

Development of a New Instrument for Measuring Psychological Factors Specific to the Activity of Seafarers

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ABSTRACT: Researchers are increasingly recognizing the importance of seafarers' psychological well-being in maritime contexts, reflecting the profound mental health challenges associated with life at sea. Seafarers endure extended periods of isolation, demanding work schedules, and restricted access to psychosocial support, all of which contribute to elevated levels of anxiety, depression, and fatigue. Although these issues are well-documented, the field lacks a standardized psychological assessment tool specifically designed for this occupational group. Existing instruments, such as the Psychological General Well-Being Index (PGWBI) and the Symptom Checklist-90 (SCL-90), offer limited insight into the unique stressors faced by seafarers. Consequently, this paper advocates for the development of a psychometrically sound, occupation-specific psychological scale to assess seafarers' mental health.

Based on a comprehensive literature review, the study identifies core psychological constructs relevant to seafaring, including occupational stress, isolation, resilience, job satisfaction, and mental health symptoms. The proposed methodology encompasses a multi-phase approach, involving construct identification, item development, scale validation through exploratory and confirmatory factor analyses, and pilot testing with a representative sample of seafarers. Cultural and contextual sensitivity is emphasized throughout, acknowledging the diversity of maritime crews.

The development of this specialized tool is crucial for improving mental health interventions, enhancing operational safety, and supporting the long-term well-being of maritime personnel. A validated instrument would enable maritime organizations, researchers, and policymakers to systematically evaluate psychological risks, implement timely support mechanisms, and foster healthier work environments. Furthermore, it holds the potential to inform policy reforms and occupational health practices, ensuring that seafarers receive the targeted mental health care they require. In doing so, this research aims to valorise the importance of psychology in maritime affairs in order to promote sustainable workforce well-being across the global maritime industry.

1 INTRODUCTION

The well-being of seafarers has increasingly become a critical area of concern in maritime research due to the unique psychological stressors inherent in their profession. Seafarers face prolonged isolation, demanding work conditions, and restricted access to mental health resources, which collectively contribute

to heightened psychological distress [16] [21] [22]. Despite these challenges, research on seafarers' mental health remains fragmented, and there is a notable lack of standardized psychological assessment instruments tailored to this occupational group. Without robust measurement tools, understanding and addressing seafarers' psychological well-being remains limited [22], hindering the development of targeted

interventions. Existing literature identifies common mental health issues among seafarers, including anxiety, depression, and chronic fatigue [1]. These psychological stressors are often exacerbated by operational demands, social isolation, and insufficient coping mechanisms. Additionally, the COVID-19 pandemic has intensified these challenges, further underscoring the urgent need for systematic assessment tools [2]. While several studies have explored psychological risks in maritime work, most rely on general mental health indices that may not fully capture the distinct stressors faced by seafarers [3]. Psychosocial factors, such as work environment, crew relationships, and cultural diversity, further shape seafarers' psychological resilience [4]. Research highlights that mental health and job satisfaction are interlinked [24], influencing both personal well-being and operational efficiency [5]. Jiang et al. [23] report that the annual incidence of mental illness among seafarers is 3.9% per 100,000 individuals. Recent epidemiological work paints a sobering—but far less extreme—picture. Long-run mortality analyses indicate that suicide has historically represented about 6 % of all seafarer deaths (1 011/17 026 deaths, 1960-2009). Contemporary insurer records from Gard [25] show a slightly higher share, 11 % of 427 crew deaths between 2019 and 2023. In survey data the problem manifests earlier in the causal chain: a global study of 1 572 seafarers found that 20 % reported suicidal ideation in the preceding two weeks. These figures underscore the urgency of systematic assessment while avoiding the implausible claim that one-third of all seafarers take their own lives. [26]. However, the absence of a specialized psychological assessment tool limits the ability to systematically evaluate these factors and implement meaningful workplace interventions.

Given these gaps, this paper underscores the pressing need to develop a psychometrically sound instrument to assess seafarers' psychological well-being. Such a tool would enable more accurate evaluations of mental health risks, inform intervention strategies, and ultimately enhance the welfare and operational effectiveness of maritime workers. The following sections explore the significance of measuring seafarers' psychology, the absence of appropriate instruments, and the essential components required to develop a valid and reliable assessment tool.

2 THE IMPORTANCE OF MEASURING PSYCHOLOGICAL FACTORS SPECIFIC TO THE ACTIVITY OF SEAFARERS

Seafarers experience a distinct set of occupational stressors, including extended work hours, social isolation, and demanding physical environments. These factors can lead to severe psychological stressors, including anxiety, depressive symptoms, and chronic fatigue, each of which affects both personal well-being and maritime operational safety [1] [3]. Thus, measuring seafarers' psychological health is vital for improving individual outcomes and ensuring efficient maritime operations.

Existing studies highlight the correlation between psychological factors and maritime safety. For

example, the Psychological General Well-Being Index (PGWBI) has been employed to evaluate mental health in seafarers, revealing high incidences of anxiety, depression, and sleep disorders [1]. Similarly, Carrera et al. [2] emphasize that workload stressors significantly contribute to seafarers' psychological strain, reinforcing the necessity for assessment methods tailored to this workforce. Addressing these psychological parameters is crucial for mitigating chronic fatigue and reducing mental health-related safety risks at sea. Furthermore, research by McVeigh et al. [5] identifies occupational predictors of perceived stress and job satisfaction, demonstrating that certain work-related and personal factors strongly influence mental health outcomes. Understanding these variables through systematic psychological assessments can facilitate timely interventions, enhance retention in the maritime workforce, and prevent job-related psychological deterioration [6].

The COVID-19 pandemic has further amplified seafarers' psychological challenges, exacerbated social isolation and increasing uncertainty in maritime operations [7] [8]. These evolving stressors highlight the importance of adaptive and comprehensive mental health assessment tools that can track emerging psychological risks. In addition to mental health outcomes, seafarer psychology directly influences job performance. Studies suggest that fatigue-related psychological stress is a leading contributor to human error in maritime operations, increasing the likelihood of accidents [9]. Therefore, a standardized psychological assessment instrument could serve as a preventive tool, allowing maritime organizations to implement targeted interventions and enhance overall safety.

Despite the clear need for systematic psychological assessments, the maritime industry lacks standardized evaluation methods specifically designed for seafarers [2]. Existing tools often fail to account for seafarers' unique occupational context, necessitating the development of specialized instruments that capture the nuances of maritime mental health.

2.1 *The Absence of Instruments to Measure Psychological Factors in Seafaring*

While understanding of maritime workers' psychological difficulties has expanded, the absence of standardized psychological assessment instruments remains a major research gap. Current studies acknowledge that while general mental health measures such as the PGWBI and the Symptom Checklist (SCL-90) have been applied to maritime populations, they lack the specificity required to address the unique stressors of seafaring [1] [10].

Carrera et al. [2] note that existing assessment methodologies often fail to capture seafarers' dynamic work conditions, including fluctuating stress levels due to voyage duration, environmental factors, and cultural diversity aboard ships. McVeigh et al. [5] further argue that psychological instruments designed for general occupational settings do not adequately address the complexities of maritime work. These findings indicate a pressing need for tailored tools that can assess psychological resilience, occupational stress, and the broader psychosocial environment of seafarers.

Additionally, region-specific studies emphasize the importance of contextual sensitivity in psychological assessment. For instance, Ekawati [11] explores Indonesian seafarers' psychosocial risks, highlighting the need for instruments that consider cultural and geographical variations. Similarly, research by Nittari et al. [3] identifies key contributors to seafarers' mood disorders, including social isolation and long work shifts, stressing the importance of developing specialized assessment tools. Without reliable psychological measurement tools, maritime organizations lack the necessary data to implement effective mental health strategies. The absence of standardized assessment instruments not only limits research advancements but also hinders industry-wide efforts to improve mental health support systems for seafarers.

2.2 *Developing A Sound and Valid Instrument For Psychological Factors In Seafaring*

A comprehensive psychological assessment tool for seafarers must consider multiple dimensions, including occupational stressors, mental health symptoms, and coping mechanisms. A valid instrument should incorporate factors such as isolation, job satisfaction, fatigue, and interpersonal relationships, all of which significantly impact seafarers' psychological well-being [5] [10]. The development of such an instrument should follow established psychometric methodologies, including exploratory and confirmatory factor analyses, to ensure reliability and validity [13]. Additionally, integrating existing frameworks, such as the SCL-90 and PGWBI, into the scale's design could enhance its applicability to maritime settings while addressing specific occupational stressors [1] [3].

Recent studies emphasize the role of workplace interventions in mitigating psychological distress. For instance, Ekawati [11] highlights the need for psychosocial training tailored to seafarers, suggesting that assessment tools should measure both mental health symptoms and resilience factors. Similarly, research on organizational support structures indicates that job satisfaction and psychological well-being are closely linked, reinforcing the importance of including workplace satisfaction metrics in the instrument [17].

The ongoing evolution of the maritime industry, coupled with emerging mental health challenges, necessitates the development of a standardized psychological assessment tool. By systematically evaluating seafarers' mental health, such an instrument would provide valuable insights for both researchers and maritime organizations, ultimately enhancing the well-being, safety, and efficiency of seafarers worldwide.

Seafarers' psychological welfare constitutes a critical factor for both personal health outcomes and operational safety in maritime environments. However, the absence of standardized assessment tools limits the ability to identify and address mental health risks effectively. Developing a specialized instrument tailored to seafarers' unique occupational challenges is imperative for advancing research, informing interventions, and fostering a supportive maritime work environment. A validated

psychological scale would serve as a crucial tool for improving seafarers' mental health, thereby contributing to safer and more sustainable maritime operations.

3 METHODOLOGY

The development of a seafarer psychology scale necessitates a comprehensive, multi-phase methodological approach designed to address the unique psychological challenges faced by maritime workers. This methodology encompasses the identification of relevant psychological constructs, instrument design, scale validation, and pilot testing to ensure applicability within the seafaring context. The resulting instrument aims to provide a reliable and valid measure of the distinctive psychological experiences and challenges encountered by seafarers, addressing a significant gap in existing psychological assessment tools.

3.1 *Identification of Constructs*

The first phase of scale development included a systematic literature review to identify psychological constructs specifically relevant to the seafaring environment. Extensive review of maritime psychology literature revealed numerous stressors and psychological challenges unique to seafarers, including elevated levels of occupational stress, anxiety, depression, and burnout [5] [2] [13]. McVeigh et al. [5] highlighted that the maritime industry presents distinctive stressors that significantly impact mental health, including heavy workloads, prolonged separation from family, and psychosocial challenges inherent to life at sea. Additional research identified various factors influencing seafarers' mental health, such as occupational demands, psychosocial work environments, and limited access to mental health resources [10][8] [1].

Based on this literature, we identified key constructs for measurement, including job stress, psychological well-being, adjustment to maritime life, and resilience. These constructs were selected based on established frameworks from previous studies [2] [8]. To enhance ecological validity and ensure relevance to the target population, we supplemented the literature review with qualitative insights obtained through focus groups and interviews [4] [12]. Specifically, we adapted items from existing psychological scales to the seafaring context and conducted focus group sessions with 12 experienced captains currently on active duty. Additionally, we interviewed three psychologists specializing in seafarer mental health to gain expert perspectives on the psychological challenges unique to this population.

3.2 *Scale Development*

The second phase focused on developing scale items that effectively measure the identified constructs. We employed a mixed-methods approach, utilizing both Likert-scale items for quantitative assessment and open-ended questions to capture qualitative data. This approach aligns with methodologies demonstrated in

previous studies on seafarers' mental health assessment [14][1][15].

Item development prioritized clarity, conciseness, and contextual relevance to the seafaring environment, enhancing response validity. The scale structure was designed to facilitate differentiation between specific psychological states, including anxiety, depression, and job satisfaction levels. This approach is consistent with existing literature on measurement tools for assessing mental health and well-being among seafarers [2][12][6].

The initial item pool consisted of 53 items, which were subsequently refined to 36 items following preliminary pilot testing. This refinement process incorporated feedback from the pilot study participants, allowing for necessary revisions to enhance the scale's psychometric properties. Furthermore, we integrated feedback mechanisms within the pilot study to validate user experience and identify potential areas for improvement, ultimately enhancing the instrument's reliability and utility [16] [17].

3.2.1 Sample 1: Validation Process and Results

3.2.1.1 Sample Characteristics.

The initial validation sample (Sample 1) consisted of 150 seafarers recruited through convenience sampling via the authors' professional networks. The online survey remained active for four months. The demographic profile of Sample 1 revealed a significant gender imbalance, with males comprising 87.2% (130 respondents) and females 11.4% (17 respondents) of the sample. The age distribution was concentrated in the middle age ranges, with 47.7% (71 respondents) aged 31-45 years, 35.6% (53 respondents) aged 18-30 years, 12.8% (19 respondents) aged 46-65 years, and 2.7% (4 respondents) aged 66 years and above.

Regarding marital status and family structure, 43.0% (64 respondents) were single, 37.6% (56 respondents) were married, and 17.4% (26 respondents) were widowed or divorced. Additionally, 59.1% (88 respondents) reported having no children, while 37.6% (56 respondents) had children. The professional profile revealed a hierarchical structure within the maritime industry, with positions distributed as follows: Captain (26.2%, 39 respondents), Chief Engineer (15.4%, 23 respondents), Trainee (12.1%, 18 respondents), Second Officer (11.4%, 17 respondents), Third Officer (8.7%, 13 respondents), and First Officer (6.7%, 10 respondents).

The experience distribution showed a bimodal pattern: 0-5 years (28.2%, 42 respondents), 11-15 years (20.1%, 30 respondents), 16-20 years (20.1%, 30 respondents), 6-10 years (16.8%, 25 respondents), 21-25 years (8.7%, 13 respondents), and 26+ years (2.7%, 4 respondents). When asked about the most challenging ship types to work on, respondents identified Tankers (32.2%, 48 respondents), Container ships (18.8%, 28 respondents), Bulk carriers (14.1%, 21 respondents), Dry cargo vessels (12.1%, 18 respondents), Military vessels (6.7%, 10 respondents), and LNG/LPG carriers (5.4%, 8 respondents). The distribution of ship types where respondents spent most of their careers included Bulk carriers (24.8%, 37 respondents), Dry cargo

vessels (23.5%, 35 respondents), Tankers (20.1%, 30 respondents), Container ships (13.4%, 20 respondents), and Military vessels (7.4%, 11 respondents).

3.2.1.2 Exploratory Factor Analysis

Following data collection from Sample 1, we employed EFA to uncover the fundamental dimensionality of the assessment tool. The 'minimum residual' extraction method was used in combination with an 'oblimin' rotation to allow for correlated factors. Prior to conducting the EFA, we assessed the suitability of the data for factor analysis using Bartlett's Test of Sphericity and the Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy.

Bartlett's Test of Sphericity yielded a chi-square value of 2523 (df = 171, $p < .001$), confirming the factorability of the correlation matrix as it deviated significantly from an identity matrix. The overall KMO value was 0.933, well above the recommended threshold of 0.6, confirming the sampling adequacy for factor analysis. The fact that the individual KMO values of the items ranged between 0.860 and 0.965 supports the suitability of the data for factor analysis.

The EFA results revealed a three-factor solution that best represented the fundamental framework of the scale. The factor loadings matrix showed clear patterns of item loadings on the three factors:

- Factor 1 included 11 items (S, M, N, Q, E, J, O, G, P, D, R) with factor loadings ranging from 0.418 to 0.809
- Factor 2 included 5 items (H, I, C, L, K) with factor loadings ranging from 0.477 to 0.895
- Factor 3 included 3 items (B, A, F) with factor loadings ranging from 0.404 to 0.816

The three-factor solution explained 55.0% of the total variance, with Factor 1 accounting for 25.7%, Factor 2 for 18.2%, and Factor 3 for 11.0% of the variance. The inter-factor correlation matrix indicated moderate to strong correlations between the factors: Factor 1 and Factor 2 ($r = 0.716$), Factor 1 and Factor 3 ($r = 0.533$), and Factor 2 and Factor 3 ($r = 0.510$). These correlations support the use of an oblique rotation method and suggest that the factors represent related but distinct constructs.

3.2.1.3 Factor Structure and Scale Items

Based on the content analysis of the scale items, the three factors identified in the exploratory and confirmatory factor analyses were named as follows:

1. Psychological Well-being and Adaptation (Factor 1): This factor encompasses items related to emotional and psychological responses to seafaring life, including feelings of loneliness, unhappiness, irritability, sleep disturbances, and overall negative impacts on mental health.
2. Interpersonal and Environmental Challenges (Factor 2): This factor includes items related to difficulties in adapting to the social and physical environment on ships, such as multicultural challenges, discomfort with living among strangers, food adaptation issues, trust concerns, and health problems.
3. Social Isolation and Communication Difficulties (Factor 3): This factor comprises items related to the impact of prolonged separation from land and

family, difficulties in maintaining communication skills, and challenges in readjusting to life ashore.

Table 1 presents the complete list of items for each factor in the final version of the Seafarer Psychology Scale.

Table 1. Factors and Items of the Seafarer Psychology Scale

Factor	Item Code	Item Content (Turkish)	English Translation
Factor 1: Psychological Well-being and Adaptation	VAR00005	Gemide kendimi yalnız hissediyorum.	I feel lonely on the ship.
	VAR00006	Gemide bulunmaktan mutlu değilim	I am not happy being on the ship.
	VAR00008	Denize çıkmadan önceki halime göre daha sinirli bir yapıya sahibim	I have a more irritable temperament compared to before going to sea.
	VAR00011	Gemide uyku düzenimi ayarlayamıyorum	I cannot regulate my sleep pattern on the ship.
	VAR00014	Artık gemide çalışmak istemiyorum fakat maddi kaygılarım bunun önüne geçiyor	I no longer want to work on the ship, but my financial concerns prevent this.
	VAR00015	Gemide sefer süresi uzadıkça yaşanan tartışmalar da artıyor.	As the voyage duration increases, arguments on the ship also increase.
	VAR00018	Çalıştığım gemilerde ruhl sağlığı bozuk insanlarla sıklıkla karşılaştığımı düşünüyorum.	I think I frequently encounter people with mental health problems on the ships I work on.
	VAR00020	Kıyılardan uzak bir meslekte çalışmanın ruh sağlığımı olumsuz etkilediğini düşünüyorum	I think working in a profession far from shores negatively affects my mental health.
	VAR00004	Gemideki çok ulusluluktan kaynaklanan kültür farkı beni olumsuz etkiliyor.	The cultural differences arising from multinationality on the ship negatively affect me.
	VAR00009	Tanımadığım insanlarla bir arada yaşamak beni tedirgin ediyor.	Living together with people I don't know makes me uncomfortable.
Factor 2: Interpersonal and Environmental Challenges	VAR00010	Çalıştığım insanlarla bir arada yaşamak beni olumsuz etkiliyor.	Living together with the people I work with negatively affects me.
	VAR00012	Gemideki yemek düzenine alışamıyorum ve aç kalmak beni sinirlendiriyor.	I cannot adapt to the meal schedule on the ship, and being hungry makes me angry.
	VAR00013	Gemideki insanlara karşı güvensizlik yaşıyorum.	I experience distrust towards people on the ship.
	VAR00017	Gemideyken sağlık problemlerim artıyor. (Mide bulantısı, ağrı, ateş basması vb.)	My health problems increase while on the ship. (Nausea, pain, hot flashes, etc.)
	VAR00019	Gemide yaşanan problemleri (kişisel) tolere etmekte güçlük çekiyorum.	I have difficulty tolerating problems (personal) experienced on the ship.
	VAR00001	Uzun süre karadan uzak kalmak, ailemle olan ilişkilerimi kötü etkiliyor.	Being away from land for a long time negatively affects my relationships with my family.
	VAR00002	Seferden döndükten sonra karadaki hayata alışmakta zorlanıyorum.	I have difficulty adapting to life ashore after returning from a voyage.
Factor 3: Social Isolation and Communication Difficulties	VAR00003	Denizde kaldıkça iletişim gücümü kaybediyorum.	I lose my communication skills the longer I stay at sea.
	VAR00007	Gemide kurulan kısıtlı iletişim beni daha içe kapamış hale getirdi.	The limited communication established on the ship has made me more introverted.

recommended threshold of 0.90 for a good fit. The model chi-square test was significant ($\chi^2 = 270$, $df = 117$, $p < .001$), which is common in larger samples and does not necessarily indicate poor fit when other indices suggest adequate fit.

Reliability analyses were conducted to evaluate the internal consistency of the scale and its subscales. The overall scale demonstrated excellent reliability with a Cronbach's alpha of 0.941. The reliability statistics for the individual factors were also strong: Factor 1 ($\alpha = 0.904$), Factor 2 ($\alpha = 0.854$), and Factor 3 ($\alpha = 0.828$). Item-level reliability statistics indicated that all items contributed positively to the scale's reliability, with no substantial increases in Cronbach's alpha if any item were deleted (values ranging from 0.936 to 0.940).

These results from Sample 1 provided strong initial evidence for the psychometric properties of the seafarer psychology scale, supporting a three-factor structure with good reliability and acceptable model fit. Based on these findings, we proceeded to further validate the scale with a second sample using confirmatory factor analysis.

3.2.2 Sample 2: Confirmatory Analysis and Convergent/Divergent Validity

3.2.2.1 Sample Characteristics

Following the exploratory factor analysis with Sample 1, we sought to confirm the three-factor structure with a larger, independent sample (Sample 2). This sample consisted of 221 maritime professionals, with 95.02% male and 4.98% female participants. The age distribution was similar to Sample 1, with the majority aged 31-45 years (51.13%), followed by 18-30 years (37.56%), 46-65 years (10.86%), and 66 and above (0.45%). Regarding marital status, 56.11% were married and 43.89% were single, with 54.30% having no children and 45.70% having children.

The professional profile of Sample 2 included Captains (21.72%), First Officers (16.74%), Second Officers (13.57%), Second Engineers (10.86%), Third Officers (9.95%), Chief Engineers (9.05%), and Trainees (7.69%), among others. Years of offshore experience ranged from 0-5 years (32.58%) to 26+ years (1.81%), with the majority having 0-10 years of experience (59.73%). Participants reported most experience with Dry Cargo vessels (39.82%) and Tankers (26.70%), while identifying Tankers (35.29%) and Dry Cargo vessels (18.10%) as the most difficult ship types. Notably, 84.62% of participants indicated they had considered transitioning to onshore positions.

3.2.2.2 Confirmatory Factor Analysis

We conducted a confirmatory factor analysis (CFA) to validate the three-factor structure identified in the exploratory phase. The CFA model specified the three factors with their respective indicators as identified in the EFA. The factor loadings from the CFA showed strong relationships between the indicators and their respective factors, with standardized estimates ranging from 0.572 to 0.853 for Factor 1, 0.601 to 0.834 for Factor 2, and 0.577 to 0.812 for Factor 3. All factor loadings were statistically significant ($p < .001$), providing strong support for the hypothesized factor structure.

3.2.1.4 Model Fit and Reliability

The model fit indices for the three-factor solution indicated an acceptable fit to the data. The Root Mean Square Error of Approximation (RMSEA) was 0.0769 (90% CI: 0.0651-0.0892), which is below the recommended threshold of 0.08 for a reasonable fit. The Tucker-Lewis Index (TLI) was 0.904, exceeding the

The factor covariances indicated strong relationships between the three factors, with standardized estimates of 0.813 between Factor 1 and Factor 2, 0.860 between Factor 1 and Factor 3, and 0.887 between Factor 2 and Factor 3. These high correlations suggest that while the factors represent distinct constructs, they are closely related aspects of seafarers' psychological experiences.

The model fit indices for the CFA demonstrated a good fit to the data. The Comparative Fit Index (CFI) was 0.912, exceeding the recommended threshold of 0.90 for a good fit. The Tucker-Lewis Index (TLI) was 0.898, approaching the recommended threshold of 0.90. The Standardized Root Mean Square Residual (SRMR) was 0.0516, well below the recommended threshold of 0.08 for a good fit. The Root Mean Square Error of Approximation (RMSEA) was 0.0797 (90% CI: 0.0697-0.0898), which is at the borderline of the recommended threshold of 0.08 for a reasonable fit. The chi-square test was significant ($\chi^2 = 394$, $df = 164$, $p < .001$), yielding a chi-square/df ratio of 2.40, which is below the recommended threshold of 3.0 for a reasonable fit.

3.2.2.3 Reliability Analysis

Reliability analyses for Sample 2 confirmed the strong internal consistency of the scale. The overall scale showed outstanding reliability with a Cronbach's alpha of 0.942 and McDonald's omega of 0.897. The mean score for the scale was 3.33. Item-level reliability statistics indicated that all items contributed positively to the scale's reliability, with no substantial increases in Cronbach's alpha or McDonald's omega if any item were deleted (values ranging from 0.937 to 0.943).

Convergent and Divergent Validity

To establish convergent and divergent validity, we examined correlations between our seafarer psychology scale (Psiko) and three established measures:

1. The Turkish version of the Work And Meaning Inventory (WAMI) [18]
2. The Turkish version of the Multidimensional Work Motivation Scale [19]
3. The Turkish version of the Perceived Stress Scale (PSS) [20]

The correlation analysis revealed significant relationships that supported both convergent and divergent validity. The seafarer psychology scale showed a significant positive correlation with the Perceived Stress Scale ($r = 0.223$, $p = 0.006$), indicating convergent validity as both measures assess stress-related constructs. Conversely, the seafarer psychology scale demonstrated significant negative correlations with the Work And Meaning Inventory ($r = -0.680$, $p < .001$) and the Multidimensional Work Motivation Scale ($r = -0.286$, $p < .001$), providing evidence of divergent validity as these scales measure distinct constructs (meaning and motivation) that would be expected to have inverse relationships with psychological distress. Additional correlations between the validation measures further supported the nomological network: the Perceived Stress Scale was negatively correlated with both the Work and Meaning Inventory ($r = -0.221$, $p = 0.006$) and the Multidimensional Work Motivation Scale ($r = -0.478$, $p < .001$), while the Work And Meaning

Inventory and the Multidimensional Work Motivation Scale were positively correlated ($r = 0.365$, $p < .001$).

Descriptive Statistics

Descriptive statistics for Sample 2 ($N = 221$) revealed the following patterns:

- Perceived Stress Scale: Mean = 2.83 (SD = 0.501), Median = 2.83, Range = 1.57-5.00
- Work And Meaning Inventory: Mean = 2.98 (SD = 1.11), Median = 2.98, Range = 1.00-5.00
- Multidimensional Work Motivation Scale: Mean = 3.66 (SD = 1.01), Median = 3.66, Range = 1.00-6.32
- Seafarer Psychology Scale (Psiko): Mean = 3.17 (SD = 1.13), Median = 3.30, Range = 1.00-5.00

The Shapiro-Wilk test indicated non-normal distributions for the Perceived Stress Scale, Work And Meaning Inventory, and Seafarer Psychology Scale ($p < .001$), while the Multidimensional Work Motivation Scale showed a normal distribution ($p = 0.314$).

4 CONCLUSION

The methodology for developing the seafarer psychology scale represents a detailed and systematic approach spanning multiple phases, from the identification of relevant psychological constructs to the validation and dissemination of the final instrument. Through rigorous methodological procedures, including comprehensive literature review, qualitative insights from industry experts, careful item development, and thorough validation processes with two independent samples, we have developed a psychometrically sound instrument tailored to the unique psychological challenges faced by seafarers.

The exploratory factor analysis with Sample 1 ($N = 150$) demonstrated a robust three-factor structure explaining 55% of the variance, with excellent reliability ($\alpha = 0.941$). The confirmatory factor analysis with Sample 2 ($N = 221$) validated this structure, demonstrating good model fit and strong factor loadings. The convergent and divergent validity analyses established the scale's relationship with related constructs, supporting its construct validity within the nomological network of psychological measures.

This process, grounded in existing empirical research and innovative methodological practices, contributes significantly to enhancing understanding and support of seafarers' mental health and well-being within their unique and challenging occupational context. The resulting scale provides a valuable tool for assessing psychological factors specific to the maritime environment, addressing a significant gap in existing psychological assessment measures for this specialized population.

4.1 Outlook and Next Steps

The present two-sample validation establishes factorial validity and internal consistency, yet a fully standardised psychological test requires broader evidence. Our next phase (2025-2026) will therefore (i) draw a stratified random sample of ≥ 1000 seafarers across vessel types and flag states to produce

stable norms and cut-off scores; (ii) conduct test-retest and inter-rater reliability studies over typical tour lengths (± 90 days); (iii) examine predictive validity against safety incidents and medical-leave records; and (iv) translate/adapt the SPS into at least five IMO working languages, following ITC/APA guidelines for cross-cultural test adaptation. These steps will move the SPS toward the full quality standards required of a psychological test and will furnish maritime organisations with an evidence-based screening tool for targeted mental-health interventions.

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APPENDIX A: ADMINISTRATION SHEET (READY FOR PHOTOCOPYING OR E-SURVEY)

Item	Statement	1 = Strongly Disagree ... 5 = Strongly Agree
1	I feel lonely on the ship.	1 2 3 4 5

2	I am not happy being on the ship.	1 2 3 4 5
3	I have a more irritable temperament compared to before going to sea.	1 2 3 4 5
4	I cannot regulate my sleep pattern on the ship.	1 2 3 4 5
5	I no longer want to work on the ship, but my financial concerns prevent this.	1 2 3 4 5
6	As the voyage duration increases, arguments on the ship also increase.	1 2 3 4 5
7	I think I frequently encounter people with mental health problems on the ships I work on.	1 2 3 4 5

8	I think working in a profession far from shores negatively affects my mental health.	1	2	3	4	5
9	The cultural differences arising from multinationality on the ship negatively affect me.	1	2	3	4	5
10	Living together with people I don't know makes me uncomfortable.	1	2	3	4	5
11	Living together with the people I work with negatively affects me.	1	2	3	4	5
12	I cannot adapt to the meal schedule on the ship, and being hungry makes me angry.	1	2	3	4	5
13	I experience distrust towards people on the ship.	1	2	3	4	5
14	My health problems increase while on the ship. (Nausea, pain, hot flashes, etc.)	1	2	3	4	5
15	I have difficulty tolerating problems (personal) experienced on the ship.	1	2	3	4	5
16	Being away from land for a long time negatively affects my relationships with my family.	1	2	3	4	5
17	I have difficulty adapting to life ashore after returning from a voyage.	1	2	3	4	5
18	I lose my communication skills the longer I stay at sea.	1	2	3	4	5
19	The limited communication established on the ship has made me more introverted.	1	2	3	4	5

1. Scoring instructions (place on the second page)

Scale structure

* Factor 1 – Psychological Well-being & Adaptation* (8 items: 5, 6, 8, 11, 14, 15, 18, 20)

* Factor 2 – Interpersonal & Environmental Challenges* (7 items: 4, 9, 10, 12, 13, 17, 19)

* Factor 3 – Social Isolation & Communication* (4 items: 1, 2, 3, 7)

Response format 1 = Strongly disagree ... 5 = Strongly agree. No items are reverse-scored.

Sub-scale scores Mean the items in each factor.

Total SPS score Mean of all 19 items (range 1-5). Higher values = greater psychological strain.

Interim interpretive bands (based on Sample 2, N = 221)

SPS mean	Interpretation	z-approx.
< 2.0	Low distress	< -1 SD
2.0 – 3.5	Moderate (typical)	-1 SD ... +0.3 SD
> 3.5	High-risk, flag for follow-up	> +0.3 SD

(Cut-offs will be refined once a larger normative sample is available.)

2. Psychometric summary (page 3)

Statistic	Total scale	F1	F2	F3
Cronbach α	0.94	0.90	0.85	0.83
McDonald ω	0.90	0.88	0.84	0.80
KMO (overall)	0.93	–	–	–

CFA fit (Sample 2) CFI = 0.912; RMSEA = 0.080; SRMR = 0.052