>
<td>43 1.00</td>
<td>53 1.00</td>
</tr>
<tr>
<td></td>
<td>0.90 (0.54–1.51)</td>
<td>1.01 (0.61–1.67)</td>
<td>0.86 (0.51–1.45)</td>
<td>0.96 (0.58–1.60)</td>
</tr>
<tr>
<td>Rescue and support</td>
<td>40 0.90 (0.54–1.51)</td>
<td>47 1.00</td>
<td>39 0.86</td>
<td>52 0.96</td>
</tr>
<tr>
<td></td>
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<td></td>
<td>(0.51–1.45)</td>
<td>(0.58–1.60)</td>
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<tr>
<td>Rank</td>
<td></td>
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</tr>
<tr>
<td>Officers</td>
<td>44 1.00</td>
<td>51 1.00</td>
<td>38 1.00</td>
<td>50 1.00</td>
</tr>
<tr>
<td></td>
<td>0.68 (0.43–1.10)</td>
<td>0.67 (0.42–1.07)</td>
<td>1.09 (0.67–1.75)</td>
<td>1.18 (0.74–1.88)</td>
</tr>
<tr>
<td>Non-officers</td>
<td>35 0.68 (0.43–1.10)</td>
<td>41 0.67 (0.42–1.07)</td>
<td>43 1.09</td>
<td>56 1.18</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(0.67–1.75)</td>
<td>(0.74–1.88)</td>
</tr>
</tbody>
</table>

Table 4: Associations of workplace and occupational status with various risk factors for metabolic syndrome in the subgroup of those male seafarers with waist circumference ≥94 cm

<table>
<thead>
<tr>
<th></th>
<th>High blood pressure (SBP &gt;130 and DPB &gt;85 = 48%) n = 136</th>
<th>High triglycerides (&gt;1.7 mmol/l = 62%) n = 141</th>
<th>Low HDL cholesterol (&lt;1.03 mmol/l = 38%) n = 140</th>
<th>High glucose level (&gt;5.6 mmol/l = 71%) n = 134</th>
<th>&gt;2 risk factors (= 73%) n = 125</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>% OR (CI)</td>
<td>% OR (CI)</td>
<td>% OR (CI)</td>
<td>% OR (CI)</td>
<td>% OR (CI)</td>
</tr>
<tr>
<td>Agea</td>
<td>1.05 (1.01–1.09)</td>
<td>0.99 (0.96–1.03)</td>
<td>0.97 (0.93–1.00)</td>
<td>1.03 (0.99–1.08)</td>
<td>1.00 (0.96–1.04)</td>
</tr>
<tr>
<td>Shipping company</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cargo</td>
<td>62 1.00</td>
<td>67 1.00</td>
<td>33 1.00</td>
<td>77 1.00</td>
<td>80 1.00</td>
</tr>
<tr>
<td></td>
<td>0.39 (0.18–0.83)</td>
<td>0.59 (0.28–1.24)</td>
<td>1.32 (0.63–2.79)</td>
<td>0.66 (0.29–1.49)</td>
<td>0.51 (0.21–1.23)</td>
</tr>
<tr>
<td>Rescue and supply</td>
<td>40 0.39 (0.18–0.83)</td>
<td>58 0.59 (0.28–1.24)</td>
<td>41 1.32 (0.63–2.79)</td>
<td>68 0.66 (0.29–1.49)</td>
<td>69 0.38</td>
</tr>
<tr>
<td>Rank</td>
<td></td>
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</tr>
<tr>
<td>Officers</td>
<td>47 1.00</td>
<td>57 1.00</td>
<td>33 1.00</td>
<td>69 1.00</td>
<td>72 1.00</td>
</tr>
<tr>
<td></td>
<td>1.40 (0.66–2.96)</td>
<td>1.90 (0.91–3.98)</td>
<td>1.50 (0.73–3.09)</td>
<td>1.44 (0.64–3.22)</td>
<td>1.47 (0.62–3.51)</td>
</tr>
<tr>
<td>Non-officers</td>
<td>70 1.90 (0.91–3.98)</td>
<td>43 1.50 (0.73–3.09)</td>
<td>75 1.44 (0.64–3.22)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

aCont. variable (ascending).
than in the current study and 12% more were heavy smokers (Hansen et al., 1994). Non-officers were significantly more likely than officers to be daily smokers. This is in line with findings from population studies in Western countries, where the proportion of daily smokers as well as heavy smokers is usually lower among the higher-educated than the less-educated population groups which can mainly be explained in terms of different social/subcultural norms and attitudes which make smoking more or less acceptable, different levels of knowledge about health consequences of smoking as well as differences in experience of stress and in choice of coping strategies (Giskes et al., 2005; Huisman et al., 2005). The differences in intensity of smoking between employees of the two companies, i.e. the higher number of cigarettes smoked daily in the rescue and support company might mainly be explained by a considerably higher amount of ‘unstructured work time’, as main parts of the work time consist of ‘staying alert’ which provides employees with plenty of time to, e.g. smoke.

**Physical activity**

A majority of the respondents held jobs, which were largely sedentary or required only minimal physical activity whereas a job demanding moderate to hard physical efforts was reported only by about one-third of the seafarers. These results are almost identical with those for the general Danish adult male population (Ekholm et al., 2006). Contrary to the traditional image seafaring has become a physically undemanding job for most, which to a large degree is due to factors such as better equipment, particularly automation of many work routines on-board the ships as well as during port dockings. High frequency (more than three times a week) of physical activity during leisure time was reported by only about one-third of respondents for the work setting and only one-fourth for the at home situation, which was largely in line with figures (27%) reported for the general Danish male populations (Ekholm et al., 2006). A closer look, however, also revealed that only 13% of the general male population described their leisure time activity level as being mainly sedentary compared with 21 and 22% of the seafarers who reported never to exercise at sea or at home. This level of exercise is clearly below the Danish National Board of Health recommendation of at least twice weekly high intensity exercise of 20–30 min.

A Norwegian study on seafarers’ physical activity (Geving et al., 2007) found a similar degree of on-board inactivity (20%), but a lower degree of inactivity for the home setting with only 5% being inactive at home. This difference, however, might be explained by a difference in measurement, as the Norwegian study included exercise as well as physical activity around the house in their assessment. In both studies, lack of motivation due to poor weather conditions at sea or lack of time were the main reasons cited for not being physically active at sea.

Although there were no differences between officers and non-officers with regard to physical activity levels, the study revealed a difference between the work places as more seafarers from the rescue and supply company were found to exercise at sea. A major reason for these varying levels of exercise might be that at the time of the survey the supply and rescue company had arranged a competition between their ships, ‘Tour de North Sea’—doing most kilometers on fitness bikes within a certain time period—which is likely to have hiked up exercise rates. Variance in training facilities is not likely to be a reason as the training space and equipment offered in the cargo company (except for one ship) were equivalent to or even larger and better placed than in the supply and rescue company. Nevertheless, the physical environment might have played a role insofar the supply and rescue company was operating mainly on rebuilt fishing boats which provided only limited space to move around. Together with the already mentioned relatively unstructured work time, this sense of confinement might have made the on-board exercise room with treadmill and exercise bike seem more appealing. Another factor might have been a desire of the rescue personnel to maintain the image of being physically fit and strong—a characteristic, which initially, when they had started out on their jobs, had been a professional requirement and selection criterion.

**Eating behavior and weight**

A difference between the sea and home setting was found in the tendency to overeat, which was more common at sea. Here, 47% were found to overeat 3 days or more per week compared with 40% when at home. This difference can be interpreted in the light of most seafarers being served
versus, the difference might be smaller than estimated here. These findings are in line with studies from other countries (Pancic et al., 2007) and are alarming particularly when taking a ‘healthy worker-effect’ into consideration. Every second year, the seafarers undergo a medical examination in order to renew their health certificate which is mandatory for signing on to a ship. This suggests that either the present findings are based on a positive pre-selection, i.e. despite being comparatively high they still underestimate the size of the problem, as workers with manifest disease have already been screened out, or else they should question the practice of these examinations. In any case, they highlight a definite need for health promotion initiatives to modify the risk potential of seafaring work places and enable and support more healthy lifestyles.

Situational barriers for living a healthy life at sea are numerous, from easy access to duty-free and therefore cheaper tobacco as well as sweets and other sugared products, which are made available in special on-board shops, lack of education or adequate training of the ship cooks, narrow food budgets, which negatively influence the nutritional value and variety of servings, to the problem that inclement weather with high seas tends to leave the on-board gyms empty. In addition, prevalent stress and boredom induced by longer-term absences from home and confinement in small spaces with limited leisure time facilities (Jezewska et al., 2006) might contribute to ‘compensatory behaviors’. In particular, this could explain the high smoking rates but also why there were higher rates of overeating and sweets consumption at sea compared with the home setting. Similarly, but with a contrary effect, the slightly higher rates of physical activity at sea compared with the home setting might also be an indirect product of the work organization as seafarers might be reluctant to spend their precious leave time on exercise instead of with their families and friends.

With regard to social status, the only significant difference was found for smoking, which was more prevalent in non-officers than officers, while differences between the two types of work places providing different environments and different work tasks were more prominent. This finding clearly suggests that for seafarers setting-related variance might have a larger impact on health than individual factors, which emphasizes the importance of health-promoting work-place settings.

Limitations
The response rate was only 43% for the health profile and 57% for the questionnaire survey.
Two types of selection bias might be associated with this limited participation rate. For one, there might be an overrepresentation of more experienced and job-secure seafarers (officers), however, according to project managers of both companies, the distribution of gender, age and rank among the respondents reflected the actual division among the seafaring personnel. The second, and more serious, issue is that it is seafarers in better health and with more favorable health behaviors who are more likely to have taken part. This would imply that a more complete representation of all employees would have generated an even more alarming picture of their health status. Likewise, social desirability tendencies may have affected, i.e. favorably biased, the results based on the self-report data about health behaviors. The sample consisted of mainly Danish seafarers which limit the generalizability of the results to, e.g. seafarers from especially non-western industrialized countries. As for measurement, the assessment of eating behaviors was based on very general single items, which are bound to generate less valid reports than more elaborate measures, such as food diaries.

CONCLUSION

The study confirmed previous findings about Western European seafarers’ more unhealthy lifestyle behaviors during work and leisure time, and at sea as well as at home. This occupational group is characterized by comparatively high levels of (heavy) smoking and physical inactivity, as well as a high percentage of obesity and a high rate of metabolic syndrome. The results clearly indicate possibilities for improvement of the seafarers’ lifestyle behavior and actions are recommended to promote healthy lifestyle. Suggestions about such actions include interventions on smoking cessation, systematic education of those who provide the food on board, i.e. cooking classes for ship cooks as well as creation of attractive exercise facilities and physical activity programs to promote recommended activity levels. To stimulate and maintain such preventive action requires individual awareness about the necessity of behavior change, but if shipping companies aim to expedite a successful turn-around they also need to consider creating an infrastructure that would enable and support such individual behavior change.

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