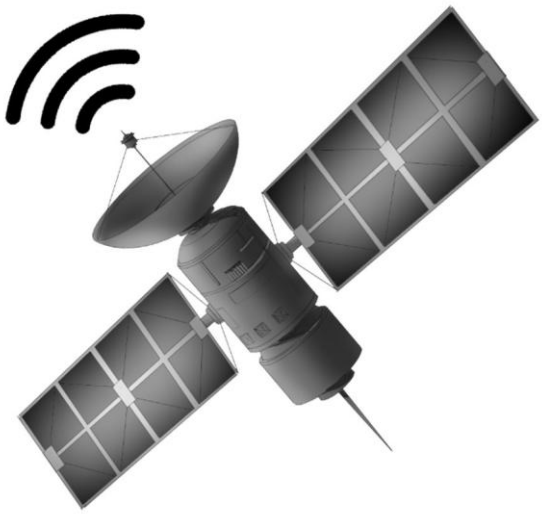


Transforming Seafarers Lives:

The Impact of Internet Connectivity Onboard

A quantitative study based on survey data from active seafarers

Bachelor thesis for the Marine Engineering Program

JEAN-PIERRE BOVIN
OLIVIA ISAKSSON

DEPARTMENT OF MECHANICS AND MARITIME SCIENCES

CHALMERS UNIVERSITY OF TECHNOLOGY
Göteborg, Sweden, 2025

Transforming Seafarers Lives:

The Impact of Internet Connectivity Onboard

A quantitative study based on survey data from active seafarers

Bachelor thesis for the marine engineering program

JEAN-PIERRE BOVIN
OLIVIA ISAKSSON

Department of Mechanics and Maritime Sciences

Division for Maritime Studies
CHALMERS UNIVERSITY OF TECHNOLOGY
Göteborg, Sweden 2025

Transforming seafarers' life: The impact of internet connectivity onboard
A quantitative study based on survey data from active seafarers

JEAN-PIERRE BOVIN
OLIVIA ISAKSSON

© JEAN-PIERRE BOVIN, 2025
© OLIVIA ISAKSSON, 2025

Department of Mechanics and Maritime Sciences
Chalmers University of Technology
SE-412 96 Göteborg
Sweden
Telephone: + 46 (0)31-772 1000

Cover: Illustration of a communication satellite by Olivia Isaksson.

Department of Mechanics and Maritime Sciences
Chalmers University of Technology
Göteborg, Sweden 2025

PREFACE

This report was written during the spring of 2025 as a Bachelor thesis in the Marine engineering program at Chalmers University of Technology.

The idea for this study sprung out from the knowledge of the high turnover rates in the shipping industry. Since the vessel both acts as the seafarer's workplace and home for an extended period of time, good well-being is extremely important for the crew. The time away and distance from family, friends and society will always be a challenge for many individuals working at sea, leaving the internet connection as the one and only link to home. During our time onboard different vessels as engine cadets, we have both experienced what internet access on board can be like. Ranging from unlimited high bandwidth internet connections similar to the ones at home to extremely limited ones allowing only a few hundred megabytes per person and day. Sometimes there could be as much as one week of downtime depending on the heading of the vessel, due to the funnel shadowing the antenna in the direction of the satellite. This, among other things such as low bandwidth and latency caused a lot of frustration for the crew.

With this in mind, we want to determine if the quality of the internet access available to crew onboard has a measurable effect on the seafarer's general well-being and decision to keep on working onboard.

We would like to thank Monica Lundh at Chalmers University of Technology for supervising this study with all her expertise, and all shipping companies who sent our survey to their vessels. We also want to thank all crew who took their time to answer our survey to make this study possible.

Jean-Pierre Bovin & Olivia Isaksson, 2025

Transforming seafarers' life: The impact of internet connectivity onboard
A quantitative study based on survey data from active seafarers

JEAN-PIERRE BOVIN
OLIVIA ISAKSSON

Department of Mechanics and Maritime Sciences
Chalmers University of Technology

SAMMANDRAG

Sjöfarten står inför en växande utmaning när det gäller att rekrytera och bibehålla sjömän, där höga personalomsättningar och en brist på personal utbildad och certifierad enligt International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) är ett globalt branschproblem.

En av de kritiska faktorerna som potentiellt kan påverka sjömäns välbefinnande och karriärval är tillgången till internet ombord. Historiskt sett har sjömän varit isolerade från familj, samhälle och vänner under långa perioder, vilket kan leda till ökad emotionell belastning, sänkt arbetstillfredsställelse och vara en anledning till att sjömän väljer att gå iland. Framsteg inom satellitteknik, såsom Starlink, har dock förbättrat tillgängligheten av internet till sjöss och kan därmed kanske förändra sjöfararnas upplevelse av yrket.

Denna studie undersöker hur tillgången till och kvaliteten på Internet ombord påverkar sjömäns välbefinnande, arbetstillfredsställelse och vilja att stanna kvar i branschen.

Data har samlats in genom en enkät där aktiva sjömän fått svara på frågor som rör välmående (WHO-5) i kombination med frågor som rör kvalitén på internetuppkoppling ombord och deras prioriteringar gällande internetuppkoppling ombord. Denna studie pekar på vilken roll internetuppkoppling ombord spelar gällande rekrytering av sjömän, besättningens arbetsmoral och övergripande välmående.

Resultaten visar att internetuppkoppling har en positiv, men inte avgörande påverkan på välbefinnandet. Respondenternas genomsnittliga WHO-5 poäng var 69,0 %. Totalt uppgav 43.0% att de inte skulle fortsätta arbeta till sjöss utan tillgång till internet, och de flesta ansåg att internetuppkoppling är en viktig faktor vid val av arbetsgivare. Åldersgrupperna 18–24 och 45–54 lade störst vikt vid internetuppkoppling vid jobbsökande.

Nyckelord: internetuppkoppling till sjöss, sjömäns välbefinnande, psykisk hälsa inom sjöfarten, personalomsättning till sjöss, maritim arbetsmiljö, sjömäns välbefinnande, WHO-5, satellit internet, åldersgrupper till sjöss

Transforming seafarers' life: The impact of internet connectivity onboard
A quantitative study based on survey data from active seafarers

JEAN-PIERRE BOVIN
OLIVIA ISAKSSON

Department of Mechanics and Maritime Sciences
Chalmers University of Technology

ABSTRACT

The maritime industry is facing a growing challenge in recruiting and retaining seafarers, high turnover rates and a shortage of seafarers educated and certified by the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) is a worldwide industry problem.

One of the critical factors potentially influencing seafarers' well-being and career decisions is internet access onboard. Traditionally in history, seafarers have been isolated from family, society and friends for extended periods of time, leading to increased emotional strain, job dissatisfaction and a proved reason for seafarers to go ashore. However, advancements in satellite technology such as Starlink, have improved internet accessibility at sea, potentially transforming the seafaring experience.

This study investigates how the availability and quality of onboard internet access impact seafarers' well-being, job satisfaction, and retention rates. Through a survey, active seafarers have answered questions regarding their well-being (WHO-5) in combination with questions about the quality of the internet connection onboard their ships and their priorities regarding it. This study explores which role internet connectivity plays in retention, crew morale, and overall occupational wellbeing of seafarers.

Results show internet access as having a positive but non-decisive impact on well-being. The average WHO-5 score of respondents was 69.0%. In total, 43.0% of respondents stated they would not remain working at sea without internet access, and most considered internet access an important factor when choosing an employer. The 18–24 and 45–54 age groups placed the highest importance on internet access during job applications.

Keywords: internet connectivity at sea, seafarer well-being, seafarer turnover, seafarer retention, satellite internet, occupational well-being, WHO-5, age groups at sea

TABLE OF CONTENTS

1. Introduction 1
1.1 Aim of the report 3
1.2 Research questions 3
1.3 Delimitations 3
2.Theory 4
2.1 Internet Access, a human right 4
2.2 How internet access is taken for granted 5
2.3 Seafarer retention and turnover 5
2.4 Well-being of seafarers with focus on mental health 6
2.5 The WHO-5 Index 7
2.6 Technical aspects of internet access at sea 8
2.7 Cost of marine internet solutions 9
3. Methods 10
3.1 Literature research & search methods 10
3.2 Creating the survey 11
3.3 Scoring and evaluation of WHO-5 data 11
3.3.1 Purposive sampling 12
3.4 Reaching out to seafarers with the survey 12
3.5 Analyzation of data 12
3.6 Ethics 12
4. Results 13
4.1 Demographic overview 13
4.2 Respondents WHO-5 score 14
4.2.1 WHO-5 scores across positions onboard 15
4.3 Internet access & it's effect on well-being 17
4.4 Internet access satisfaction compared to WHO-5 scores 18
4.5 Consideration of internet access in job applications 19
5. Discussion 23
5.1 Internet and the effect on crew well-being 23
5.1.1 Higher well-being with higher internet access satisfaction 24

5.1.2 WHO-5 score of respondents 24
5.1.3 Age groups and internet 25
5.1.4 Internet and the effects on crew member retention 25
5.2 Methods 25
5.2.1 Validation of methods 26
5.2.2 Reliability of methods 26
6. Conclusions 27
7. Recommendations for further research 28
7.1 Global study 28
7.2 Vessel types 28
7.3 Survey questions 28
7.4 Qualitative interviews 28
References 29
Appendix 1 34
Survey: Crew well-being and internet access 34

LIST OF FIGURES

Figure1. WHO-5 score across positions onboard 13
Figure 2 Gender 13
Figure 3. Responding crew's total and mean WHO-5 score 14
Figure 4. WHO-5 score across positions onboard 15
Figure 5. My day was filled with things that interest me 15
Figure 6. I woke up feeling rested 16
Figure 7. WHO-5 scores across age groups 16
Figure 8. Does internet access positively affect your well-being? 17
Figure 9. WHO-5 score compared to internet access satisfaction 18
Figure 10. Do you consider internet access before applying for a job? 19
Figure 11. Does your vessel offer limited or unlimited internet access? 20
Figure 12. How do crew use the internet access? 21
Figure 13. Would you still be a seafarer if internet was not available? 21
Figure 14. Would you stay at sea without internet- by age 22

LIST OF TABLES

Table 1. Overview of the WHO-5 index 11
Table 2. Satisfaction with onboard internet by access type 20

ACRONYMS AND TERMINOLOGY

STCW	International Convention on Standards of Training, Certification and Watchkeeping for Seafarers. A set of minimum international regulations established by the International Maritime Organization (IMO) to ensure that seafarers are properly trained and certified for their duties onboard.
V-SAT	Very small aperture terminal. A type of satellite communication system used on ships, consisting of a dish antenna capable of sending and receiving signals via geostationary satellites approximately 36000km above the earth surface to provide internet and telecommunication.
WHO	World Health Organization. Part of the United Nations responsible for international public health, known for establishing guidelines and tools such as the WHO-5 well-being index used to assess wellbeing and quality of life.
LEO	Low Earth Orbit. A satellite orbit ranging between 160 and 2000km above the earth's surface. LEO satellites, such as those used by starlink offer lower latency and higher bandwidth compared to V-SAT.

	Maritime Labour Convention. An international agreement that was signed in 2016 and entered into force in 2013.
MLC	adopted by the International Labour Organization (ILO) aimed at protecting the rights and welfare of seafarers by setting minimum working and living standards onboard merchant vessels.
Bunker Vessel	A specialized tanker designed to deliver fuel (bunkers) to other ships, usually operating in port areas or coastal waters.
ISP	Internet Service Provider. A company or entity that provides internet connectivity services to customers, including ships at sea. In the maritime sector, ISP may use satellite technologies like V-SAT or LEO constellations to provide internet and telecommunication services.
GDPR	General Data Protection Regulation. A European Union regulation on data protection and privacy that applies to all individuals within the EU and the European Economic Area (EEA). It governs how personal data is collected, stored and processed. It is particularly relevant in research involving human participants.
Retention	The ability of the maritime industry to keep seafarers in their roles at sea over time, reducing loss of experienced crew.

1. INTRODUCTION

There is a growing concern in the maritime industry as the supply of qualified seafarers is struggling to keep up with increasing demand. In 2021, a global shortage of 26,240 officers was reported (International Chamber of Shipping, 2021). To reverse this trend, efforts are needed to both increase the number of students graduating in compliance with the Standards of Training, Certification and Watchkeeping for Seafarers (STCW) and to reduce the high turnover rates among active seafarers (International Chamber of Shipping, 2021). This shortage is worsened by the industry's persistent turnover problem (Yuen et al., 2018; International Chamber of Shipping, 2021).

Psychosocial factors such as isolation from family and society are among the leading reasons many choose not to pursue or continue a career at sea (Yuen et al., 2018). Life onboard can be demanding and starkly different from life ashore. Long working hours, interrupted sleep patterns, hard physical labor, high temperatures, and cultural or social tensions among crew members can contribute to stress, anxiety, and emotional fatigue (Zhou & Zhang, 2024; Žuškin et al., 2017).

Historically, seafarers have faced long periods of isolation from loved ones, with few or no opportunities for communication. This began to change in the mid-1970s with the launch of Comsat's Marisat satellites, the first dedicated maritime communication satellites (Boeing, 2009). Companies like Inmarsat soon followed (Dalgleish, 1989; Inmarsat, n.d.). By the early 1980s, satellite communication enabled the use of telex printers and voice calls (LaRosa, 1977), and by the early 1990s, email. Although primarily limited to ship-to-office communication (Haugli, 1990).

A significant shift came in the mid to late 2000s as crew internet access began to emerge onboard. However, early access was extremely limited in both data volume and speed, often confined to specific areas like the messroom or dayroom. With the narrow bandwidths at the time, business communication took priority over crew needs and connectivity "blind spots" lasting up to 14 days were not uncommon (Collins & Hogg, 2004). When internet access was made available for private use, it was often heavily restricted in terms of daily or monthly data limits, and in many cases, crew members were required to pay to top up their data or even to connect at all (Oldenburg & Jensen, 2019).

Over time, improvements in satellite technology have enhanced both the bandwidth and coverage of onboard internet, making private access more widely available (Waterman, 2024). However, accessibility still varies significantly depending on the vessel's flag state and the policies of the shipping company (Waterman, 2024).

In the 2020s, emerging technologies are addressing the limitations of capacity and cost. Services like Starlink now offer near-global high-speed coverage (Murray, 2023). Reliable internet access

has become increasingly vital in retaining seafarers, as time away from family and friends remains one of the most significant reasons for leaving the profession (Oldenburg & Jensen, 2019). Highspeed, unlimited internet could substantially enhance seafarers' well-being and help make the profession more attractive to new recruits (Bissias et al., 2024).

Improved connectivity may also lead to higher scores on the World Health Organization-5 WellBeing Index (WHO-5), a widely used tool that assesses well-being through five self-rated questions. Higher scores on this index reflect a better well-being which is critical for sustainable careers at sea.

Increasing occupational well-being can reduce mental strain, boost morale, and potentially transform the perception of seafaring as a career. A crew that feels supported and connected is likely to perform better and remain longer in the profession, leading to improved retention rates and a healthier, more sustainable maritime workforce.

The maritime industry is currently facing a dual challenge: a growing global shortage of STCW certified seafarers and increasing difficulty in retaining seafarers. According to the Seafarer Workforce Report (2021), high turnover rates remain one of the main contributors to this shortage. Younger seafarers are viewing the seafaring career more as a temporary profession instead of a lifelong career due to a shift in priorities, where seafarers born after 1981 are valuing a balance of work and family relations higher compared to older generations (Liu, et.al, 2024). Many choose to leave the profession due to the prolonged periods of isolation, emotional strain and the mental toll of being disconnected from life ashore (Uçak & Çelik Maşalacı, 2025).

Society is becoming increasingly digitalized, and individuals are becoming more and more dependent on a reliable internet connection to manage daily life, Generation Z has grown up connected and has a bigger portion of their everyday life online compared to the older generations. Investing in a good high bandwidth crew internet connection could potentially make the industry more appealing and decrease turnover rates.

1.1 Aim of the report

This study aims to investigate potential correlations between higher well-being scores and satisfactory internet access, as well as how crew members in different age groups perceive and prioritize internet connectivity when considering employment with a shipping company. It also examines whether internet access influences seafarers decisions to remain in the profession.

Ultimately, this report seeks to highlight the growing importance of social IT infrastructure onboard merchant vessels and its role in making the maritime industry more appealing to current and future seafarers.

1.2 Research questions

- Is satisfactory internet access linked to better well-being?
- How do different age groups prioritize access to the internet onboard?
- How does internet access affect crew member retention?

1.3 Delimitations

To ensure a credible and focused analysis, this study is confined to Swedish shipping companies and crew members working onboard vessels managed from Sweden, regardless of the ship's flag or crew nationality. Companies operating bunker vessels, inshore ferries, and tugboats have been excluded, as these vessels typically do not engage in extended sea voyages and often remain within mobile coverage areas. Often these ships are too small to accommodate all crew members overnight and crew generally spend nights ashore at home or in hotels, meaning they have regular access to mobile networks or Wi-Fi during off-hours.

2.THEORY

The number of crew onboard merchant vessels today often only meets the minimum requirements set by the flag state, or slightly exceeds it (Hand, 2020). This minimal crewing standard contributes to longer watchkeeping duties and increased workloads (Brooks & Greenberg, 2022). At the same time, tighter port schedules and faster turnaround times have drastically reduced opportunities for shore leave (The Mission to Seafarers, 2024). These combined factors can lead to elevated stress, fatigue, and overall strain on the crew.

Seafaring also presents unique challenges not typically encountered in other professions. One of the most significant differences compared with most shore-based work is the prolonged separation from family, friends, and broader society. Depending on contract length and vessel type, seafarers can spend anywhere from a few weeks to over six months at sea and in extreme cases even longer. This extended absence can place strain on personal relationships and is a well-documented factor contributing to emotional distress. In fact, family-related concerns have been cited as one of the leading causes of low mood and depression among seafarers (Sampson & Ellis, 2019).

To cope with isolation and loneliness, many seafarers turn to the internet as a vital tool for staying connected with loved ones (Sampson & Ellis, 2019). Internet access is playing an increasingly critical role in the well-being of seafarers. According to a study by Futurenautics Ltd. (2018), internet access ranked as the fifth most important amenity provided by shipping companies. Moreover, 92% of the 6,000 seafarers surveyed stated that internet availability influenced their choice of employer.

The Seafarer Workforce Report 2021, published by BIMCO, highlights high turnover rates as the primary driver of the global shortage of seafarers. While the global merchant fleet continues to grow, many seafarers are choosing not to remain in the profession. Long periods away from loved ones and the isolating nature of life at sea are key reasons why many transitions to shore-based careers (Uçak & Çelik Maşalacı, 2025).

Considering these challenges, it is essential to improve the attractiveness of the seafaring profession, as noted by Collins & Hogg (2004). This includes enhancing onboard conditions to more closely resemble the living standards found ashore.

2.1 Internet access, a human right?

In recent years, the discourse surrounding internet access has evolved with increasing recognition of connectivity as a fundamental human right (Office of the United Nations High Commissioner for Human Rights, 2023; La Rue, 2011) The United Nations has emphasized that access to the internet is essential for the realization of various human rights, including freedom of expression and access to information. In 2011, the UN Special Rapporteur highlighted the indispensable role of the internet in enabling individuals to exercise their rights and called upon states to ensure universal access to the internet (La Rue, 2011). In 2022, the International Labour Organization (ILO) adopted amendments to the Maritime Labour Convention (MLC), 2006, introducing

provisions to enhance seafarers' access to internet connectivity on board ships (International Labour Organization, 2024). These amendments were set to enter into force on 23 December 2024. The amendments to MLC 3.1 Accommodation and recreational facilities of the MLC, which require that shipowners provide appropriate recreational facilities, amenities, and services, including social connectivity, adapted to meet the special needs of seafarers who must live and work on ships. This includes, as far as reasonably practicable, providing seafarers with internet access on board, with any charges for such services being reasonable in amount (International Labour Organization, 2022).

2.2 How internet access is taken for granted

The Swedish society is highly digitalized and requires internet access for all individuals to perform bank errands, reach government services, book medical appointments and much more (Edwall, 2022). The electronic ID service bank-id is often the only option for individuals to identify themselves online to access services mentioned above, which creates a “all eggs in one basket” situation with little to no redundancy (Freja eID, 2022). According to a report by Internetstiftelsen (2024) on the use of digital services, the Swedish electronic id service bank-id was used by 92% of the Swedish population in 2023. The digital mailbox service Kivra was used by 7 of 10 swedes in 2024 and the payment app Swish was used by 9 of 10 swedes in the year 2021. The ability for an individual to receive important information and handle matters with a few touches on their phone, has made the Swedish society to expect that an individual will handle matters without latency anywhere and anytime. But for a seafarer which doesn't always have access to a stable internet connection, this is not always possible.

Digital meetings with medical health professionals are also common in Sweden. According to a report by SCB (2023) 76% of Swedish citizens in 2023 used internet to seek information about illness or treatment and 44% used digital services to communicate with healthcare staff trough text. Other common ways to utilize digital services were video calls with healthcare staff, scheduling appointments, renewing prescriptions, reading test results and comparing different health care providers (SCB, 2023). What the online meeting can offer is limited and thus an in-person examination can be needed. Access to the internet makes it possible for seafarers to directly consult a medical professional directly without leaving their workplace. These changes were driven by the recognition of the critical role that internet access plays in ensuring the mental health and wellbeing of seafarers, particularly highlighted during the COVID-19 pandemic when many seafarers faced extended periods at sea without the ability to communicate with their families (Grey, 2020; International Labour Organization, 2022)

2.3 Seafarer retention and turnover

Salary has been identified as a primary motivator for individuals choosing a seafaring career, this is particularly true for individuals from developing countries, where the wages at sea significantly surpass those offered by land-based employment (Baum-Talmor, 2020; Skripnik, 2024). The seafaring profession is especially appealing to young individuals due to the relatively high starting salaries and the potential for rapid income growth with each promotion. Moreover, research

suggests that many seafarers either come from maritime families or have personal connections within the profession, which may influence their career choice (Barnett et al., 2006). However, retention remains a challenge, as many new seafarers regard the profession as a temporary career. Common trajectories include setting promotion-based goals, such as reaching the rank of second or chief engineer or establishing financial milestones before transitioning to shore-based careers (Baum-Talmor, 2020). Barnett et al. (2006) further observe that many seafarers choose to leave the profession in their late twenties or early thirties, coinciding with the life stage of starting a family. Beyond salary, access to communication has become a critical factor for retention given the isolation inherent to life at sea, internet access serves as the primary means of maintaining contact with family, friends, and the broader world. A study by Papachristou et al. (2014) found that two-thirds of respondents would not have continued their seafaring careers without access to the internet. Limited communication opportunities were identified as a leading reason why seafarers leave the industry, even among those who initially had a positive outlook on the profession.

Additionally, the INTERTANKO (2024) survey highlights onboard living and working conditions as key drivers for turnover rates. While there is no single solution to improving retention, enhancements in onboard conditions and reforms in human resources practices, particularly those that strengthen the relationship between seafarers and their employers could prove beneficial.

Creating an environment where seafarers feel valued and heard may contribute to lessen retention rates among seafarers (Martide, 2021).

Other studies also indicate that negative experiences during cadetship, such as inadequate support, poor treatment, or harassment deter many young individuals from continuing in the profession, thus quitting their maritime studies after or during their cadetship (Caesar, Cahoon, & Fei, 2015; Çelik Maşalacı, 2024). In contrast, Kypriotaki (2024) reports that for Generation Z cadets, being treated well onboard was the most important factor at sea.

2.4 Well-being of seafarers with focus on mental health

The World Health Organization (2004) defines healthy well-being as a state of mind where the individual realizes his or her own abilities, can cope with the normal stresses of life, can work productively, fruitfully and is able to contribute to his or her community. Well–being is defined as a state of mind in which the Individual thrives, rather than just the lack of mental illnesses (World Health Organization, 2004). Reliable data of seafarers' well-being has not been able to show that depression and anxiety affect seafarers more in comparison to the general population, as shown in a research report by Sampson & Ellis (2019), reinforced by the results from Hayes-Mejia & Stafström (2024) who investigated 13008 seafarers globally with a survey using the WHO-5 Index. The results from their respondents were 77.2% and 81.7%. An indication of the average well-being of the European population can be seen in the study by Office for National Statistics (2017) which concluded that the British general population had a mean WHO-5 score of 53% and the Danish general population had the highest mean score in Europe with 70%. However, it has

been clearly shown in studies that seafarers' have higher rates of suicide compared to the population ashore, while other studies have found the suicide rates of seafarers to be comparable with the general population (Sampson & Ellis, 2019). Compiled data of seafarer deaths at sea between 1960-2009 revealed that 5.9% of documented mortalities were suicides and this number increased to 13.1% compared to deaths caused by illness (Iversen, 2012). Risk factors contributing to the risk of suicide onboard include isolation from family, alcohol consumption, psychoses and accessible means to commit suicide by drowning (Andruskiene et al., 2016). The consequence of suicide could affect not only the families of seafarers but also the morale of the crew.

Seeking medical care onboard could be difficult, as land based medical facilities may be inaccessible. The Maritime Labour Convention (MLC) states that every seafarer should receive medical care at least comparable to shore based medical care (ILO, 2006). According to MLC this requirement can be met by having a physician on board or at least one seafarer on board who is certified and competent in providing medical care according to the minimum requirements for competence in section A-VI/4 table A-VI/4-2 of STCW (ILO, 2006). A crewmember is typically designated as medically responsible on board to provide medical care and coordinate with health care professionals ashore (IMO,2010). To receive care, an unwell seafarer would have to open up about their health problems directly to the medically responsible person on board, who is also their coworker. Stigma towards mental illnesses may discourage seafarers from seeking mental health care while in service out of fear to be labeled as mentally ill (Iversen, 2012). Section A-I/9 of STCW requires personnel working on ships to be certified as medically fit by a medical practitioner (IMO, 2010). Pre-employment screenings may weed out workers that exhibit or selfreport symptoms of mental ill health (Grøn, Knudsen, 2012). Stressors that negatively affect the well-being of seafarers include factors such as absence from family and friends, loneliness, isolation, insufficient sleep, long work hours, lack of shore leave, stress and bullying (Sampson & Ellis, 2019). This highlights the importance of private, accessible communication for supporting seafarers' mental health. Reliable internet access could help mitigate these problems by enabling contact with family, friends, and external health professionals, without needing to involve shipboard colleagues. Access to online health services can be important for maintaining well-being in an environment where traditional healthcare resources are limited (Yuen et al., 2022).

2.5 The WHO-5 Index

“The WHO-5 Index is a self-report instrument measuring well-being. It consists of five positive and noninvasive statements regarding the well-being experienced during the past two weeks. Each statement is rated on a 6-point scale, with higher scores indicating better well-being. The instrument has been translated into over 30 languages since its introduction in 1998” (World Health Organization, 2024). The WHO-5 scale has been utilized in many medical fields and is widely accepted as a credible source to determine the well-being of an individual (Topp et al., 2015). The WHO-5 Well-Being Index was developed as a condensed version of the WHO-10 scale, which itself originated from a broader 28-question index. The 28-question index was compiled using elements from the established mental health instruments Zung Self-Rating

Depression Scale and the General Health Questionnaire, both widely used to detect common psychiatric conditions. These parent instruments exist in multiple forms, varying in the number of questions, structure and format. Unlike these previous scales, which included both positively and negatively worded statements, the WHO-5 index consists solely of positively phrased statements. This design choice reflects the World Health Organization's intent to capture aspects of positive mental well-being rather than symptoms of distress. As a result, the WHO-5 offers a well-being score that ranges from 0% indicating the complete absence of well-being to 100%, representing optimal well-being (Topp et al., 2015).

2.6 Technical aspects of internet access at sea

Modern internet connectivity on the high seas is facilitated through various satellite communication technologies, notably Very Small Aperture Terminal (V-SAT) systems and emerging services like Starlink. V-SAT systems utilize stabilized dish antennas to establish communication and track geostationary satellites positioned approximately 36,000 kilometers above the equator (VAST Antenna, 2020). Geostationary means that the satellite takes 24 hours to complete its orbit and is thus rotating together with the planet, geographically locked to one area. This means that vast areas can be covered with only a few satellites (Atekro, 2024).
In contrast, Starlink developed by SpaceX utilizes a large amount of low Earth orbit (LEO) satellites orbiting at altitudes between 340 to 1,200 kilometers above the earth. This closer proximity enables lower latency and higher bandwidth compared to V-SAT (Atekro, 2024). Starlink's user receiver antennas track the satellites using electronically controlled phased-array antennas, allowing tracking of rapidly moving satellites without mechanically adjusting the antenna. This makes the antenna cheaper in comparison with a traditional V-SAT antenna. Starlink, among other upcoming LEO satellite systems, can enable global coverage providing an alternative to traditional geostationary satellite-based systems like V-SAT.

Right now, ships provided with Starlink utilizes a dual system connection, that is a V-SAT system in combination with most commonly Starlink, where the Starlink antenna supply the vessel with internet and in case of loss of connection, the V-SAT system will automatically takeover. Dual setup is necessary due to the fact that so far (2025) Starlink offers no guarantees of functionality to shipping companies who are always reliant on a constant and reliable connection but on the other hand the prices for installing and operating a Starlink system onboard are estimated to be about ¼ the price of a traditional V-SAT system (Waterman, 2024).

Cruise ships and ferries with capacity for many passengers often utilize more than one system onboard such as switching from satellite based to cellular based connections when close to shore or in port. These ships may also feature 4G and 5G reception for its passengers and crew onboard while at sea through the V-SAT system.

2.7 Cost of marine internet solutions

The information listed below comes from gray sources, is highly generalized and can vary depending on which internet service provider (ISP) is responsible for providing the hardware and internet connection. The purpose of this section is to shed light on the differences in cost between the different technologies in use today.

V-SAT Systems

The initial investment for installing a modern V-SAT system can range from approximately $8,000 to $15,000, (VAST Antenna, 2024) depending on several factors such as which ISP is chosen and the specific requirements of the vessel in question.

Monthly Service Fees

The service fees for modern VSAT services vary based on factors such as data usage, and service plans. On average these fees are around $1,500 per month but can be as high as $4,000 per month (Hellenic Shipping News Worldwide, 2021).

Starlink

SpaceX's Starlink has introduced a maritime-specific service offering high-speed, low-latency internet connectivity. Starlink is also available through different service plans with other companies who have traditionally been providing V-SAT services to the maritime sector. These services can often combine V-SAT and Starlink into one combined system. The prices listed below are taken from Starlink Maritime.

Hardware Costs

The Starlink Maritime service requires a one-time antenna purchase set at $1,500 as of Mars 2025. (SpaceX, n.d.).

Monthly Service Fees:

Global Priority 500GB

$650/month, ideal for small businesses with below-average bandwidth needs (SpaceX, n.d.).

Global Priority 1TB: $1,150/month, designed for small to midsize businesses with average bandwidth needs

Global Priority 2TB: $2,150/month, best for midsize businesses with above-average bandwidth needs (SpaceX, n.d.).

3. METHODS

This report is built on a quantitative study using a survey to collect research data. This chapter presents the keywords, websites, and material used to create and distribute the survey as well as analyze the collected data providing the results for this report.

3.1 Literature research & search methods

Through Chalmers library database-search, information was gathered from existing reports and from previous studies regarding crew member well-being, factors that affects mental health, crew member retention statistics and what causes the younger generations to not become seafarers. From this information it could be concluded that a good internet connection potentially could have an increasingly positive role to play in decreasing the turnover rates and thus making the seafaring career more attractive. With this information the foundation for the study was built upon and the decision to create a web survey that would focus on the WHO-5 well-being index combined with questions about internet satisfaction, to determine if there exist connections between a good wellbeing and access to satisfactory internet onboard. The design of the survey was guided by Forskningshandboken by Denscombe (2018), with particular emphasis on the section regarding web-based survey methodologies (“Webbaserade surveyundersökningar”, pp. 50–56). This reference provided a framework for developing an effective and accessible online questionnaire tailored towards the target group consisting of active seafarers.

Academic literature was sourced primarily through the following databases:

- Web of Science
- IEEE Xplore Digital Library
- ScienceDirect
- EBSCO
- Google Scholar (accessed independently)

A wide range of keywords was used to capture relevant research data regarding internet access, mental health and seafarer retention. These included:

“internet and seafarers”, “internet and ships”, “internet at sea”, “well-being of ship crew”, “mental health and shipping”, “retention AND seafarers”, “seafarer shortage”, “Internet of Things”, and “Social Internet of Things”.

In addition, Google was used to gather general information and gray literature from institutions, government sources, and maritime companies. These sources provided context for specific topics such as the cost comparison between Starlink and V-SAT systems, the role of bank-id in Swedish society, and the broader implications of living in a fully digitalized society.

Keywords used in general Google searches included:

“WHO-5”, “how VSAT differs from Starlink, Starlink”, “maritime VSAT, seafarer retention”, and “what does a merchant vessel pay for its internet?”.

In Google Scholar, more specialized terms were applied to identify studies with a focus on workforce trends and generational differences in seafaring, such as:
“increase AND seafarer* AND retention”, “seafarer* AND turnover”, “decrease turnover at sea”, “cadets and mobbing”, “retention AND young AND seafarer*”.

3.2 Creating the survey

Google forms were chosen as the platform to build the survey in since it is a well-established service from a trusted company name(https://workspace.google.com/products/forms/). Online surveys also simplify the process of reaching larger masses as it rather easily can be distributed anonymously with a link. The survey consisted of 17 questions in total (see appendix 1), starting with 5 demographic questions followed by the WHO-5 Index questions and ending with 7 questions related to the internet connection available to seafarers onboard.

3.3 Scoring and evaluation of WHO-5 data

The choice to use WHO-5 was taken due to it being a well-tested, easy and free to use clinically accepted method to measure well-being since its 1998 publication in Stockholm.(https://www.who.int/publications/m/item/WHO-UCN-MSD-MHE-2024.01) The method has been proven to provide credible results across a large variety of medical fields (Topp et al., 2015). The five questions originate from a positive noninvasive point of view which is then scored by the user to determine how good they represent the well-being experienced during the past two weeks. The number before the selected answer to a WHO-5 question determines the answerer's score for the question. The score for all five questions is then added together to determine the individual's final score which can be between 0 and 25. A score of 25 will indicate your well-being is very high while 0 indicates it is very low. To render the results in percentage, the final score is multiplied by 4 to reveal a score between 0-100%.

Table 1.

Overview of the WHO-5 index

WHO-5 Well-being Index	SCORING:	0	1	2	3	4	5
		(0) At no time	(1) Some of the time	(2) Less than half the time	(3) More than half the time	(4) Most of the time	(5) All of the time
I have felt cheerful in good spirits.							
I have felt calm and relaxed.							
I have felt active and vigorous.							
I woke up feeling fresh and rested.							
My daily life has been filled with things that interest me.							

Note: Describes the five items of the WHO-5 Well-Being Index and their corresponding scoring system. A higher score indicates a better well-being.

3.3.1 Purposive sampling

The survey was purposedly aimed towards active seafarers working onboard vessels managed by Swedish shipping companies according to the delimitations of the report to gather as much relevant data as possible. Since the study's aim is to examine connections between well-being (measured by WHO-5) and onboard internet connectivity, it was essential to gather insights directly from those living and working under the conditions in question.

Respondents were required to:

- Be currently working onboard a vessel managed by a Swedish shipping company.
- Be willing to participate voluntarily and anonymously.

Relevant shipping companies for this study were companies with seagoing vessels which exclude inshore local ferries, bunker vessels and tugboats where the crew might not spend the night onboard and where the vessels generally do not operate lengthy periods outside of mobile reception range. Shipping companies were handpicked and contacted by phone, and the survey was sent to their vessels where it could be accessed directly by seafarers. This way it could be made sure that only individuals relevant to the study were reached.

3.4 Reaching out to seafarers with the survey

Totally 14 shipping companies were contacted by phone, where the study was presented and sent to an office representative in each company. After evaluating the survey and its contents, 13 companies agreed to forward it to their vessels. The survey was answered by 143 seafarers between February 27, 2025, and March 16, 2025.

3.5 Analyzation of data

The collected survey data was analyzed by the utilization of the built-in tools in google sheets which has powerful solutions to efficiently assemble statistical data into diagrams and analytical tables (https://workspace.google.com/products/sheets/).

3.6 Ethics

The survey collected no personal information and was made to be totally anonymous. The introduction of the survey informed the answerer that by answering they agreed to participate in the research, that it is completely voluntary to do so and that they can quit the survey at any time without providing a reason. This study completely complies with the General Data protection regulation (GDPR).

- Respondents were informed how their data would be used
- Respondents were informed that no identifying information would be collected
- Respondents were informed that data they left will be sued strictly for academic research

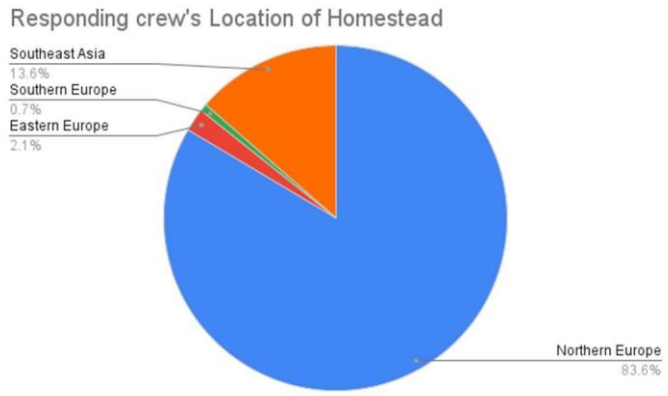
4. RESULTS

This chapter presents the survey (See appendix 1) results assembled into diagrams by analyzing the answers from the crew respondents. All questions and thus answers regarding well-being refer to how the respondents felt during the previous 2 weeks onboard.

4.1 Demographic overview

Figure 1.

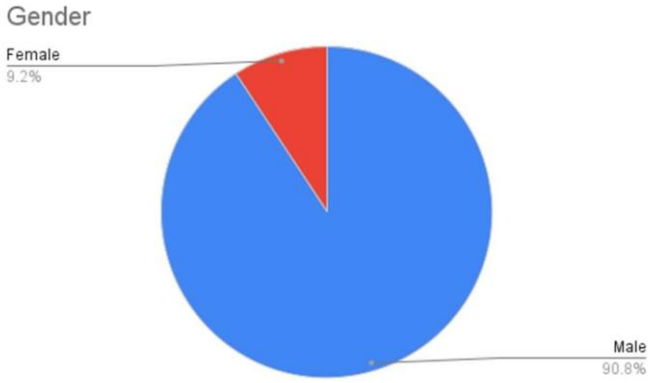
Responding crews' location of homestead



Note. Shows the geographical distribution in percentage of survey respondents' residence.

Figure 2.

Gender

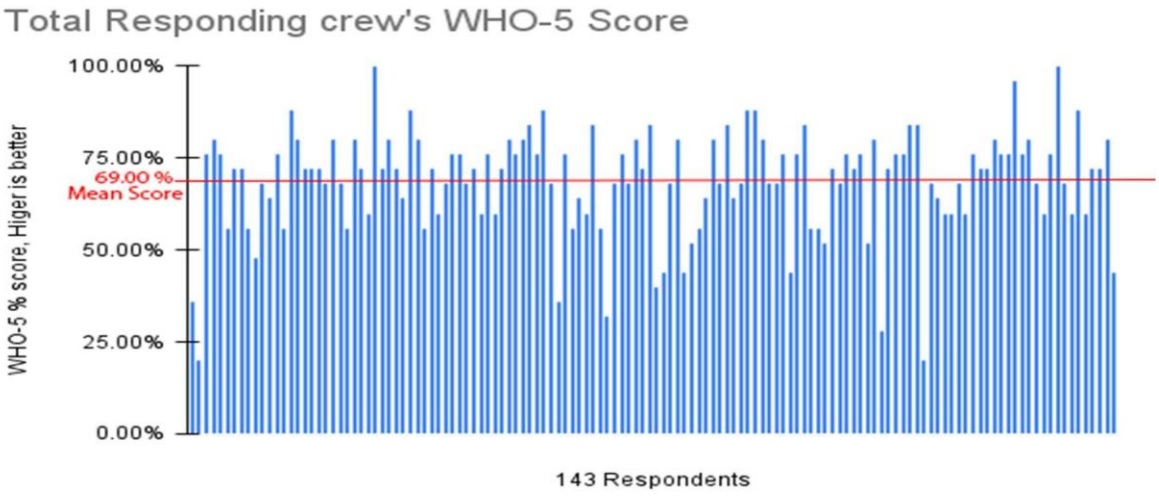


Note. Shows the gender of survey participants percentage.

The survey received responses from 143 active seafarers working on Swedish managed vessels. Figure 1 shows that most respondents reported Northen Europe as their region of residence (83.6%), Followed by Southeast Asia (13.6%). Smaller shares of the crew were based in Eastern Europe (2.1%) and Southern Europe (0.7%). Figure 2 shows that respondents consisted of (90.8%) Males and (9.2%) Females.

4.2 Respondents WHO-5 score

Figure 3.
Responding crew's total and mean WHO-5 score



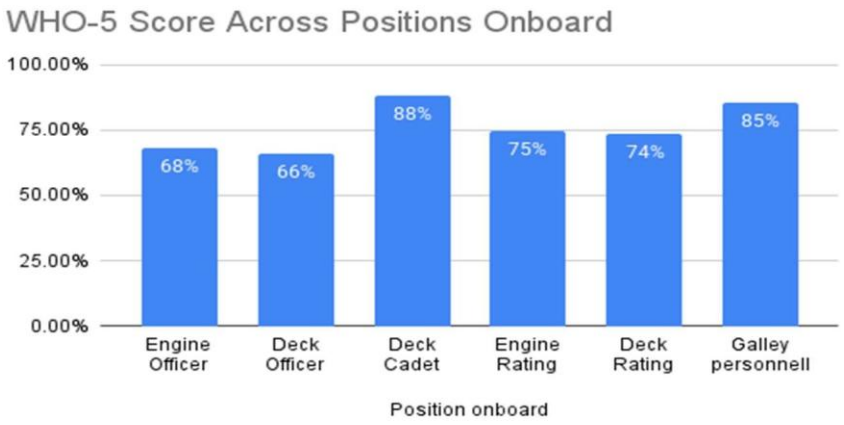
Note. Shows individual and mean WHO-5 score of the 143 survey respondents.

The mean WHO-5 score of the respondents was 69.0% as shown by the red horizontal line in Figure 3, indicating a generally positive level of well-being being experienced during the last 2 weeks of respondents. Scores above 70.0% are commonly interpreted as an indication of good well-being, where a score below 50.0% may suggest clinically depressive symptoms. Therefore, a mean score of 69.0% suggests that on average respondents are experiencing moderate to good well-being (Figure 3).

4.2.1 WHO-5 scores across positions onboard

Figure 4.

WHO-5 score across positions onboard

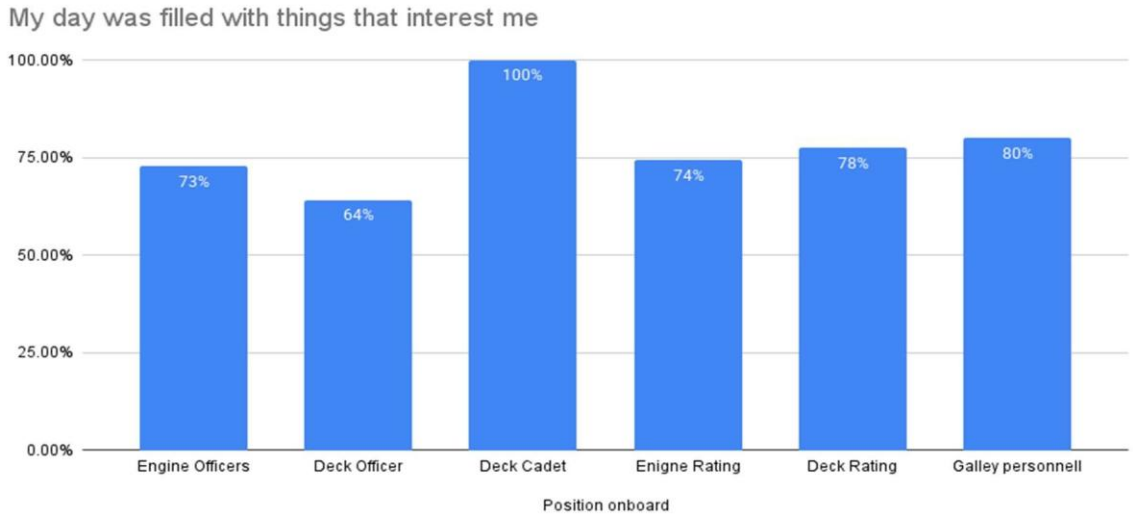


Note. Shows the variation of well-being in percentage across different departments onboard.

Figure 4 highlights differences in WHO-5 well-being scores across onboard departments. Ratings report higher well-being compared to officers, with engineers showing slightly better scores than deck officers. The highest well-being scores were observed among deck cadets and galley personnel.

Figure 5.

My day was filled with things that interest me

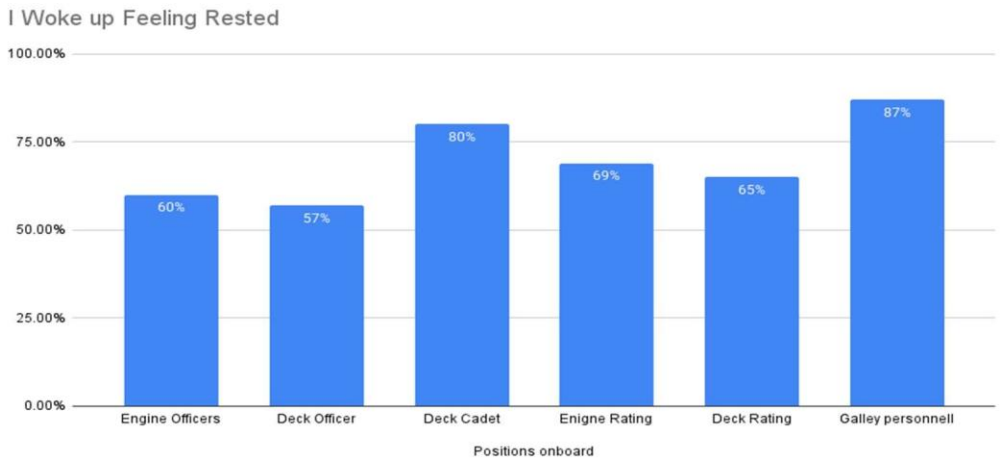


Note. Shows interest in daily activities across different departments onboard in percentage.

Figure 5 shows that when respondents rated how interesting their everyday life onboard is, the results closely mirrored the WHO-5 well-being scores by position. Overall, ratings reported higher levels of interest compared to officers, with deck cadets and galley personnel reporting the highest scores. Notably, deck officers reported the lowest levels of interest in their daily activities.

Figure 6.

I woke up feeling rested

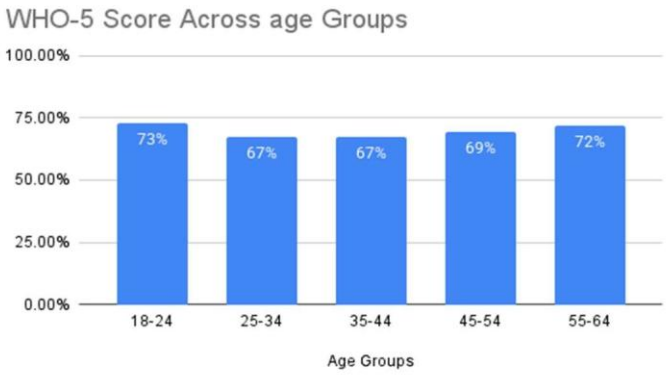


Note. Compares feelings in percentage of waking up rested across different departments onboard.

Figure 6 shows a pattern consistent with previous results regarding how rested respondents felt upon waking. Ratings reported feeling slightly more rested compared to officers, who reported slightly lower levels. Among all positions, galley personnel had the highest score at 87.0%, followed by deck cadets, who reported the second-highest level of feeling rested at 80.0%.

Figure 7.

WHO-5 score across age groups



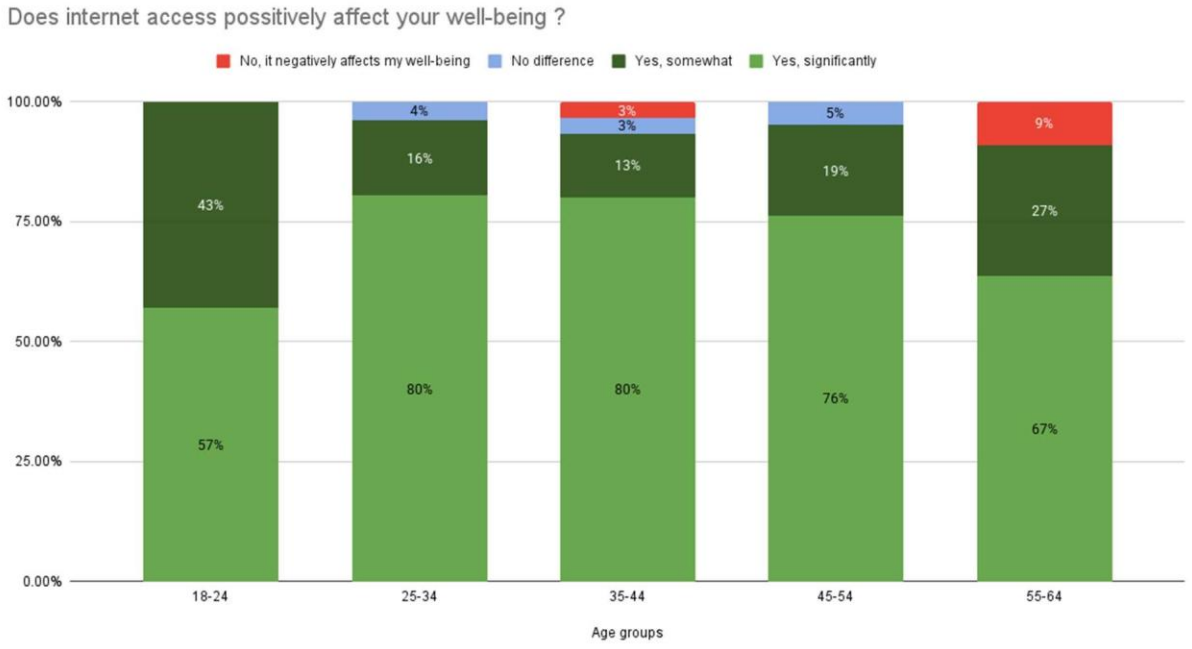
Note. Shows well-being across age groups onboard in percentage

Figure 7 Shows that WHO-5 scores are relatively consistent across age groups, with only minor differences in average well-being. The 18–24 age group reports the highest average score at 73.0%, suggesting slightly better well-being among younger respondents. The 25–34 and 35–44 age groups share the same average of 67.0%, while a modest increase is seen in the 45–54 group at 69.0%. The 55–64 age group reports an average score of 72.0%, close to that of the youngest respondents.

4.3 Internet access & it's effect on well-being

Figure 8.

Does internet access positively affect your well-being?



Note. Shows the precepted effect of internet access on well-being across age groups in percentage. The different answers to the question are represented by the different colors.

Figure 8 shows that, across all age groups, most respondents felt that internet access positively impacts their well-being, with answers mainly divided between "Yes, somewhat" and "Yes, significantly." Neutral and negative responses were minimal across the board. The 55–64 age group had the highest rate of negative responses, with 9.0% stating "No, it negatively affects my well-being."

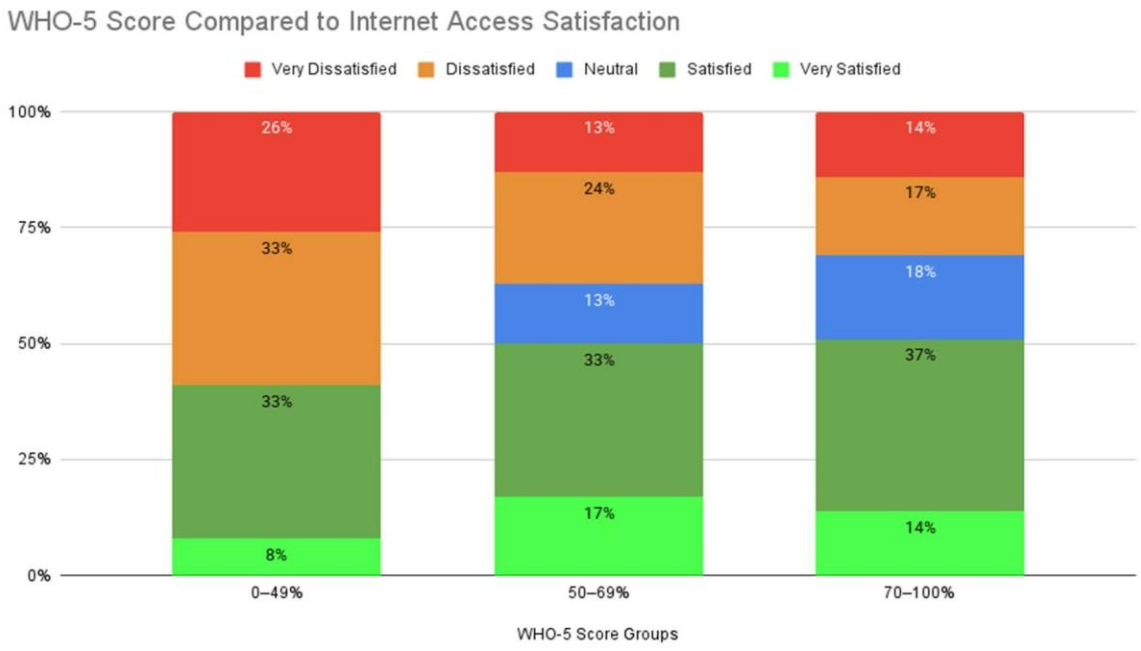
Interestingly, the 18–24 age group had the lowest percentage of "Yes, significantly" responses at 57.0%, but also the highest "Yes, somewhat" responses at 43.0%. Notably, this group reported no neutral or negative responses at all. One crew member who indicated in the survey that internet access negatively affected their well-being later contacted the authors via email to elaborate on this response. The crew member explained that although the vessel provided unlimited internet

access, the available bandwidth was too limited during peak usage times to perform essential tasks. This made it difficult to complete secure errands, such as logging in with bank-id or handling twostep verifications except during working hours when most of the crew were offline. At other times, websites failed to load or timed out during authentication.

4.4 Internet access satisfaction compared to WHO-5 scores

Figure 9.

WHO-5 score compared to internet access satisfaction



Note. Compares WHO-5 score against levels of satisfaction with onboard internet access.

Figure 9 Divides the respondents into three groups based on their WHO-5 score.

- 0-49% - Low well-being
- 50-69% - Moderate well-being
- 70-100% - High well-being

The three well-being groups are compared based on how respondents in each group answered the question: How satisfied are you with the internet access onboard?

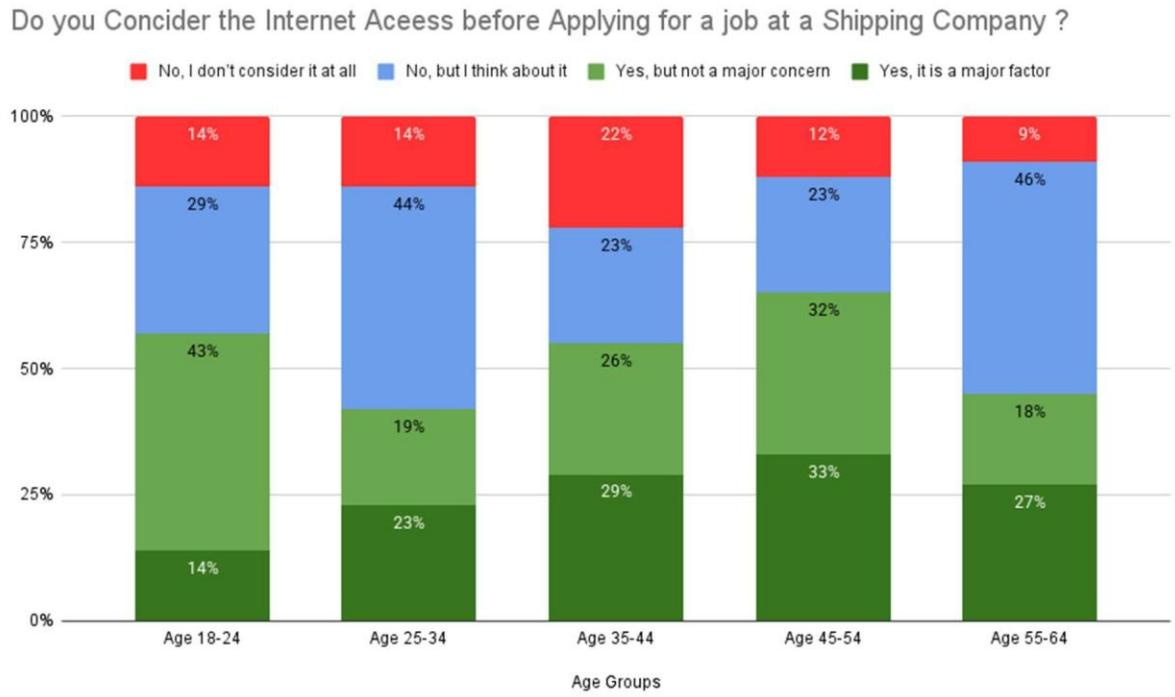
- Very satisfied
- Satisfied
- Neutral
- Dissatisfied
- Very dissatisfied

In figure 9 a pattern emerges showing that well-being improves with greater satisfaction with internet access. Respondents with WHO-5 scores in the 50–69% and 70–100% ranges were more likely to report feeling neutral, satisfied, or very satisfied with the onboard internet, compared to those in the 0–49% group.

4.5 Consideration of internet access in job applications

Figure 10.

Do you consider the internet access before applying for a job?



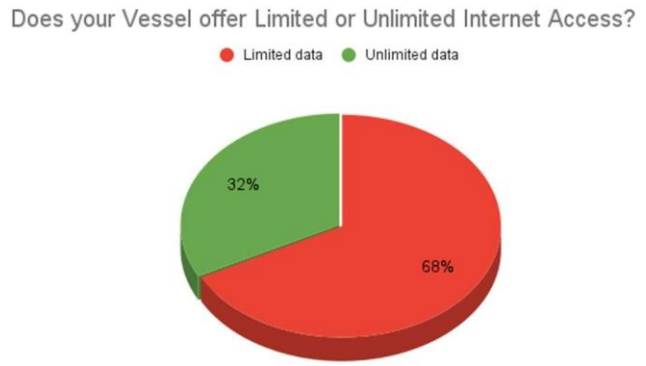
Note: Shows how important crew members consider internet access while applying for a job.

Figure 10 shows how different age groups responded to the question: “Do you consider crew internet access before applying for a job at a shipping company?”

The majority of respondents across the age groups answered positively, indicating that internet access is an important factor when choosing an employer. The 18–24 and 45–54 age groups had the highest number of respondents who actively consider onboard internet access. In contrast, the 25–34 age group had the fewest respondents who viewed it as important, with a significant portion choosing a neutral stance, similar to the trend seen in the 55–64 age group.

Figure 11.

Does your vessel offer limited or unlimited internet access



Note: Shows the share of data accessibility types onboard (Limited vs. Unlimited).

When asked whether their internet access was limited or unlimited, 32.2% of respondents reported having unlimited access, while 68.0% reported limited access (Figure 11).

Those with limited internet access, (96 out of 143 respondents) representing 67.0% of the total, provided information about their daily data allowance as following:

Data allowance in megabytes per day

- Average: 1161mb/day
- Highest reported: 3400mb/day
- Lowest reported: 50mb/day

Table 2.

Satisfaction with onboard internet by access type

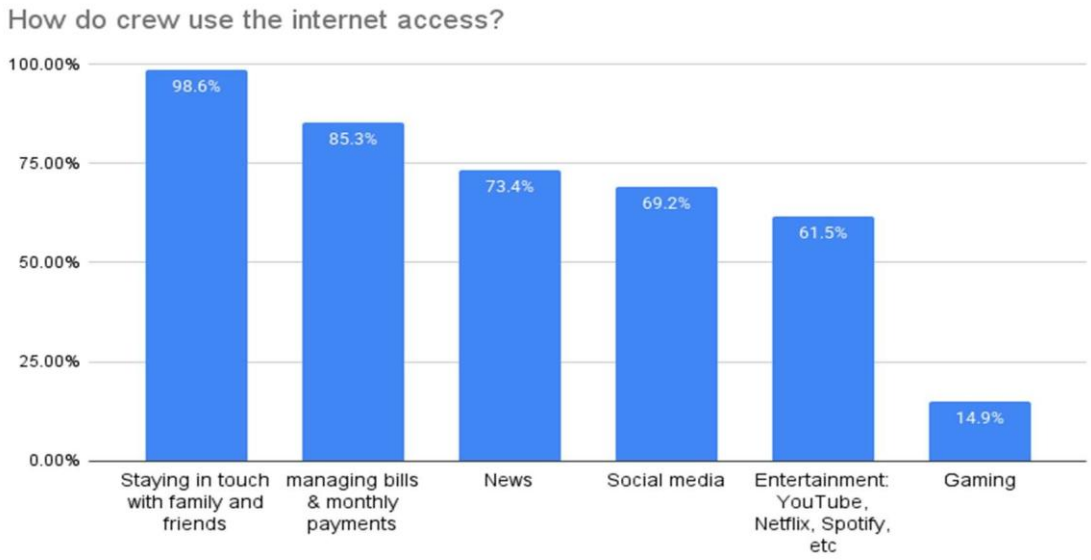
			Satisfaction with internet access onboard in %				
Data	Number of Respondents	WHO-5 Score %	Very Satisfied	Satisfied	Neutral	Dissatisfied	Very Dissatisfied
Limited	96	68.00%	17.70%	31.20%	10.40%	18.80%	10.40%
Unlimited	47	70.00%	10.60%	36.20%	21.30%	17.00%	21.30%

Note: Table comparing data between respondents with limited and unlimited internet access.

Table 2 compares respondents with limited and unlimited internet access in terms of their average WHO-5 well-being scores and satisfaction with the onboard connection. In both groups, the most common response was “Satisfied.” Interestingly, the proportion of respondents who reported being “Very Dissatisfied” was higher among those with unlimited internet access.

Figure 12.

How do crew use the internet access?

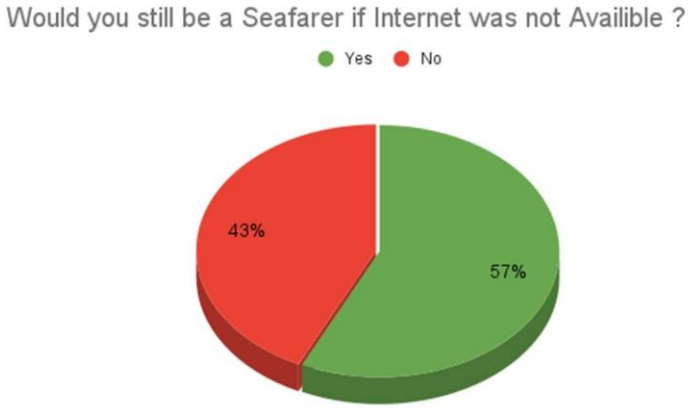


Note: Shows how crew primarily use internet access onboard.

Figure 12 shows that the primary use of the internet onboard is to stay connected with family and friends, as well as to manage monthly payments and bills. Although entertainment is a common use, it is clearly secondary to these more essential purposes.

Figure 13.

Would you still be a seafarer if internet was not available?

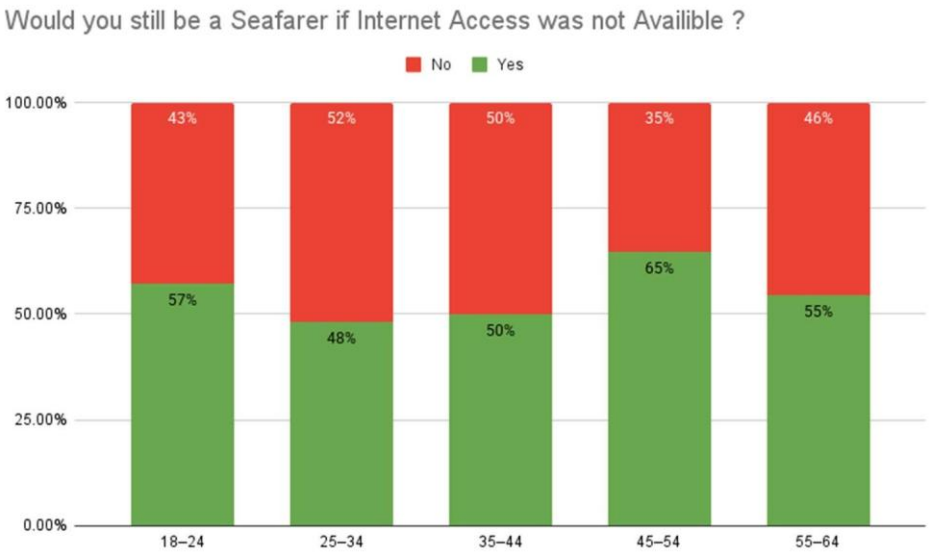


Note: Shows the total number of seafarers who would still be seafarers in absence of internet access.

When asked whether internet access affects the choice to remain a seafarer 57.0% of respondents answered that they would still be seafarers if internet access was not available onboard compared to the 43.0% responding they would not (Figure 13).

Figure 14.

Would you stay at sea without internet -by age



Note: Shows the percentage of seafarers who would continue in the profession without internet access.

Figure 14 illustrates how different age groups responded to the question, “Would you still be a seafarer if internet access was not available?” The 18–24 and 45–54 age groups had the highest proportion of respondents who would continue working as seafarers without internet access. In contrast, the 25–34 age group showed the largest share of those who would not remain in the profession without internet access.

5. DISCUSSION

This aim of this study was to find out how internet connectivity onboard merchant vessels managed by Swedish shipping companies influenced well-being and retention of seafarers. Quantitative data from survey questions that incorporated the WHO-5 Index was used in combination with questions regarding satisfaction of the available crew internet access onboard. Connections, though subtle, between satisfaction with the crew's internet access, well-being and intentions to keep working at sea were found.

5.1 Internet and the effect on crew well-being

Data on the perceived impact of internet access on crew well-being, as illustrated in Figure 8, reveals that, when asked directly, most respondents across all age groups reported a positive effect of internet access on their personal well-being. This supports the notion that connectivity can help alleviate emotional strain caused by isolation, identified by Sampson and Ellis (2019) as a key stressor for seafarers.

However, a small number of respondents indicated that onboard internet access negatively affected their well-being. Some of these individuals reached out to elaborate on their experiences, citing frustrations with poor bandwidth and restrictive data allowances. Even on vessels with unlimited access, the usability was compromised when bandwidth was shared among many users. One crew member described via email that critical tasks requiring secure verification, such as bank-id or two-step authentications, were only possible during off-peak hours, as pages otherwise failed to load or were timed out. This example underscores that unlimited access does not guarantee a reliable or usable internet connection.

Furthermore, as shown in Table 2, a comparison of WHO-5 well-being scores between respondents with limited versus unlimited internet access showed minimal differences, 68.0% and 70.0%, respectively. This could suggest that the quality and usability of internet access may be more critical than the connection type alone but needs to be researched further. Results from this study indicate that inadequate bandwidth, even under unlimited plans, could contribute to stress rather than relief, particularly when access is essential for managing personal affairs. This aligns with earlier results by Futurenautics Ltd. (2018), which highlighted connectivity issues as a significant source of dissatisfaction among seafarers. This further illustrates the challenges faced by crew in a society where reliable internet access is increasingly taken for granted. Ultimately, internet access, though clearly beneficial for improved well-being, is just one component of a much broader picture. Life at sea is shaped by many complex factors, including workload, interpersonal relations, working conditions, rest hours, and the physical environment (Sampson & Ellis, 2019). All of which collectively influence a seafarers' well-being. In this context, internet access could support well-being, but it is not a decisive factor on its own.

5.1.1 Higher well-being with higher internet access satisfaction

The relationship between well-being and satisfaction with internet access onboard shown by Figure 9 revealed meaningful, though not definitive patterns. As shown in Figure 9, respondents were grouped by their WHO-5 scores into low (0–49%), moderate (50–69%), and high (70–100%) well-being categories. While there was a visible trend indicating that respondents with higher wellbeing also reported greater satisfaction with their onboard internet connection and that dissatisfaction was more common among those with lower well-being, the connection is not strong enough to be considered conclusive. Nevertheless, the fact that a positive trend exists across these categories reinforces the idea that digital connectivity plays a meaningful role in supporting positive well-being onboard, possibly by enhancing the feeling of being connected to society and family which coincide with the study by Sampson & Ellis (2019). As such, internet access should no longer be viewed as a luxury, but rather as a cornerstone in occupational well-being. Ensuring stable and satisfactory internet access onboard will not solve all challenges, but it can serve as a pillar in broader strategies aimed at improving the well-being of seafarers and thus, possibly helping to make the industry more appealing.

5.1.2 WHO-5 score of respondents

The general well-being of respondents onboard was found to be 69.0% as shown in Figure 3, which indicates a generally good well-being onboard Swedish vessels. This score further strengthens the claim by Sampson & Ellis (2019) that seafarers in general do not experience a lower well-being in comparison to the general population ashore. This is also supported by findings by the Office for National Statistics (2017), which reported a WHO-5 index score of 53% for the British general population and 70% for Denmark. The relatively high score from this study aligns with the study by Hayes-Mejia & Stafström (2024) which managed to globally collect the results from 13008 seafarers which averaged 77.2% and 81.7% on the WHO-5 scale. Well-being across age groups shown in Figure 7 were uniform, ranging from 73.0%, 67.0% and 72.0% concluding that the general well-being across different age groups is almost the same.

The same pattern is also visible in Figure 6 where respondents were asked whether they had woken up feeling rested during the past 2 weeks. Figure 6 suggests that officers are more tired compared to ratings, cadets and galley personnel. Engineers responded that they woke up feeling rested 60.0% of the time and deck officers 57.0% of the time. This difference between the engineering and deck department could be due to most vessels surveyed having unmanned engine rooms at night and thus under normal circumstances allowing the engineers to sleep through the night. This is not the case in the deck department where night shifts on the bridge are mandatory. The results in figure 4 comparing well-being between positions onboard suggest that officers generally have a lower well-being in comparison to ratings, galley personnel and cadets.

5.1.3 Age groups and internet

Figure 10 shows that all age groups reported that internet access positively impacted their wellbeing, particularly the age group (18-24) which had the largest share of respondents answering that they think about the internet connection onboard before applying for a job at a shipping company. The older age groups responded with greater variability with a higher proportion of respondents indicating a willingness to remain at sea even in the absence of internet access. These generational contrasts possibly underline a shifting norm in the maritime workforce as stated in the study by Liu, et.al (2024 where expectations at sea are increasingly becoming aligned with shore-based standards. According to Figure 10, respondents aged 18–24 also place greater emphasis on internet access when applying for a job compared to those aged 25–34. Interestingly, the perceived importance of internet access increases again among the 35–44 age group and reaches its peak within the 45–54 age group. This upward trend could reflect shifting personal priorities, where maintaining regular communication with children and families becomes increasingly important.

5.1.4 Internet and the effects on crew member retention

When it comes to retention the results indicate that internet access positively influenced the seafarers' decisions to remain working at sea. Nearly half (43.0%) of respondents stated they would not continue working at sea if internet access were not available onboard as shown in Figure 13. This figure is significant in light of the global shortage of STCW-certified officers reported by the Seafarer Workforce Report (2021). As shown in Figure 10, all age groups have a majority of respondents thinking about the internet connection before applying for a job at a shipping company. This shows that digital integration in society is nearly universal. As described by Internetstiftelsen, (2024) and SCB (2023) 92% of Swedes are using bank-id and many depend on digital health and financial services. This hints at the importance of continuously improving the internet standards onboard. Making sure the internet access available is satisfactory could be one important step to reduce turnover rates by making the seafarer feel less isolated onboard, which is one of the leading factors why seafarers are leaving their careers at sea, as found by the study from Uçak & Çelik Maşalacı (2025).

5.2 Methods

The survey reached 143 active seafarers working onboard Swedish managed vessels. Although purposive sampling and delimitations allowed us to better focus the research there might still be biases. Especially given that answers from some positions onboard like galley personnel (3) and cadets (2) were underrepresented. It is possible the survey was only sent to the engine control room and bridge, thus not reaching the shared computers easily accessible to ratings, cadets and galley personnel. The age groups (18-24) were also underrepresented with only 7 respondents and nobody over the age of 65 answered, proving the rarity of these age groups onboard Swedish vessels. The low representation rate from these groups might make the answers not completely representative of the wider population.

Another demographic pattern observed in the survey was the underrepresentation of Southeast Asian seafarers. While it is well known that a significant portion of crew onboard Swedishmanaged vessels are recruited from Southeast Asia, only a small share of survey respondents originated from this region. Thus, it is possible the results may not fully capture the experiences and perceptions of this demographic group.

5.2.1 Validation of methods

The validity of the study is reinforced by the use of the WHO-5 Well-Being Index, a globally recognized and validated tool developed by the World Health Organization (Topp et al., 2015). Its structure, consisting of five positively worded, non-invasive questions, makes it well-suited for anonymous surveys. In this study, the WHO-5 was applied to assess respondents' well-being during their time onboard in a standardized and replicable way. However, well-being is influenced by more than just the availability and quality of internet access onboard, a range of other factors also play a role. Given the complexity of the situation onboard, it cannot be ruled out that influences other than internet access have affected respondents in the two weeks leading up to their responses to the WHO-5 Index. To strengthen the validity of any potential connection between well-being and internet access, this study would have benefited from a supplementary qualitative study to provide deeper insight into the issue.

5.2.2 Reliability of methods

Given the anonymous online format and clear framing of questions, it is reasonable to assume that if the survey were distributed again under similar conditions, it would yield comparable results. Patterns from the WHO-5 analysis align with responses to the more direct questions on internet and well-being. The fact that both tools subtly pointed in a similar direction, though with different degrees of strength supports the idea that the instruments measured what they intended to measure. However, as mentioned earlier, a higher number of responses from other nationalities, e.g. Southeast Asia who serve during longer periods onboard, could have given a different response.

6. CONCLUSIONS

This study set out to explore how internet connectivity impacts the well-being and retention of seafarers working aboard vessels managed by Swedish shipping companies. Through the analysis of survey responses from 143 active seafarers, several meaningful insights emerged that underscore the growing importance of digital access in the maritime industry.

The average well-being score among respondents as measured by the WHO-5 Index, was 69.0%, suggesting a generally moderate to good level of well-being onboard. However, variations were observed across the different roles onboard as officers, particularly deck officers, consistently reported lower well-being compared to engineers, cadets, ratings, and galley personnel.

When asked directly, internet access was repeatedly identified as an important factor affecting well-being, with a majority of respondents across all age groups stating that internet access positively impacted their well-being, often significantly so. This direct association was supported but not conclusively proven, as indirect analysis comparing WHO-5 scores with levels of satisfaction regarding onboard internet access yielded much less prominent results compared to the direct question. While a pattern suggesting higher internet access satisfaction aligns with higher well-being did emerge, the connection was not strong enough to be deemed fully definitive. This outcome reinforces the idea that while internet access plays a valuable role in supporting wellbeing, it is only one of many elements shaping a seafarer's onboard experience, further emphasizing the complexity of life onboard.

The 18–24 and 45-54 age groups showed the highest proportion of respondents considering internet access important when applying for a job. Age groups 25-34 and 55-64 considered internet access the least when applying for a job.

Retention trends were more decisive as nearly half of the respondents stated they would not continue working at sea if internet access was unavailable onboard. Most respondents confirmed they do consider or have the quality of crew internet access in mind when choosing an employer.

7. RECOMMENDATIONS FOR FURTHER RESEARCH

This study provides insight into the relationship between internet access onboard, the well-being and retention of seafarers. However further investigations to deepen the understanding and importance of these connections would give a broader and more comprehensive perspective about this topic.

7.1 Global study

This study was limited to Swedish managed vessels which may not fully reflect global seafaring conditions. A multinational study including a diverse sample of seafarers from various flag states around the world would help to broaden the understanding and assess how internet connectivity influences well-being and retention rates on a wider scale. A global study would also identify regional differences, expectations and outcomes.

7.2 Vessel types

In a wider study with more respondents, it would be possible to include vessel types by having the seafarers answer what type of ship he or she is onboard. It would further focus the data and provide an insight into well-being and internet access in comparison to vessel types. Shipping companies value internet access differently, companies operating bulk carriers are generally less willing to invest in crew internet access, and companies operating tankers, in particular LNG Tankers are more willing to do so (Hellenic Shipping News Worldwide, 2021).

7.3 Survey questions

Future surveys could be enhanced by including questions that more thoroughly assess the quality of private crew access to the internet. Factors such as bandwidth capacity, data limits, quality and range of on-board Wi-Fi. Future studies should include questions regarding network restrictions such as prohibited or blocked websites and services. Future improvements could involve the frequency with which crew members are able to go ashore and gather information on the typical length of crew contracts. This could provide valuable context for understanding long-term connectivity needs.

7.4 Qualitative interviews

Future research could benefit from collecting qualitative data from interviews with crew, shipping company representatives and internet service providers to gain deeper insight and gather personal opinions to focus the data and further strengthen the validity of the report.

REFERENCES

Andruskiene, J., Barseviciene, S., & Varoneckas, G. (2016). Poor Sleep, Anxiety, Depression and Other Occupational Health Risks in Seafaring Population. TransNav: International Journal on Marine Navigation & Safety of Sea Transportation, 10(1), 19–26. https://doi.org/10.12716/1001.10.01Grøn, S., & Knudsen, F. (2012). Why do Filipinos have fewer reported work accidents than other nationals? Findings from literature. International Maritime Health, 63(2), 96–101.

Barnett, M., Gatfield, D., Overgaard, B., Pekcan, C., & Graveson, A. (2006). Barriers to progress or windows of opportunity? A study in career path mapping in the maritime industries. WMU Journal of Maritime Affairs, 5(2), 127–142. https://doi.org/10.1007/BF03195100

Baum-Talmor, P. (2020). Careers at sea: Exploring seafarer motivations and aspirations. In V. O. Gekara & H. Sampson (Eds.), The world of the seafarer: Qualitative accounts of working in the global shipping industry (pp. 51–63). Springer. https://doi.org/10.1007/978-3-030-49825-2_5

Bissias, G. I., Pallis, A. A., & Theotokas, N. I. (2024). Gen Zers and the seafaring profession: A generational approach to enrolment in merchant marine academies. WMU Journal of Maritime Affairs. https://doi.org/10.1007/s13437-024-00355-4

Boeing. (2009, April 25). Marisat: World's first maritime telecommunications satellite system. The Boeing Company. https://web.archive.org/web/20090425091056/http://www.boeing.com/defensespace/space/bss/factsheets/376/marisat/marisat.html

Brooks, S. K., & Greenberg, N. (2022). Mental health and psychological wellbeing of maritime personnel: A systematic review. BMC Psychology, 10(1), Article 139. https://doi.org/10.1186/s40359-022-00850-4

Caesar, L. D., Cahoon, S., & Fei, J. (2015). Exploring the range of retention issues for seafarers in global shipping: Opportunities for further research. WMU Journal of Maritime Affairs, 14(1), 141–157. https://doi.org/10.1007/s13437-015-0078-0

Çelik Maşalacı, B. (2024). Mobbing exposed by deck cadets at onboard training during the internship period. Transportation Research Record. https://doi.org/10.1177/03611981241275540

Collins, P., & Hogg, J. M. (2004). The ultimate distributed workforce: The use of ICT for seafarers. AI & Society, 18(3), 209–241. https://doi.org/10.1007/s00146-003-0287-5

Dalgleish, D. I. (1989). An introduction to satellite communications (2nd ed.). Institution of Engineering and Technology.

Edwall, F. (2022, June 20). Focus on Sweden: How Swedes use the internet. Subtonomy. https://www.subtonomy.com/post/focus-on-sweden-how-swedes-use-the-internet

Freja eID. (2022, October 20). When systems fail and no alternative is offered. https://frejaeid.com/en/when-systems-fail-and-no-alternative-is-offered/

Futurenautics Ltd. (2018). Crew connectivity 2018 survey report. Futurenautics Maritime. https://cyberonboard.com/wp-content/uploads/Crew_Connectivity_2018_Survey_Report.pdf

Grey, A.-M. (2020, December 10). The case for connectivity: A new human right. United Nations Chronicle. https://www.un.org/en/un-chronicle/case-connectivity-new-human-right

Hand, M. (2020, May 5). Limited shore leave taking its toll on seafarers. Seatrade Maritime News. https://www.seatrade-maritime.com/crewing/limited-shore-leave-taking-its-toll-onseafarers

Haugli, H.-C. (1990). Implementation of Inmarsat mobile satcom systems. International Mobile Satellite Conference, Ottawa, 1990. Inmarsat. https://ntrs.nasa.gov/api/citations/19920014830/downloads/19920014830.pdf

Hayes-Mejia, R., & Stafström, M. (2024). Wellbeing and happiness and their association with working conditions at sea: A cross-sectional study among the global workforce of seafarers. Inquiry: A Journal of Medical Care Organization, Provision and Financing, 61, 00469580241256349. https://doi.org/10.1177/00469580241256349 PMC

Hellenic Shipping News Worldwide. (2021, September 22). How much does a merchant ship pay for its VSAT communications? https://www.hellenicshippingnews.com/how-much-does-amerchant-ship-pay-for-its-vsat-communications/

ILO (2006) Maritime Labour Convention (MLC), International Labour Organization

IMO (2010) International Convention on Standards of Training, Certification, and Watchkeeping for Seafarers (STCW), Manilla Amendments 2010, International Maritime Organization

International Labour Organization. (2022). Maritime Labour Convention, 2006, as amended (including 2022 amendments). International Labour Office. https://www.ilo.org/resource/other/maritime-labour-convention-2006-amended-including-2022amendments

International Chamber of Shipping. (2021). Seafarer Workforce Report 2021: The Global Supply and Demand for Seafarers in 2021. BIMCO. https://www.bimco.org/about-us-and-ourmembers/publications/seafarer-workforce-report

International Labour Organization. (2024, July 4). New important set of amendments to the MLC, 2006 will enter into force on 23 December 2024. International Labour Organization. https://www.ilo.org/resource/news/new-important-set-amendments-mlc-2006-will-enter-force23-december-2024

Internetstiftelsen. (2024). Svenskarna och internet. Hämtad 2025-03-29, https://svenskarnaochinternet.se/rapporter/svenskarna-och-internet-2024/

INTERTANKO. (2024). Seafarers survey: Making your way at sea (Rev. 1). https://www.intertanko.com/images/downloads/Seafarers_Survey_2023_web_2.pdf

Inmarsat. (n.d.). About us. Retrieved May 8, 2025, from https://www.inmarsat.com/en/about.html

Iversen, R. T. B. (2012). The mental health of seafarers. International maritime health, 63(2), 78-89. doi: https://pubmed.ncbi.nlm.nih.gov/22972547/

Kypriotaki, A. (2024, March 5). Sailors' Society tackles what motivates Gen Z cadets. SAFETY4SEA. https://safety4sea.com/sailors-society-tackles-what-motivates-gen-z-cadets/

LaRosa, R. M. (1977). Maritime satellite requirements and utilization. IEEE Journal of Oceanic Engineering, OE-2(3), 267–273. https://research.ebsco.com/linkprocessor/plink?id=28af548bf367-3ad3-83f8-6067c92b2217

La Rue, F. (2011). Report of the Special Rapporteur on the promotion and protection of the right to freedom of opinion and expression, Frank La Rue (A/HRC/17/27). United Nations Human Rights Council. https://www2.ohchr.org/english/bodies/hrcouncil/docs/17session/

Liu, G., Li, H., & Yu, J. (2024). Why do we not want to work onboard? An explanation of generational changes in seafarers' work values. Ergonomics. https://doi.org/10.1080/00140139.2024.2441443

Martide. (2021, September 7). 9 crew retention strategies to stop seafarers jumping ship. Martide. https://www.martide.com/en/blog/top-crew-retention-strategies

Murray, B. (2023). Maersk to install Starlink to end blind spots for ships and crew. Bloomberg. https://research.ebsco.com/linkprocessor/plink?id=b865bf6d-3014-3f43-894c-ea66299a4058

Office for National Statistics. (2017, March 9). Measuring national well-being in the UK: International comparisons, 2017. https://www.ons.gov.uk/peoplepopulationandcommunity/wellbeing/articles/measuringnationalwellbeing/internationalcomparisons2017

Office of the United Nations High Commissioner for Human Rights. (2023, March). It may be time to reinforce universal access to the internet as a human right, not just a privilege, High Commissioner tells Human Rights Council. https://www.ohchr.org/en/news/2023/03/it-may-betime-reinforce-universal-access-internet-human-right-not-just-privilege-high

Oldenburg, M., & Jensen, H.-J. (2019). Needs and possibilities for ship crews at high seas to communicate with their home. International Journal of Occupational Medicine and Environmental Health, 32(6). https://doi.org/10.13075/ijomeh.1896.01436

Papachristou, A., Stantchev, D., & Theotokas, I. (2014) Communication, internet access and retention of seafarers in the shipping industry. Paper presented at the International Association of Maritime Economists (IAME) Conference, Norfolk, VA, USA.

Sampson, H., & Ellis, N. (2019). Seafarers' mental health and wellbeing. Seafarers International Research Centre, School of Social Sciences, Cardiff University. Retrieved from https://orca.cardiff.ac.uk/id/eprint/127214/1/seafarers-mental-health-wellbeing-full-report.pdf

SCB. (2023). Undersökning om digitala tjänster inom hälso- och sjukvård. Hämtad 2025-03-29, från https://www.ehalsomyndigheten.se/nyheter/2024/allt-fler-valjer-att-kommunicera-digitaltmed-varden/

Skripnik, I. (2024, August 26). Best paying fleet. How much do seafarers make in 2024? Ukrcrewing.com.ua. https://ukrcrewing.com.ua/en/articles/best_paying_fleet

Slišković, A., & Penezić, Z. (2016). Testing the associations between different aspects of seafarers' employment contract and onboard internet access and their job and life satisfaction and health. Arhiv za Higijenu Rada i Toksikologiju, 67(4), 351–361. https://doi.org/10.1515/aiht2016-67-2785

SpaceX. (n.d.). Starlink for maritime. https://www.starlink.com/business/maritime

The Mission to Seafarers. (2024). Seafarers Happiness Index: Quarter 2, 2024. https://www.missiontoseafarers.org/wp-content/uploads/Seafarers_Happiness_Index_Q2_2024.pdf

Topp, C. W., Østergaard, S. D., Søndergaard, S., & Bech, P. (2015). The WHO-5 Well-Being Index: A systematic review of the literature. Psychotherapy and Psychosomatics, 84(3), 167–176. https://doi.org/10.1159/000376585

Toygar, A., Nart, S., & Yıldırım, U. (2023). Work-family conflict and work alienation among seafarers: The mediating role of emotional exhaustion. Marine Policy, 155, 105759. https://doi.org/10.1016/j.marpol.2023.105759

Uçak, Ş. Ş., & Çelik Maşalacı, B. (2025). An in-depth study of factors influencing retention and career paths of Turkish seafarers in the profession. Research in Transportation Business & Management, 59, 101299. https://doi.org/10.1016/j.rtbm.2025.101299

VAST Antenna. (2024, December 09). How VSAT differs from satellite? VAST Antenna. https://www.vastantenna.com/how-vsat-differs-from-satellite/

VAST Antenna. (2024, November 27). VSAT Antenna Price Guide: What You Need to Know https://www.vastantenna.com/vsat-antenna-price-guide/

Waterman, S. (2024). Navigating Starlink disruption in the maritime connectivity market. VIA Satellite. https://search.ebscohost.com/login.aspx?direct=true&AuthType=sso&db=bsu&AN=176926571&authtype=sso&custid=s3911979&site=ehost-live&scope=site

World Health Organization. (2004). Promoting mental health: concepts, emerging evidence, practice: a report of the World Health Organization, Department of Mental Health and Substance Abuse in collaboration with the Victorian Health Promotion Foundation and the University of Melbourne. Geneva: World Health Organization.

World Health Organization. (2024). WHO-5 well-being index (WHO-5) (WHO/UCN/MSD/MHE/2024.01). World Health Organization. https://www.who.int/publications/m/item/WHO-UCN-MSD-MHE-2024.01

Yuen, K. F., Loh, H. S., Zhou, Q., & Wong, Y. D. (2018). Determinants of job satisfaction and performance of seafarers. Transportation Research Part A: Policy and Practice, 110, 1–12. https://doi.org/10.1016/j.tra.2018.02.006

Zhou, Q., & Zhang, L. (2024). Why do we not want to work onboard? An explanation of seafarers' career decision-making. Ergonomics. https://doi.org/10.1080/00140139.2024.2441443 Žuškin, E., Mustajbegović, J., Schachter, E. N., & Kern, J. (2017). Lifestyle factors in Croatian seafarers as relating to health and stress on board. International Maritime Health, 68(1), 37–44. https://doi.org/10.5603/IMH.2017.0007

APPENDIX 1Survey:

Crew Well-Being and Internet Access

Dear Seafarer,

As part of our graduation thesis in the marine engineering program at Chalmers University of Technology, we Jean-Pierre Bovin and Olivia Isaksson are studying **crew well-being in relation to internet access on board swedish managed vessels**. Our goal is to understand how important internet access is for seafarers and how it is prioritized in regards to crew well-being, job application and crew member retention.

We would greatly appreciate your input in the matter.

The survey will only take a few minutes to complete.
By filling out this form, you consent to participate in our research, your participation in this study is entirely voluntary. All responses will remain **anonymous**, and no identifying information will be collected. The data will be used strictly for academic research and will be handled with confidentiality. You have the right to withdraw from the study at any time without providing a reason.

If you have any questions, feel free to contact us:
Jean-Pierre Bovin – bovinj@student.chalmers.se | +46 76-339 82 92
Olivia Isaksson – oliviai@student.chalmers.se | +46 73-330 53 77

Thank you for your time,

Best regards,
Jean-Pierre Bovin & Olivia Isaksson

Chalmers University of Technology
Department of Mechanics and Maritime Sciences
Division of Maritime Studies
SE – 412 96 Gothenburg

Age *

- ◯ 18-24 years old
- ◯ 25-34 years old
- ◯ 35-44 years old
- ◯ 45-54 years old
- ◯ 55-64 years old
- ◯ 65+ years old

Position onboard *

- ◯ Deck Officer
- ◯ Engine Officer
- ◯ Deck Rating
- ◯ Engine Rating
- ◯ Galley personnel
- ◯ Other: _____

How long have you been a seafarer? *

- ◯ Less than 1 year
- ◯ 1–3 years
- ◯ 4–7 years
- ◯ 8–12 years
- ◯ 13–20 years
- ◯ More than 20 years

Location of homestead *

- ◯ Northern Europe
- ◯ Eastern Europe
- ◯ Western Europe
- ◯ Southern Europe
- ◯ Southeast Asia
- ◯ Prefer not to say
- ◯ Other: _____

WHO-5 Well-being Index

Please respond to each item by marking one box per row, regarding how you felt in the last two weeks.

I have felt cheerful in good spirits. *

- ◯ (5) All of the time
- ◯ (4) Most of the time
- ◯ (3) More than half the time
- ◯ (2) Less than half the time
- ◯ (1) Some of the time
- ◯ (0) At no time

I have felt calm and relaxed. *

- ◯ (5) All of the time
- ◯ (4) Most of the time
- ◯ (3) More than half the time
- ◯ (2) Less than half the time
- ◯ (1) Some of the time
- ◯ (0) At no time

I have felt active and vigorous. *

- ◯ (5) All of the time
- ◯ (4) Most of the time
- ◯ (3) More than half the time
- ◯ (2) Less than half the time
- ◯ (1) Some of the time
- ◯ (0) At no time

I woke up feeling fresh and rested. *

- ◯ (5) All of the time
- ◯ (4) Most of the time
- ◯ (3) More than half the time
- ◯ (2) Less than half the time
- ◯ (1) Some of the time
- ◯ (0) At no time

My daily life has been filled with things that interest me. *

- ◯ (5) All of the time
- ◯ (4) Most of the time
- ◯ (3) More than half the time
- ◯ (2) Less than half the time
- ◯ (1) Some of the time
- ◯ (0) At no time

Crew Internet Access

This part of the study will investigate the internet access available to crew members.

How satisfied are you with the internet access on board? *

- ◯ Very satisfied
- ◯ Satisfied
- ◯ Neutral
- ◯ Dissatisfied
- ◯ Very dissatisfied

How much data is provided to the crew ? *

- ◯ Unlimited data
- ◯ Limited data
- ◯ Limited with the possibility to purchase more data
- ◯ Only availible through purchase

If your crew internet access is limited, what monthly or daily data limit is provided for you ?

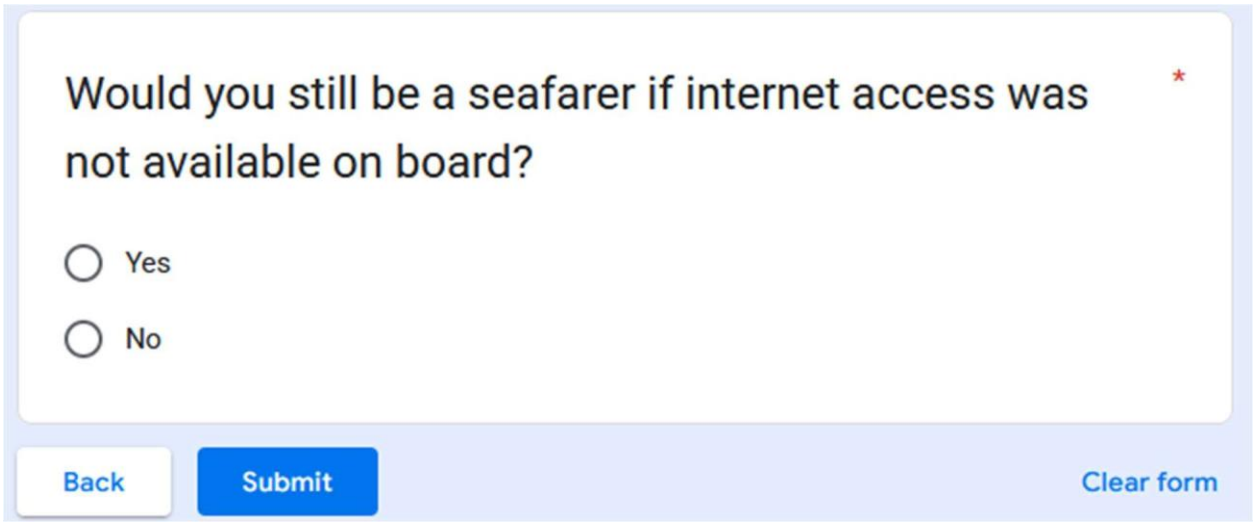
Your answer

Do you feel that internet access on board contributes positively to your overall well-being? *

- Yes, significantly
- Yes, somewhat
- No difference
- No, it negatively affects my well-being

When applying for a job, do you check the internet access provided by the company ? *

- Yes, it is a major factor
- Yes, but not a major concern
- No, but i think about it
- No, I don't consider it at all


Would you still be a seafarer if internet access was not available on board? *
Yes
No
Back
Submit
Clear form

DEPARTMENT OF MECHANICS AND MARITIME SCIENCES
CHALMERS UNIVERSITY OF TECHNOLOGY
Göteborg, Sweden
www.chalmers.se



CHALMERS