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The Fit seafarer – fact or fiction?

A study in seafarers exercise habits

Bachelor thesis in the Master Mariner Program

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CHALMERS UNIVERSITY OF TECHNOLOGY
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Abstract

The work and lifestyle aboard vessels at sea has always been a special kind of life, with long working days, shift work with nocturnal working hours and long working periods that keeps the seafarer from home. The work aboard ships has become more sedentary since the introduction of computers and less crowded with the development of technology and various machines. Because of this and the lack of the free daily physical activity that you get ashore, puts extra pressure on the individual sailor to maintain a regular exercise habit in order to keep a healthy lifestyle while onboard. Regular exercise has been proven to have a lot of health benefits, such as weight reduction, improve stress tolerance, prevent or at least decrease the negative effects of fatigue related to shift work. The idea was to highlight the importance of regular exercise and the purpose of the study is to investigate the seafarers exercise habits and how the seafarers experience the eventual support and encouragement from their employer.

The research was conducted by compiling an online based questionnaire that was distributed to the individual sailor through the company's HR department. The theory is compiled from scientific articles and research papers about the different risk factors related to a sedentary lifestyle and the benefits of exercise.

The results of this study show that the participants keep a relatively high exercise frequency, consisting of mostly cardio and weight training, with the main goal of improving their physics. The majority of the participants felt that they do have time to exercise while onboard, despite the time limitations of shift work and lack of energy from long working hours. About half of the participants does not feel any support from their employer regarding physical activity, but only 15 percent use the healthcare allowance that they are offered. Therefore, the shipping companies need to find other ways to activate and motivate their employees onboard.

Keywords: (Seafarer, Physical activity, Exercise, Habits, Benefits, Stress, Fatigue, Occupational health)

Sammanfattning

Arbetet och livsstilen ombord på fartyg till sjöss har alltid varit en speciell typ av liv, med långa arbetsdagar, skiftarbete med nattliga arbetstider och långa arbetsperioder som håller sjömannen hemifrån. Arbetet ombord har blivit mer stillasittande sedan introduktionen av datorer och med utvecklingen av teknik samt olika maskiner har den genomsnittliga storleken på besättningen minskats. På grund av detta och bristen på den dagliga vardagsmotionen som man får i land, läggs ett större ansvar på den enskilde sjömannen för att upprätthålla regelbundna träningsvanor och bibehålla en hälsosam livsstil ombord. Regelbunden träning har visat sig ha många hälsofördelar, såsom viktminskning och förbättrad stresstolerans, vilket förhindrar eller åtminstone minskar de negativa effekterna av utmattning i samband med skiftarbete. Tanken var att lyfta fram betydelsen av regelbunden motion och syftet med studien är att undersöka sjömännens träningsvanor och hur de upplever eventuellt stöd och uppmuntran från arbetsgivaren.

Forskningen genomfördes genom att sammanställa ett onlinebaserat frågeformulär som distribuerades till den enskilde sjömannen genom rederiernas HR-avdelning. Teorin är sammanställd av vetenskapliga artiklar och forskningsrapporter om olika riskfaktorer relaterade till en stillasittande livsstil och fördelarna med regelbunden motion.

Resultaten av denna studie visar att deltagarna håller en relativt hög träningsfrekvens, bestående av mestadels konditions- och styrketräning, med huvudmålet att förbättra sin fysik. Majoriteten av deltagarna kände att de har tid att träna ombord, trots tidsbegränsningar på grund av skiftarbete och brist på energi från långa arbetsdagar. Ungefär hälften av deltagarna känner inte något stöd från sin arbetsgivare angående fysisk aktivitet, men endast 15 procent använder de friskvårdsbidrag som erbjuds. Rederierna måste därför hitta nya metoder för att aktivera och motivera de ombordanställda sjömännen till en hälsosam livsstil.

Nyckelord: (Sjömannen, Motion, Träning, Vanor, Fördelar, Stress, Utmattning, Företagshälsovård)

Acknowledgements

The authors would like to thank the participants in the survey and the supervisor Monica Lundh.

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1 Introduction

Health and wellness is a hot topic in today's society, whether it is a new gym around the corner, the latest diet being advertised on TV or politicians fighting over healthcare cost, the trend is obvious. Never before has health and wellness had this level of interest and significance for individual persons. As this trend continues to grow, the importance of a supporting employer increases as the workplace becomes an important part in activating and encouraging the individual employee to a healthier lifestyle.

Exercise is well documented to increase stamina, muscle strength, flexibility and weight reduction, as well as reducing the risk of cardiovascular disease, lowering blood fats and glucose levels (Laskowski, 2012). Regular exercise also improves psychological statues and sleep quality (Biddle, Fox, Boutcher, 2000; 2003). Is has been observed that exercise also reduce certain types of cancer and have a positive effect on chronic pain (Penedo, Dahn, 2005). There is a lot of evidence for health benefits regarding physical activity and exercise (Ardic, 2014).

Vessels that sail around the world today serve a wide range of different purposes. The one thing they have in common is that they are all built to ship a specific type of cargo from point A to point B. Aside from that, there are few other similarities between most ships in how they are designed and what features you can find onboard. One such feature is the training facilities. Training facilities onboard can range from a few dumbbells in a closet to a designated and spacious facility with a complete setup of machines and weights.

In the maritime industry, shift work is naturally the most prominent way of working due to the nature of the operations conducted onboard. At sea, the vessel is sailing 24 hours a day at all times to cut down transport times, and in port the operations never stop due to the extensive costs that come along with spending time at berth. This kind of around the clock operations present a difficult situation for the crew that are responsible for maintaining this hectic schedule, while at the same time maintaining themselves (Costa, 1996).

The aim with this report is to map out the exercise habits of Swedish seafarers working on vessels controlled by Swedish companies. The report will explain what different possibilities they have to exercise onboard and also what kind of difficulties they may face to maintain a healthy and sustainable lifestyle as a seafarer.

1.1 Purpose

The purpose with this report is to investigate the exercise habits and motivation to physical activity of Swedish seafarers working onboard vessels controlled by Swedish companies. The report will also investigate how the shipping companies invest in health and wellness and how those investments are perceived by the seafarers onboard.

1.2 Questions

- How do the seaman's exercise habits look like?
- How do the shipping companies invest in wellness?
- How do the seafarers experience the support and investments from the company?

1.3 Delimitations

The focus of the report has been limited to Swedish seafarers who work on a selection of Swedish controlled vessels of different sizes and in different segments of the shipping industry. The companies range from large organizations to smaller family businesses.

2 Background and theory

The World Health Organization (WHO) recommends adults over the age of 18 a minimum of 150 minutes of moderate-intensity physical activity throughout the week, or to perform at least 75 minutes of high-intensity physical activity per week (WHO, 2017).

The WHOs recommendations for physical activity are easier to achieve ashore than onboard a vessel. When living ashore you can get the weekly physical activity just by ordinary daily activities, such as walking the dog, getting of the bus two stops before or mowing the lawn. These kinds of activities are non-existing onboard, therefore it is not as simple to achieve the recommended amount of weekly physical activity while working on a ship. Add to this, there are limitations in both time, mostly because of shift work, and space onboard. Because of this there is a higher obligation for individuals who work on vessels to use the facilities available onboard to activate themselves.

As a result of the working and living conditions onboard there are an increased risk to experience fatigue, and in extension a number of other severe health conditions as a consequence by the lack of exercise. By striving for or maintaining regular exercise habits, the seafarers are more resistant to the effects of working on a vessel.

2.1 Health benefits from exercise

A lot of recent reports say that a worldwide epidemic in the terms of obesity and an unhealthy and sedentary lifestyle is ongoing. These issues are big risk factors for multiple negative health outcomes (Penedo, Dahn, 2005). Studies have shown that a sedentary and physically inactive lifestyle doubles health risks and adds a disease burden to society comparable with obesity, smoking and hypertension (Ardic, 2014). Such an inactive lifestyle during middle age seems to shorten the lifespan, which has been observed in several studies. Physical activity has extensive benefits on health and the prevention of disease, including the reduction of mortality rates (Penedo, Dahn, 2005).

Evidence that supports the benefits of physical activity and exercise on physical and mental health continues to accumulate at an accelerated rate (Penedo, Dahn, 2005). Moderate exercise has been proven to decrease the risk for coronary heart disease (Lee, Djoussé, Sesso, Wang, Buring, 2010). There is also evidence that regular physical activity decreases the systolic pressure among individuals, which leads to a reduced risk of diabetes related complications, diabetes related death and myocardial infarction (Ardic, 2014). Furthermore, the consequences of a sedentary lifestyle (e.g. diabetes, obesity) are related to both cancer occurrence and mortality in various cancer populations (Ardic, 2014).

2.1.1 Obesity

As mentioned before, the world is getting unhealthier and more inactive. This inactive lifestyle and an increasing amount of sitting time seems like it has become an independent risk factor for the development of metabolic risk factors (Laskowski, 2012).

Obesity and overweight is a significant public health problem due to the association with chronic diseases, such as hypertension, cardiovascular diseases, type 2 diabetes, cholecystitis, bile stones, and some types of cancer, respiratory dysfunctions and some mental problems (Ardic, 2014). It has been observed that exercise alone as a solution to the obesity problem is less effective than diet, but exercise in combination with diet is the most effective tool to weight loss (Laskowski, 2012). Still, even in the absence of weight loss, regular exercise does increase the cardiovascular and metabolic benefits and improves lung function (El-Gamal, Khayat, Shikora, Unterborn, 2005). Furthermore, regular exercise is a good way to minimize weight gain and to sustain a long-term weight loss, particularly if the total exercise time is in the range of about 5 hours of moderate intensity activity per week (Lee, Djoussé, Sesso, Wang, Buring, 2010). Studies have also shown that even a small weight loss can be connected with a significant decrease in cardio metabolic risk factors (Laskowski, 2012).

2.1.2 Cardiovascular disease

In the 1960s began the first heart rehabilitation programs with physical activity as a treatment towards the prevention of cardiovascular disease. A participation in a heart rehabilitation program with focus on physical exercise has an effect not only on the condition but on self-assessed health and quality of life as well (Ståhle, 2004). Another effect is the decrease in relapse or death by 30% in the following years after an acute event (Ståhle, 2004). The most common risk factor of cardiovascular disease is, according to Henriksson (1998), the absence of physical activity, since life today is not that physically demanding.

In 2016, cardiovascular disease was the most common cause of mortality worldwide (McAloon et al. 2016). Coronary artery disease is the most significant precursor for myocardial infarction which is the main component in the mortality of cardiovascular disease, being responsible for roughly seven million deaths every year (McAloon et al. 2016). A sedentary lifestyle highly contributes to cardiovascular disease problems, particularly for coronary artery disease and it is also one of the risk factors for myocardial infarction (Xiao, 2017). For a long time, it was a recommendation to avoid physical activity after a cardiovascular event, but today exercise is an important part of the cardiac rehabilitation programs. There is increasing evidence which supports that when adequately given and supervised, physical activity is an important part of the rehabilitation program after a myocardial infarction (Xiao, 2017). This can also prevent future complications and an increased quality of life for infarcted individuals (Xiao, 2017).

The most studied and recommended form of activity with the most beneficial effects is aerobic exercise, which consists of the movement of large muscle mass in a rhythmic manner for a sustained period. Aerobic exercise includes everyday activities such as occupational activity, heavy household work and gardening, but also exercise, for instance cycling, running, walking, rowing, swimming, hiking or Nordic walking (Xiao, Xiao, Zhao, 2017). Similar to other forms of interventions, such as medication, physical exercise should be individually adjusted in terms of duration, frequency and intensity, to achieve the best results (Xiao, Xiao, Zhao, 2017).

2.1.3 Mental health and stress

The definition of mental health, according to WHO (2014), is a state of well-being where every individual recognizes their own potential, is able to deal with the normal stresses of life, can work productively and successfully, and is able to contribute to society.

When humans are exposed to stress, the hormone cortisol increases, which is vital in a number of different bodily functions. But an elevated or inferior level of cortisol over a prolonged time is harmful to us both mentally (e.g. depression) and physically (e.g. cardiovascular diseases) (Hansen, Zachrisson, 2016). Physical activity is also a stress factor to the human body, thus during exercise cortisol is released in the body. Though the more one exercise the less physiological responses such as lower cortisol levels and a lower heart frequency is seen, not only during physical activity, but also upon exposure to other stress factors (Rimmele, 2007). Thus, if individuals are continuously physically active, the cortisol released during exercise will gradually decrease with each workout. This means that a person who exercise regularly is exposed to other stress factors, e.g. work-related, will have a lowered level of cortisol released. As a result, those who exercise regularly become more stress-tolerant (Hansen, Zachrisson, 2016).

In addition to the direct physical-health benefits from physical activity, studies show that engaging in physical activities also benefits emotional well-being (Penedo, Dahn, 2005). There is also evidence which supports that exercise improves mood and reduces symptoms of anxiety and depression (Biddle, Fox, Boutcher, 2000; 2003).

Mental health problems related to stress, such as depression, anxiety and burnout are an important public health subject, and are related to an increased turnover and absenteeism rate, decreased organizational commitment and a reduced work performance (Cropanzano, Rupp, & Byrne, 2003). Burnout has also observed to be a significant health risk associated with some cardiovascular diseases and poor self-rated health, but also various mental issues, such as disturbed sleep, depression, psychosomatic complaints and anxiety (Gerber, Jonsdottir, Lindwall, Ahlborg, 2014). However, most workers encounter some grade of occupational stress, but far from everyone develop health problems because of it. To be able to maintain the

individual well-being and to evade downward spirals linked with high work-related stress, individuals need both personal coping skills and external resources to be able to deal with stressful experiences and to avoid the development of the various health problems (Gerber et al. 2014).

A study by Lodde, et al. (2008), compares sailors with shore based personnel within the same company. The sailors that participated in the study worked aboard the French oceanographic vessels and the shore based personnel, engineers and technicians, were from the French oceanographic institute. What the study concluded were that the sailors perceived negative stress in a greater degree than the shore personnel. 17% of the sailors compared to none of the shore personnel were categorized in the high stress category. 10% of the sailors in the study showed such high levels of stress that it could be harmful to their health, while merely 2% of the shore personnel reached those high stress levels.

The main factors for the sailors' higher stress levels were time pressure, especially in cargo operations (loading/offloading), separation from family, long working hours, work in dangerous and hot environments onboard, and the limited social interactions (Lodde et. al, 2008) (Oldenburg, Jensen, Latza, Baur, 2009).

2.2 Shift work

Working onboard a ship has gone from a manual labour to more of a monitoring and sedentary work along with the technological evolution and introduction of computers (Committee, O. T. E. O. S. 1990). Tasks like cargo handling, engine room maintenance and deck work were once physically demanding and required a large crew to manage. With technological progress these tasks have evolved to more monitoring and less physical work which demands less people to operate the vessel, thus the general crew size have decreased significantly over the years (Committee, O. T. E. O. S. 1990). The downside of decreasing the crew size is that there are less persons onboard to handle unexpected problems that could arise, with the result of an increased workload on those who are left onboard (Committee, O. T. E. O. S. 1990).

As mentioned earlier in the introduction, shift work is the single most common way of organizing the work onboard a commercial vessel. Even though it is inevitable and has been used since the time sailing vessels dominated the market, there are still problems remained to be solved. There are a couple of different kinds of shift work used at sea, the most common is 4/8, meaning that you work 4 hours and then rest for 8 hours, followed by the day shift, which is similar to normal office hours (e.g. 7 to 16). Another common type of shift, and the most demanding, is the 6/6 shift, meaning that you work 6 hours and then rest for 6 hours. Then there are some who have other types of shifts, for example 12/12, or on call based shifts.

The main problem with shift work, and especially nocturnal working hours, is the effect it has on sleep and the possibilities to exercise. Irregularities in the sleeping patterns and disturbances of the circadian rhythm have several documented impacts on health (Costa, 1996). The circadian rhythm is the body's biological clock which responds to daylight and darkness and controls the production of sleep hormones, known as melatonin (Reiter, 1993). Working at night and sleeping during the day upset this biological drive, resulting in sleep difficulties which have a negative impact on the body's necessary recovery (Reiter, 1993).

The first thing that comes to mind is fatigue and lowered concentration due to the lack of rest and recovery for the brain. In the short term perspective that is not a major hazard for the overall health status other than the increased risk of near misses and accidents. In the long term perspective, systematic lack of sleep contributes to a number of health risks as gastrointestinal, psychological (fatigue, anxiety, depression) and cardiovascular diseases (Costa, 1996).

2.2.1 Fatigue

Fatigue is a well-researched and well documented subject with numerous effects on the human body (Borg, 1982). Fatigue is a condition resulting from a lack of sleep and recovery over longer periods of time (Borg, 1982). It is not to be confused with simple sleepiness for shorter periods of time as fatigue is a medical condition that affects the cognitive performance, situational awareness and the physiological performance of the person (Louie, Doolen, 2007). Naturally, suffering from fatigue while carrying out watch keeping duties or any other duties requiring situational awareness and quick decision making is not recommended as it is likely to have a negative effect on the performance (Louie, Doolen, 2007).

As discussed earlier, the nature of the maritime industry is a 24/7 business which require long periods of shift work, nocturnal working hours, irregular schedules and reduced manning, which in many cases leads to fatigue among the crew (Louie, Doolen, 2007). Fatigue on its own or in combination with other factors is one of the main reasons to accidents and near misses at sea (Hetherington, Flin, Mearns, 2006).

Despite new IMO regulations of resting hours, there are still situations like discharging operations that require single crew members to stay awake for more than 12 hours with only a 6 hour break (Hetherington, Flin, Mearns, 2006). By doing so, the risk of fatigue increases, leading to lowered cognitive performance and in extension the risk of an accident or near miss is larger. One investigation found that out of 98 ship casualties, fatigue was a contributory factor in 23% of the cases (Hetherington, Flin, Mearns, 2006).

There are no simple solutions to avoid or recover from fatigue, but there are several actions to be made in order to prevent it from happening or prevent it from worsening. The main actions to take on an individual level are sufficient sleep and regular exercise (Louie, Doolen, 2007). Sleep and exercise are connected, one benefitting the other, or one harming the other. Regular and moderate exercise depletes the body's energy reserve for shorter periods, leading to an increased need for recovery and therefore resulting in improved sleep both in quantity and quality (Driver, Taylor, 2000). As mentioned earlier in this report, the quality of sleep is equally important as the number of hours of sleep, thus exercise is an important part in improving the body's recovery and prevents fatigue from occurring (Driver, Taylor, 2000).

2.3 Worksite physical activity programs

The employer and the worksite play an important part in the encouragement and activation of physical activity among the employees. The worksite is naturally a place where the employee spends a lot of time, and it is therefore an excellent intervention point to encourage and promote employees to exercise more. Research shows that a successful physical activity program in a company significantly increases the physical activity and exercise habits among the employees, both at work and at home (Proper, et al, 2003).

This is even more evident for a crewmember in the maritime industry who also live at their workplace, and therefor spend all of their time at work and have no option not to do so. In these cases, the employer plays an even bigger part and have more responsibility to enable and encourage the employee to exercise and provide them with training facilities (Proper, et al, 2003).

Physical activity programs can have a wide variety of meanings, but the general definition is that it is a centrally organized activity for a larger group of individuals. It can manifest as monthly step-counting competitions at the office or registering a larger group of employees to a running race. (Dishman, Oldenburg, O'Neal, Shephard, 1998). Benefits of group activities and competitions is that it has some amount of peer pressure on individuals that normally do not exercise on their own, and it also appeals to a basic human instinct to compete and measure oneself to another.

2.4 Physical activity within the Swedish population

Statistics Sweden conducts different surveys, among the Swedish population, every year on the behalf of the Swedish Parliament. The report *Living conditions* presents the statistics from a survey with 11 582 participants, who were aged 16 years and over. Of the 11 582 interviewed, 8 235 individuals were part of the section regarding leisure 2014 and 2015. The survey *Living conditions* contains statistics about, outdoor activities, sports and exercise, cultural habits, internet usage, holiday travels and access to a holiday home.

About 80% of the Swedish population participated in sports or exercised either indoors or outdoors at least once at some point in the last twelve months during the period 2014–2015. On average, in the years 2014–2015, 70% of men and 74% of women practised sports or exercise more than 20 times, either in an indoor facility or outdoors, which can be seen in diagram 1. Among men, 60%, and among women, 66%, participated in sports or exercised more than 20 times outdoors. Of these individuals, 32% among the women and 40% among the men, stated that they went jogging or running outdoors when they practiced sports. According to the report by Statistics Sweden (2017) it is more common to practice sports outdoors than indoors. Approximately the same proportions men and women, 53 and 54% respectively, practised sports indoors at least once during the period. Participating in sports and exercising is quite

common across all age groups. Among the men it can be distinguished a gradual decline in exercise with the rising age, a decline that cannot be seen for the women until their 80's.

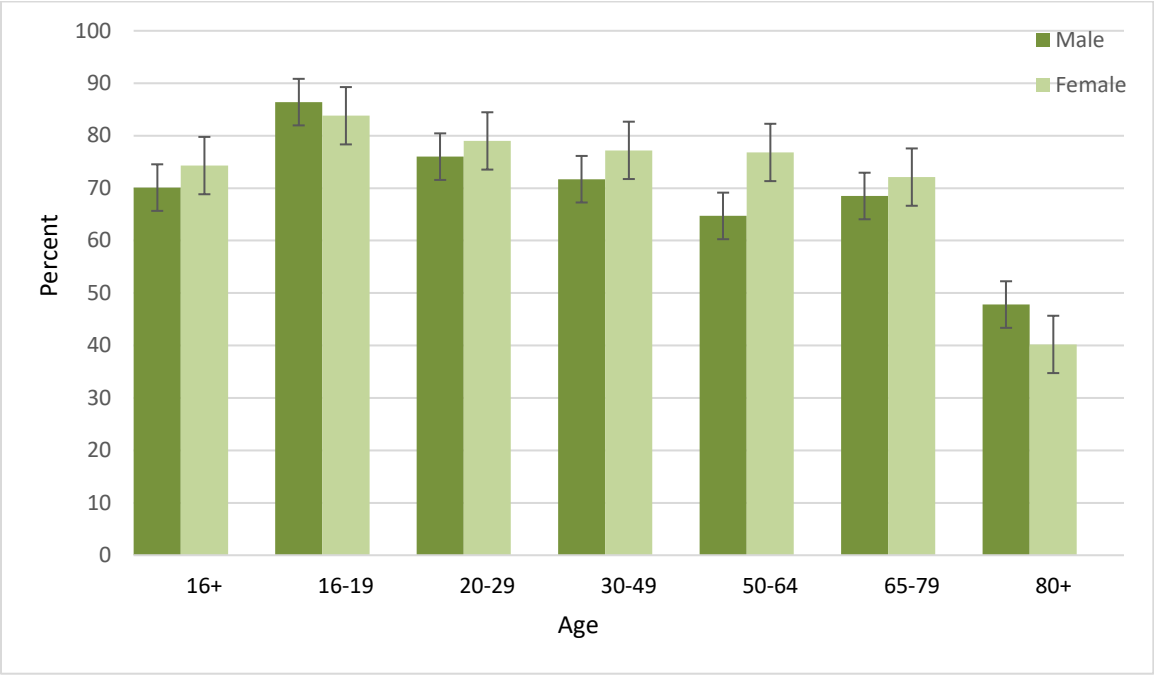


Diagram 1. Percentage of men and women of different age groups who have participated in sport or exercised, either outdoors or indoors, more than 20 times in the last 12 months, 2014–2015. (Percent and margin of error) (SCB, 2017)

3 Method

A questionnaire was compiled to investigate how the general seaman´s exercising routines look like, what their opinions are on occupational health and the possibilities they have to exercise at work and at home (See Appendix 1) (Denscombe, 2016).

Delimitations in the amount and type of shipping companies who were selected for the questionnaire were made to get a dispersion in company size and type of vessels. This was made in order to derive a fair picture of the Swedish maritime industry. Senior maritime students at Chalmers University of Technology were also asked to participate in the survey.

Scientific articles and literature on the subject was studied in order to clarify the purpose of the report and why it is needed, and also to better understand to what extent health and wellness is an important part in the Swedish maritime industry.

3.1 Data analysis

The results from the questionnaire were compiled into descriptive statistics. The results were then compared with current research in the field and other similar questionnaires to assess the reliability of the answers.

3.2 Ethics

In the beginning of the questionnaire the participants were informed that the results from the questionnaire were to be used in a bachelor thesis regarding exercise habits and in general health and wellness onboard Swedish vessels. Their participation was voluntary and their answers were to be handled anonymously. There were also possibilities to contact the authors via email with questions about the questionnaire.

4 Results

The questionnaire (See appendix 1), which was compiled as an online survey and distributed to the ten selected companies HR department via email, and they later forwarded the questionnaire to their employees. The survey contained 18 questions which were divided into four sections, demography, exercise habits, equipment onboard and miscellaneous. The replies from the 66 participants are presented with a variety of diagrams; circle diagrams, bar diagrams and text.

4.1 Demography

The age of the participants of this study were divided in age groups, as shown below (diagram 2), were 47% were between 18 and 25, 42% were 26 to 35, 8% were 36 to 46 and 3% were 56 to 65. With an average age of 28 ± 8,2 years.

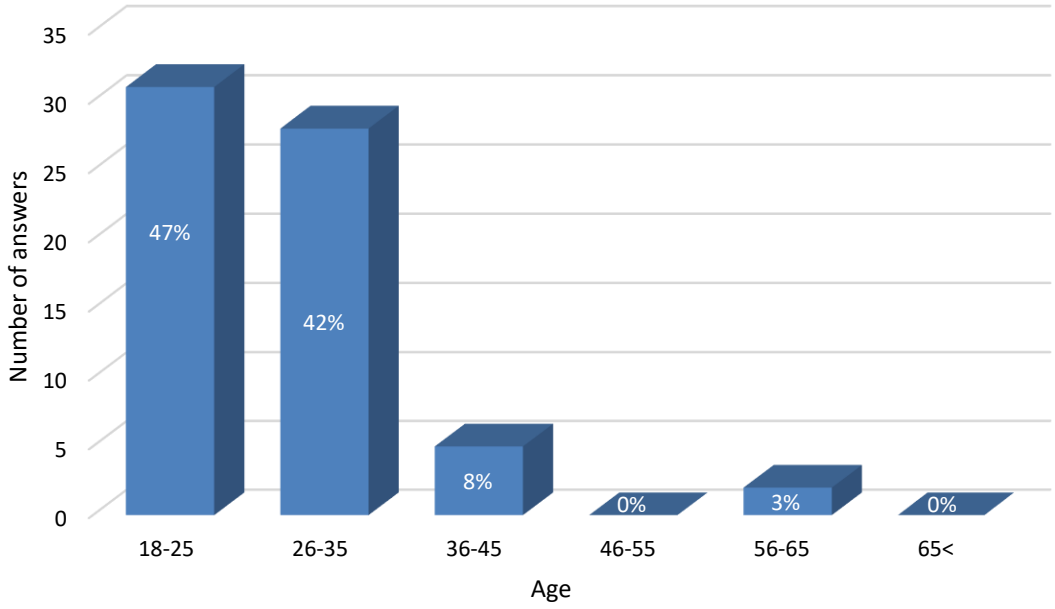


Diagram 2. Age distribution of the participants

The gender distribution reflects the Swedish maritime industry with 85% men and 15% female. The participants were also divided into work departments with the distribution of deck, 70%, and engine, 30%

This graph (diagram 3) shows the different type of ships the participants work on, which is a representative reflection of the Swedish maritime industry. With a distribution of 48% who work on tankers, 8% on RoRo (Roll on/Roll off, e.g. Wallenius), 29% on RoPax (Roll on/Roll off and passenger, e.g. Viking Line), 3% on bulk carriers, 11% on cruise ships, 8% on offshore vessels, 2% on fishing vessels and 12% said that they were students who have had internship periods on different type of vessels.

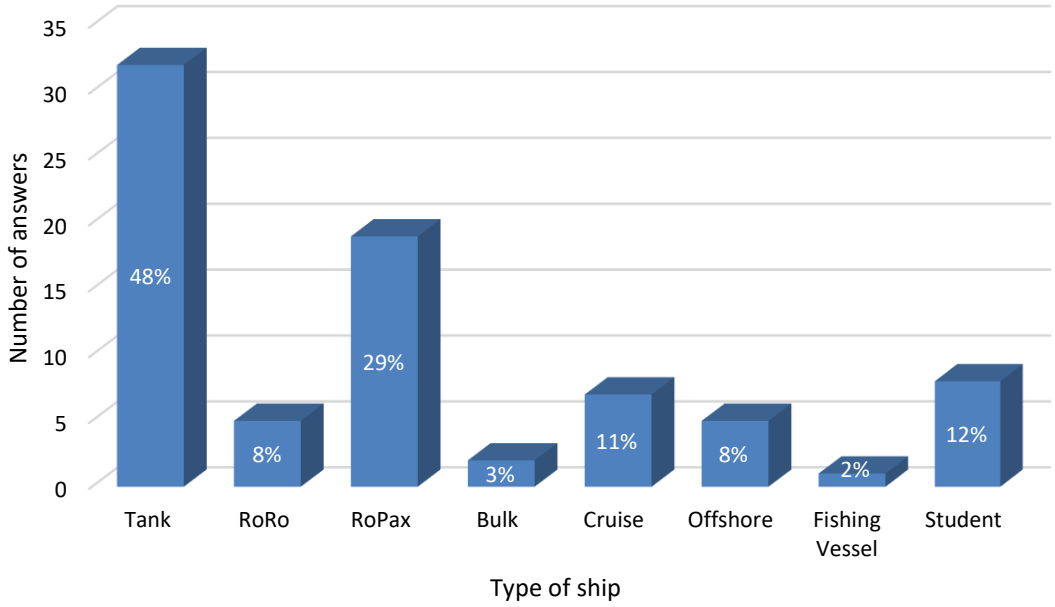


Diagram 3. Type of ship the participants work on

The participants were also asked what kind of shift work they have (diagram 4), where 12% stated that they work 6/6, 30% said 4/8, 21% worked the day shift, 30% said that they have another type of shift or that it varied between the times that they were onboard and the last 6% stated that they were on call.

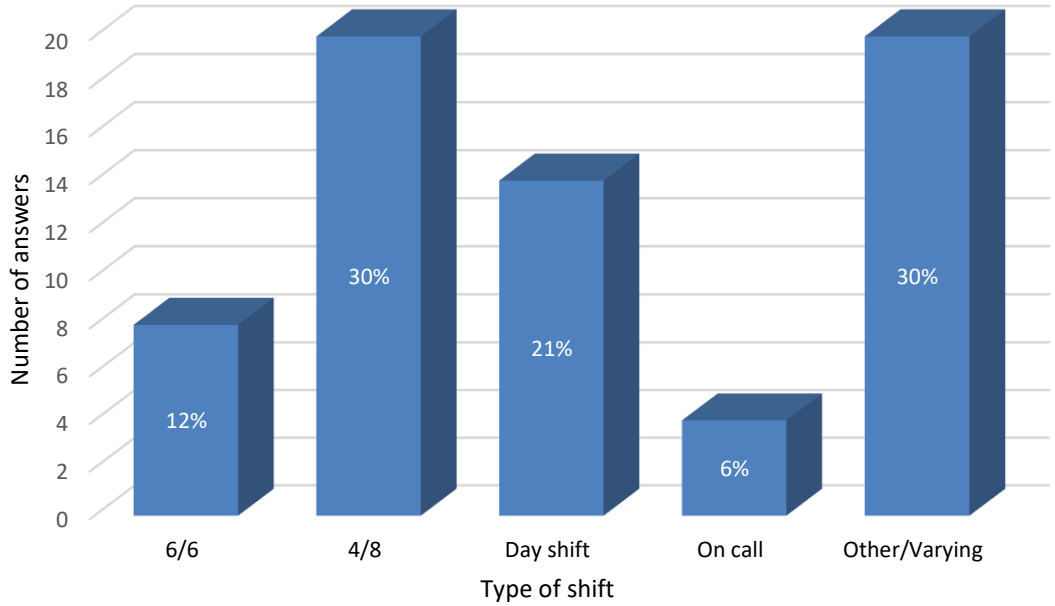


Diagram 4. Type of shift

4.2 Exercise habits

The first question of this section was, "How often do the participants exercise onboard" (diagram 5). 11% stated that they never exercise, 6% less than one time per month, 12% one to two times per month, 9% said that they exercise one time per week, 23% two to three times per week and 39% stated that they exercise 4 times, or more, per week. The participants were also asked how often they exercise ashore. The answers, as shown below, are quite similar to how often they exercise onboard, with 11% stated that they never workout, 5% less than one time per month, 11% said one to two times per month, 14% one time per week, 35% said two to three times per week and 26% stated that they exercise four times per week or more.

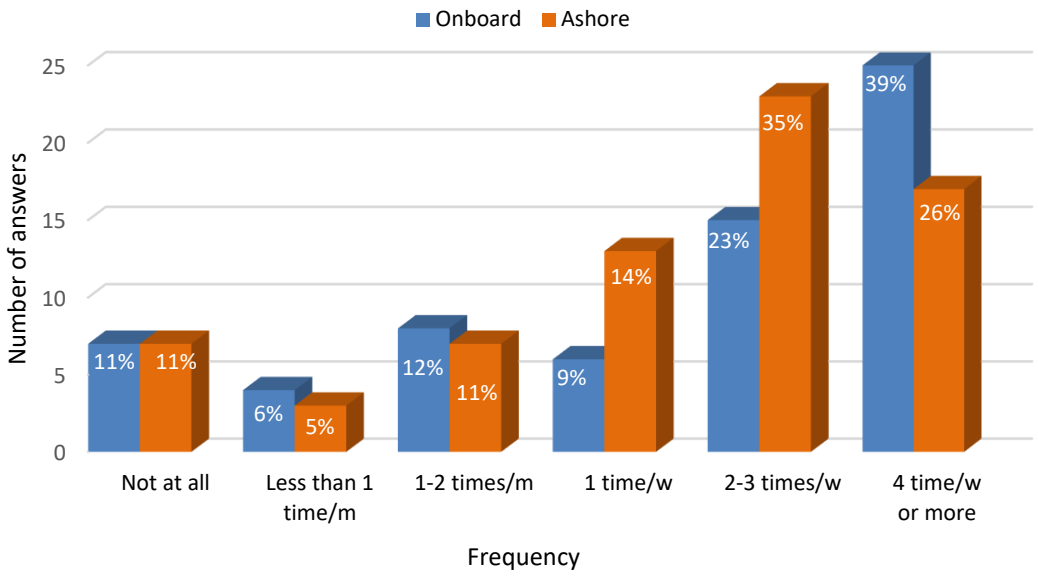


Diagram 5. Exercise frequency onboard vs ashore

This was a multiple-choice question, which gave more answers than participants, but the goal with the question was to see which kind of exercise is most common. As shown in the graph below (diagram 6), weight training and cardio dominate the type of exercise the participants choose to do both while onboard and ashore. What separates the answers on the ashore part of the question, is the increase in choice of team- and individual sport.

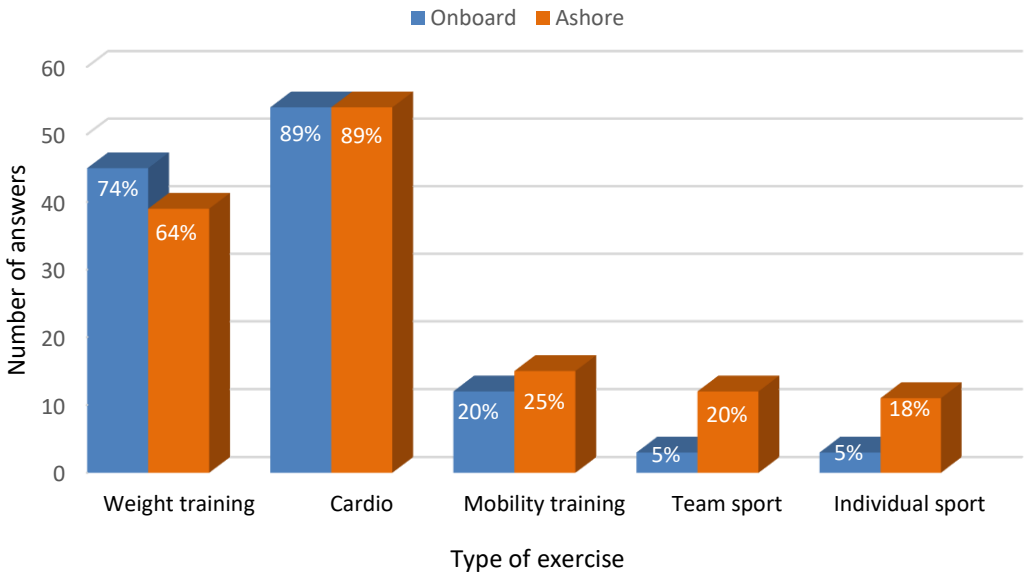


Diagram 6. Type of exercise onboard vs ashore

4.3 Equipment onboard

The first question in this category, the participants were asked to grade the equipment they have onboard, on a scale 1 to 5, were 1 was very poor and 5 was excellent (diagram 7). 18% thought the equipment they have available is poor or very poor. 26% said neither good nor bad, but the majority, 53%, are satisfied with the equipment they have onboard.

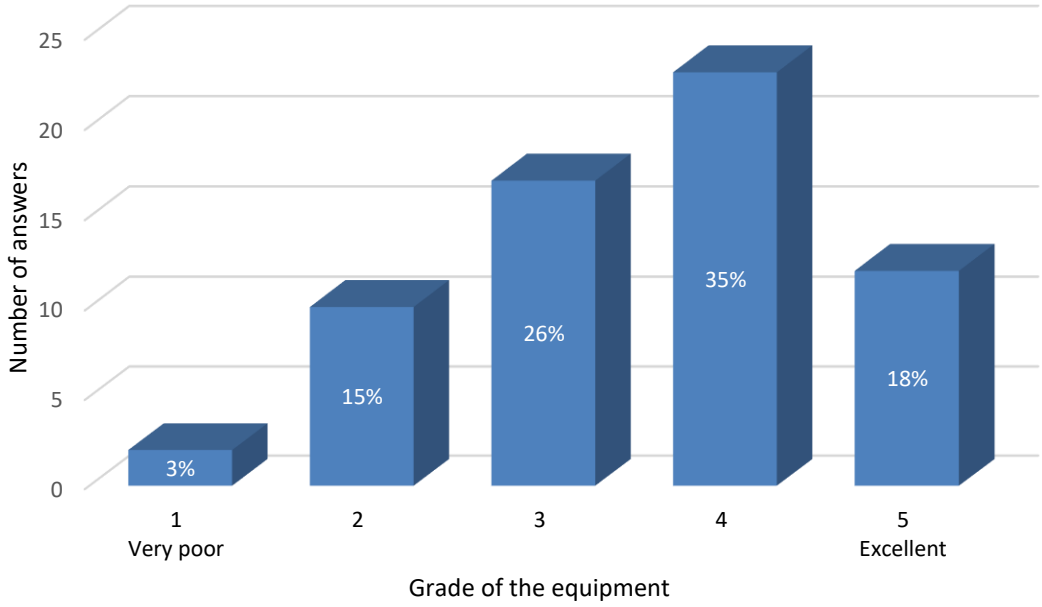


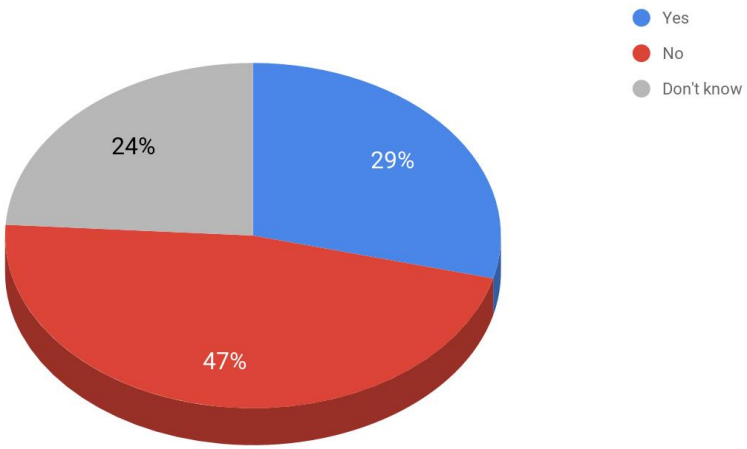
Diagram 7. Grade of the equipment onboard

The participants were also asked to list what kind of equipment they have to their disposal and the most common answers were:

- Treadmill
- Bike
- Rower
- Crosstrainer
- Free weights
- Dumbbells
- Multi machines

Is there any equipment that you miss onboard, were the next question in the survey. In general, the participants were satisfied, the most common complaint were that they wish for more space to exercise and the condition of the equipment. There were a few who were missing some specific types of equipment, for example: a barbell, a wider selection of free weights and more cardio machines.

The last question in this section were to see if the they had exercised more if they had better equipment to use. The majority, 47% said no, 29% said yes and 24% said that they don't know (circle diagram 1).



Circle diagram 1. Exercise more with better equipment

The participants were also asked to motivate their answer, and the bottom line of the different answers were that the frequency and amount of training is not depending on the quality of the gym, but new and fresh equipment is an incentive to exercise more and try different types of training.

4.4 Miscellaneous

Why do you exercise, was the first question in this section (diagram 8). The majority stated that the reason for their workouts is to improve their physic. The rest of the alternatives, weight reduction, relaxation, improve sleep and stress management, had an even spread of answers.

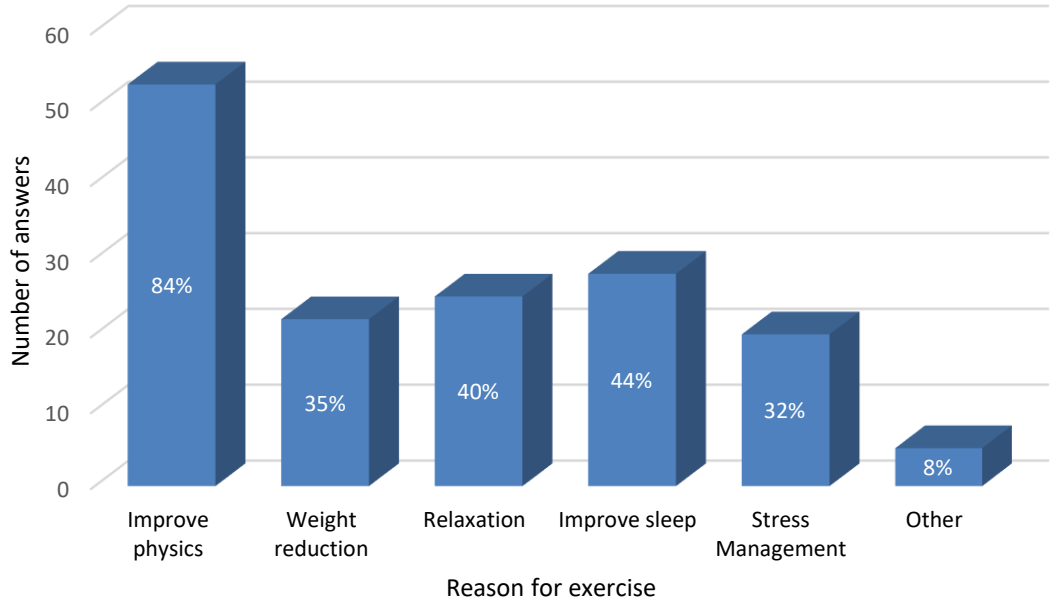


Diagram 8. Why the participants exercise

Next question, the participants were asked if they feel support and encouragement from the company. 47% of the participants felt a good support from the company who have motivating competitions and encourage exercise both at sea and at home. The other 53% have never heard any kind of encouragement from the company, and it seems like it is a non-important question for those companies.

The participants were asked if they feel that they have time to exercise while onboard, were 76% stated that they feel that there is time available to exercise, while 24% said that they don't have time for it.

The participants were also asked to motivate their answer, and in general it seemed that it is not the time that is limiting, it is the shift work and lack of energy as a result of long hours at work. There are two opinions in the matter, one common comment is "It is a matter of priority, I prioritize exercise and therefore I have time". The other one is "I work too much and do not have time, I need prioritize sleep over exercise".

The participants were asked about their attitude towards exercising on working hours if it was made a possibility from the company's side. In the graph below (diagram 9), 1 is a negative attitude and 5 is positive. The majority, 70%, of the participants have a somewhat positive or positive attitude. 15% are indifferent, and 15% have a somewhat negative or negative attitude towards exercising on working hours.

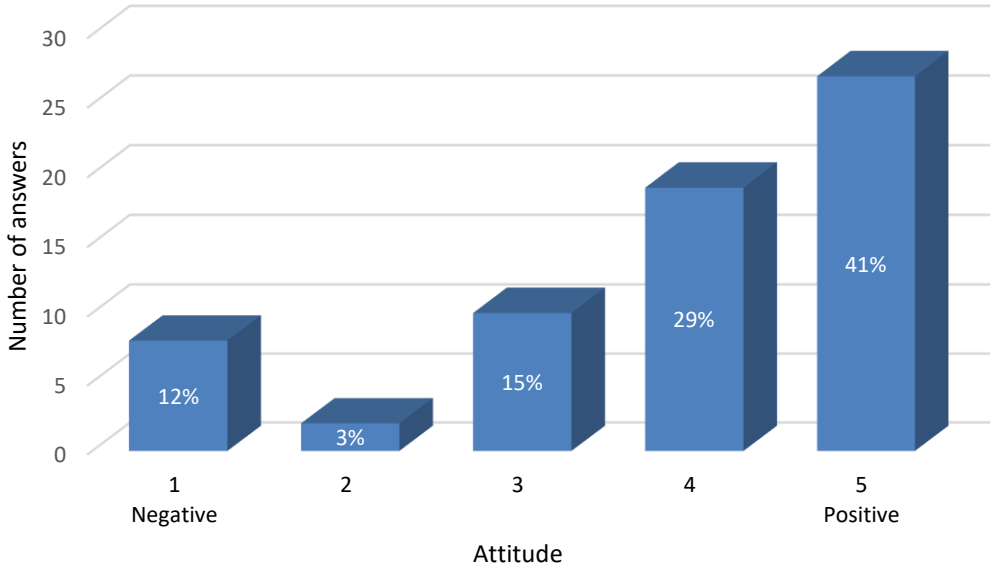
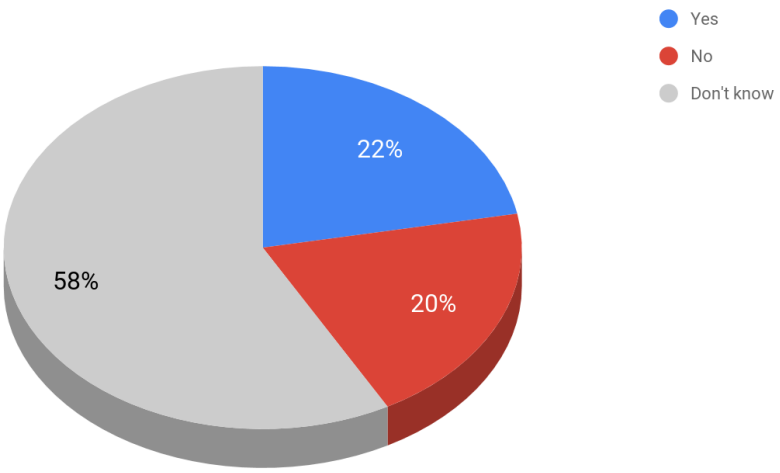


Diagram 9. Attitude towards exercising on working hours

The next question was if the participants are offered some kind of healthcare allowance (circle diagram 2). 22% stated that they do have healthcare allowance, 20% said that they don't have it and 58% said that they don't know if their employer offers it or not.



Circle diagram 2. Do the company offer some kind of health care allowance

This was a follow-up question to the one above, where the participants were asked if they use the healthcare allowance. The answers were that only 15% said that they do use it and 85% stated that they don’t use the allowance.

The last question was directed to the group of participants that do have healthcare allowance, they were asked about what kind of allowance their company offer. What they said was that the company offer financial contribution towards gym membership, training clothes and shoes.

5 Discussion

The results from the questionnaire were in general expected but also in some parts surprising when we looked at the exercise frequency onboard and ashore. We had a fairly clear vision about seafarers' exercise habits from our own experiences at sea, and it was a more negative view where the frequency was quite low and the general interest for physical activity was of minor significance onboard. Therefore, we did not expect this many seafarers to exercise that much every week and that physical activity is such a prioritized activity for seafarers.

However, the fact that the average seafarer does not get the same amount of daily exercise as someone working ashore is not to be forgotten as daily exercise is an important part of a healthy lifestyle. When we looked into exercise statistics from Statistics Sweden regarding the general Swedish population and compared those statistics with Swedish seafarers in the same age groups, genders and type of activities we found a significant difference in the amount of daily exercise (SCB, 2017). Especially in the older age groups the amount of low-intensity daily exercise was significantly more frequent in the general population ashore than it was for seafarers onboard. Clearly this have a natural explanation as it is close to impossible to walk the dog or take a walk in the woods when you work onboard a vessel, but the problem remains. This results in that the individual need to take a bigger responsibility to activate themselves to compensate for the lack of daily exercise, and in most cases, that means going to the gym.

We did expect the exercise facilities to be a threshold to regular exercise for many seafarers as they often are small and not fully equipped, but in general the participants of our questionnaire were satisfied with the facilities onboard, as seen in diagram 7, and stated that the facilities were not a large factor that affected their exercise habits (circle diagram 1). Other factors like shift work and the need to prioritise sleep were the main contributory factors to abstain from exercise onboard. Given the importance of sleep and recovery, this is a valid point for individuals who work shifts and have a shortage of time available each day (Driver, Taylor, 2000). However, that does not take away the importance and benefits of prioritizing exercise on a regular basis. Sleep can never substitute exercise in a long-term perspective, the human body need both to maintain a healthy condition (Driver, Taylor, 2000). Further consequences of sleep deprivation or the lack of exercise are related to several negative health conditions, such as increased stress and risk of cardiovascular diseases among several other conditions (Hansen, Zachrisson, 2016) (Xiao, 2017).

These results show us that the support from the shipping companies need to be better and find other ways to activate employees who do not exercise at all. The fact that 85% do not use the healthcare allowance, and that 58% of the participants did not know if their employer even offered healthcare allowance or not (circle diagram 2), paints a pretty clear picture. Even though the companies comply with the rules of offering healthcare allowance, there is not much else that is done, and it appears that healthcare allowance do not have any significant effect on exercise habits and exercise frequency among employees.

The shipping companies need to find other types of solutions to attract their employees to the training facilities, as just simply providing a gym evidently does not do the trick. In general, that means that the companies need to work more proactive and listen to the needs of their employees, what they need to find motivation to exercise. Such solutions could be to hang a TV in the gym to watch while working out, or offering wearable fitness trackers for everyone so they will be able to keep track of their own physical activity. The Swedish Maritime Administration offers an exercise reporting system called "Motionscentralen" (seatime.se, 2018) where you register your activities and compete against other Swedish seafarers, both on an individual level but also ship to ship competitions. Other similar means of activating the employees is to offer physical activity programs on a company level. Several studies show that physical activity programs have a significant effect on activating employees who do not normally exercise on their own (Dishman, Oldenburg, O'Neal, Shephard, 1998). That could for example be a step-counting competition or organizing competitions between the ships in the company.

5.1 Method discussion

One source of error is that we do not know who have answered the questionnaire and who has not. The unrecorded participants are evidently quite high, especially in the older age groups. There is a bias in terms of that we lack participants in the older age groups and therefore our results show that exercise is much more popular among younger individuals. However, when we compared our results to the statistics of the general population we found a significant difference in our results and what the statistics showed, and that older individuals exercise a lot more than what our results says. The average age is quite low and we can assume that it is partly a result of our online based questionnaire which could appeal more to a younger age group.

That can explain why our results show a larger interest for exercise and wellness in younger people. A second reason can be that many of the participants already exercise a lot and therefore have a bigger interest in participating in this type of questionnaire. To reach all age groups and get a non-biased result the best method would be to have both a questionnaire and personal interviews with individuals from all age groups.

6 Conclusion

Our research shows that the majority exercise quite often but we appear to have reached the individuals who already maintain a regular exercise habit. The results from our study shows that the seafarers who exercise onboard is also the ones who exercise when ashore, thus their exercise habits do not change depending on their current living situation. Daily exercise like walking is not taken into account here. What we can conclude from our research is that shipping companies need to find other ways to activate their employed seafarers.

6.1 Subjects for further research

- Is health and wellness a priority issue within the Swedish maritime industry? From a shipping company's perspective.
- How do the shipping companies measure the effect of their investments in healthcare?
- Is there a relationship between money invested in healthcare and the amount of sick leave in a company?
- Compare a shore based company with a shipping company to see if there is a difference in how they work with healthcare and wellness.

Reference

Ardic, F. (2014). Health benefits of exercise. *Türkiye Fiziksel Tip Ve Rehabilitasyon Dergisi, 60*(2), 9-14. doi:10.5152/tftrd.2014.33716

Biddle, S., Fox, K. R., Boutcher, S. H., & Ebook Central (e-book collection). (2000;2003;). *Physical activity and psychological well-being* (1st ed.). New York; London: Routledge. doi:10.4324/9780203468326

Borg, G. A. V. (1982). Psychophysical bases of perceived exertion. Medicine and Science in Sports and Exercise, 14(5), 377-381. 10.1249/00005768-198205000-00012

Committee, O. T. E. O. S. (Ed.). (1990). *Crew size and maritime safety*. Retrieved from https://ebookcentral.proquest.com

Costa, G. (1996). The impact of shift and night work on health. *Applied Ergonomics, 27*(1), 9-16. 10.1016/0003-6870(95)00047-X

Cropanzano, R., Rupp, D. E., & Byrne, Z. S. (2003). The relationship of emotional exhaustion to work attitudes, job performance, and organizational citizenship behaviors. *Journal of Applied Psychology, 88*(1), 160-169. doi:10.1037/0021-9010.88.1.160

Denscombe, M. (2016). *Forskningshandboken: För småskaliga forskningsprojekt inom samhällsvetenskaperna* (3., rev. och uppdaterade uppl. ed.). Lund: Studentlitteratur

Dishman, R. K., Oldenburg, B., O'Neal, H., & Shephard, R. J. (1998). Worksite physical activity interventions. *American Journal of Preventive Medicine, 15*(4), 344-361. doi:10.1016/S0749-3797(98)00077-4

Driver, H. S., & Taylor, S. R. (2000). Exercise and sleep. *Sleep Medicine Reviews, 4*(4), 387-402. doi:10.1053/smrv.2000.0110

El-Gamal, H., Khayat, A., Shikora, S., & Unterborn, J. N. (2005). Relationship of dyspnea to respiratory drive and pulmonary function tests in obese patients before and after weight loss. *Chest, 128*(6), 3870-3874. doi:10.1378/chest.128.6.3870

Gerber, M., Jonsdottir, I., Lindwall, M., & Ahlborg, G. (2014). Physical activity in employees with differing occupational stress and mental health profiles: A latent profile analysis. *Psychology of Sport and Exercise, 15*(6), 649-658. doi:10.1016/j.psychsport.2014.07.012

Hansen, A., & Zachrisson, L. (2016). *Hjärnstark: Hur motion och träning stärker din hjärna*. Stockholm: Fitnessförlaget.

Henriksson, J. (1998). Regelbunden fysisk aktivitet minskar risken för hjärtkärlsjukdom. Läkartidningen 1998; 95: 5894-5896

Hetherington, C., Flin, R., Mearns, K. Safety in shipping: The human element (2006) *Journal of Safety Research*, 37 (4), pp. 401-411. doi: 10.1016/j.jsr.2006.04.007

Laskowski, E. R. (2012). The role of exercise in the treatment of obesity. *PM and R, 4*(11), 840-844. doi:10.1016/j.pmrj.2012.09.576

Lee, I., Djoussé, L., Sesso, H. D., Wang, L., & Buring, J. E. (2010). Physical activity and weight gain prevention. *Jama, 303*(12), 1173-1179. doi:10.1001/jama.2010.312

Lodde, B., Jegaden, D., Lucas, D., Feraud, M., Eusen, Y., & Dewitte, J. (2008). Stress in seamen and non seamen employed by the same company. *International Maritime Health, 59*(1-4), 53-60

Louie, V. W., & Doolen, T. L. (2007). A study of factors that contribute to maritime fatigue. *Marine Technology and SNAME News, 44*(2), 82

McAloon, C., Boylan, L., Hamborg, T., Stallard, N., Osman, F., Lim, P., & Hayat, S. (2016). The changing face of cardiovascular disease 2000-2012: An analysis of the world health organisation global health estimates data. *International Journal of Cardiology, 224*, 256-264. 10.1016/j.ijcard.2016.09.026

Oldenburg, M., Jensen, H., Latza, U., & Baur, X. (2009). Seafaring stressors aboard merchant and passenger ships. *International Journal of Public Health, 54*(2), 96-105. doi:10.1007/s00038-009-7067-z

Penedo, F. J., & Dahn, J. R. (2005). Exercise and well-being: A review of mental and physical health benefits associated with physical activity. *Current Opinion in Psychiatry, 18*(2), 189-193. doi:10.1097/00001504-200503000-00013

Proper, K. I., Koning, M., van der Beek, Allard J, Hildebrandt, V. H., Bosscher, R. J., & van Mechelen, W. (2003). The effectiveness of worksite physical activity programs on physical activity, physical fitness, and health. *Clinical Journal of Sport Medicine, 13*(2), 106-117. doi:10.1097/00042752-200303000-00008

Reiter, R. J. (1993). The melatonin rhythm: Both a clock and a calendar. Experientia, 49(8), 654-664. 10.1007/BF01923947

SCB (2017), *Levnadsförhållanden* – Rapport 128. Fritid 2014–2015

Ståhle, A. (2004). Kranskärlssjukdom kräver livslång regelbunden fysisk träning. *Läkartidningen, 101*(39), 2988-2990

WHO. (2014). Mental health: A state of well-being. Retrieved from:

http://www.who.int/features/factfiles/mental_health/en/

WHO (2017), recommendations for physical activity. Retrieved from:

http://www.who.int/mediacentre/factsheets/fs385/en/

Xiao, J., SpringerLink (Online service), & SpringerLink (e-book collection). (2017). *Exercise for cardiovascular disease prevention and treatment: From molecular to clinical, part 1*. Singapore: Springer Singapore

Xiao, J., Xiao, Zhao, & SpringerLink (e-book collection). (2017). *Exercise for cardiovascular disease prevention and treatment*. S.l.: Springer

Appendix

Health and well-being at sea

This questionnaire is part of the basis for our bachelor thesis at the Master Mariner program at Chalmers University of Technology, where we investigate if health and well-being within the Swedish maritime industry.
It is completely voluntary to participate, and your answers will be collected anonymously.
The survey takes about 5 minutes to complete.
If you have any questions regarding the questionnaire, please contact us via email: marcusoscar.exjobbb@gmail.com
Thank you for your participation!
//Oscar Carlzon
Marcus Carlsson

Demography

1. Your age
    - 18-25
    - 26-35
    - 36-45
    - 46-55
    - 56-65
    - 65+

2. Gender
    - Female
    - Male
    - Does not want to disclose

3. What kind if vessel do you work on?
    - Tank
    - Roro
    - RoPax
    - Bulk
    - Cruise
    - Offshore
    - Other:

4. Which department do you belong to?
    - Deck
    - Engine
    - Hotel department
    - Other:

5. Are you:
    - Watch keeping – 6/6
    - Watch keeping – 4/8
    - Other watch keeping
    - Dayshift
    - Other:

Exercise habits

6. How often do you exercise ONBOARD?
    - Not at all
    - Less than 1 time/month
    - 1-2 times/month
    - 1 time/week
    - 2-3 times/week
    - 4 times/week or more

7. What kind of exercise do you practise ONBOARD?
    - Weight training
    - Cardio
    - Mobility training
    - Team sport
    - Individual sport
    - Other:

8. How often do you exercise ASHORE?
    - Not at all
    - Less than 1 time/month
    - 1-2 times/month
    - 1 time/week
    - 2-3 times/week
    - 4 times/week or more

9. What kind of exercise do you practise ASHORE?
    - Weight training
    - Cardio
    - Mobility training
    - Team sport
    - Individual sport (e.g. tennis, badminton, golf)
    - Other:

Equipment onboard

10. How would you rate the exercise equipment onboard your vessel 1-5 (where 1 = very poor and 5 = excellent)

1 2 3 4 5

11. What type of equipment is there onboard?

12. Is there any equipment that you miss onboard?

13. Would you exercise more if there were better equipment onboard?

- Yes
- No
- Don't know

Please motivate

Miscellaneous

14. Why do you exercise?

- Improve physics
- Weight reduction
- Relaxation
- Improve sleep
- Stress management
- Other:

15. Do you feel encouragement from the company towards regular exercise?

- Yes
- No

Please motivate

16. Do you feel that you have time to exercise while onboard?

- Yes
- No

Please motivate

17. What is your attitude towards a possibility to be able to exercise on work hours on a scale from 1-5 (where 1 = negative and 5 = positive)

1 2 3 4 5

18a. Do your employer offer healthcare allowance?

- Yes
- No
- Don't know

18b. Do you use the healthcare allowance?

- Yes
- No

18c. What kind of healthcare allowance do the company offer?

Thank you for your participation!