

Visualisation and bibliometric analysis of worldwide research trend of stress among seafarer: an extensive publication analysis

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ABSTRACT

Stress is the most predominant and worldwide psychological human condition that undoubtedly impedes the state of mind of the individuals. During the last few years, a tremendous change and growth in the global publishing trend for human stress have been observed. Like other professionals (doctors, bankers, teachers, and businessmen), the mariners or seafarers are also being the most common victims of this human psychological disorder (stress) these days. The keywords “seafarer” and “stress” have been exposed to mine the research trend of the articles exploring the stress among the seafarers. From 2001 to 2020, more than six thousand (6211) human stress-based articles have been reported in Scopus indexing database. However, the number of articles related to the stress among seafarer is 136 only i.e. 2.18% of the human-stress based articles. The research related to the psychological disorder (stress) among seafarer has been increased during the last two decades. Germany, United Kingdom and Italy found to be the topmost countries for exploring the stress among the seafarer. The study concluded that the human psychological conditions like bulimia, anorexia nervosa, obsessive-compulsive disorder, schizophrenia, generalised anxiety disorder, cyclothymia, mood, conduct, and personality disorders along with stress still need to be extensively mined to diagnose the state of mind of seafarers.

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Key words: seafarer, psychological disorders, stress, maritime industry

INTRODUCTION

The bibliometric and publishing study assists in getting the complete publication and citation trend of the articles [1]. This information will assist in finding the impact and influence of research domain, articles, journals, publishers, authors, research groups and funding agencies. The details regarding universities, authors, research groups and countries who are pursuing their research work in specific areas for the welfare of the society can be easily extracted from a bibliometric analysis. The details of funding agencies that support similar kind of work can also be extracted through the research trend of this study. The ideas relating to stress, related works, and the novelty of this research work have been briefly highlighted in the rest of this section.

STRESS

Earlier, cancer, diabetes and heart attacks were the most critical and prevalent global human disorders [2]. However, nowadays, the psychiatric disorders are the most proliferating human diseases. Stress is a predominant, persistent and global human psychiatric disorder. It is a human psychiatric disorder that inevitably revamps the state-of-mind of an individual [3, 4]. It affects the thinking, moving, walking, eating and working capacity of the victim. The late diagnosis of stress may intricate several other human critical disorders like diabetes, stroke, anxiety and depression. Therefore, it is intended to diagnose these psychiatric conditions at an early stage.

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RELATED WORKS

Earlier, different studies have been carried out to explore the publishing and bibliometric trend for disaster health [5], public health research [6], open-access [7], clinical radiology [8], predatory journals [9], epidemiology [10], health services [11], ergonomics [12], feature selection [13], and neurological disorders [14]. However, a little attention is given to mine the research trend of stress among maritime industry workers. The maritime industry is the backbone of the world trade business and is responsible for globalization and foreign exchange.

NOVELTY

The objective of this study is to examine and highlight the publishing trend of stress among seafarer based articles. A Scopus indexing database has been explored for the same. The period of observation was restricted to two decades i.e. 2001 to 2020. Here, an extensive research trend analysis in terms of global publications, sources (books, journals, and conferences), countries, access (open/closed), and languages have been explored. The list of productive journals, universities, and funding agencies active in this research area has also been highlighted.

The methodology used in this bibliometric analysis is presented in section "Materials and methods". The results and discussions are summarised in section "Results and discussion". Finally, the work is concluded in section "Concluding remarks and future directions".

MATERIALS AND METHODS

DATA SOURCES

The Scopus indexing database has been mined for this bibliometric analysis. The articles related to the human-stress and stress among seafarers published between 2001 and 2020 were extracted and explored.

SEARCH STRATEGY

In Scopus, the search term "(TITLE-ABS-KEY ("seafarer" AND "stress") AND (LIMIT-TO (PUBYEAR,2020) OR LIMIT-TO (PUBYEAR,2019) OR LIMIT-TO (PUBYEAR,2018) OR LIMIT-TO (PUBYEAR,2017) OR LIMIT-TO (PUBYEAR,2016) OR LIMIT-TO (PUBYEAR,2015) OR LIMIT-TO (PUBYEAR,2014) OR LIMIT-TO (PUBYEAR,2013) OR LIMIT-TO (PUBYEAR,2012) OR LIMIT-TO (PUBYEAR,2011) OR LIMIT-TO (PUBYEAR,2010) OR LIMIT-TO (PUBYEAR,2009) OR LIMIT-TO (PUBYEAR,2008) OR LIMIT-TO (PUBYEAR,2007) OR LIMIT-TO (PUBYEAR,2006) OR LIMIT-TO (PUBYEAR,2005) OR LIMIT-TO (PUBYEAR,2004) OR LIMIT-TO (PUBYEAR,2003) OR LIMIT-TO (PUBYEAR,2002) OR LIMIT-TO (PUBYEAR,2001))" has been mined for analysis of this study. Both subscription and open-access based articles, conference papers, reviews, book chapters, letters, notes, editorials, and books have been considered for this investigation.

The data extracted from Scopus have been mined for the countries, research categories, universities, and languages.

Moreover, the publication trend for some major psychiatric conditions like bulimia, anorexia nervosa, obsessive-compulsive disorder, schizophrenia, generalised anxiety disorder, cyclothymia, mood, conduct, and personality disorders have also been assessed. This research trend analysis assists to gain clear insights regarding the variation in publication trend of stress and other human psychiatric conditions.

RESULTS AND DISCUSSION

STRESS AMONG SEAFARER RELATED ARTICLES IN THE WORLD

The number of the last 20 years worldwide publications relevant to the keywords used in the search strategy has been depicted in Figure 1A. In the last two decades, the number of publications per year has increased from 1 to 18 nearly. Moreover, thirty seven different countries have carried out research related to this theme. The country-wise publishing details are presented in Figure 1B. The highest number of publications are from Germany (24), followed by the United Kingdom (20) and Italy (11).

The source-wise distribution (Fig. 1C) reflects that the studies related to the theme under observation have been published in the form of research articles, notes, letters, book chapters, reviews, conference papers, books, and editorials. More editorials and short communications are required to cover the publication gaps for these studies. The contribution of subscription (63%) and open-access (37%) based articles are reported in Figure 1D. Despite English, some of the studies have also been authored in German, French, Chinese, Italians and Croatian (Fig. 1E).

STATISTICS

In the previous 10 years (2011–2020), the number of worldwide publications related to seafarer stress has skyrocketed from 1 to 136. A positive growth trend ($R^2 = 0.693308$) has been observed. The statistics report for the same is depicted in Table 1. The coefficient of determination (R^2) indicates that 70% (approx.) of variation of several publications around the mean are completely extracted by the year of publication that means 70% of values fit the regression model.

RESEARCH CATEGORIES

Globally, 19 distinct research categories (Agricultural, Biological Sciences, Arts, Humanities, Decision Science, Computer Science, Chemical Engineering etc.) related to stress among seafarers have been found (Fig. 2). Among these distinct categories, medicine (83, 61.02%) social sciences (34, 25%), engineering (31, 22.79%), and environmental sciences (19, 13.97%) found to be more common.

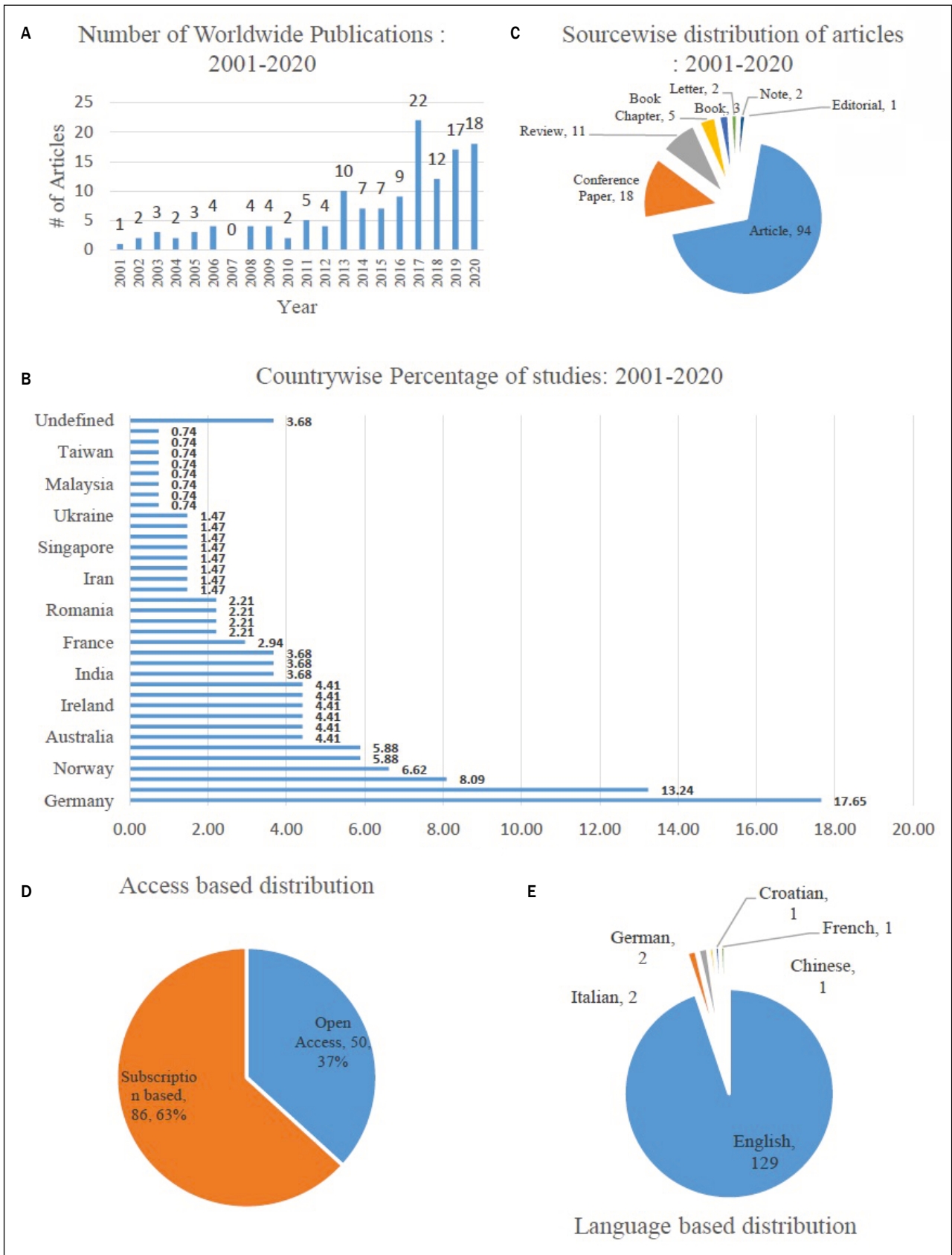


Figure 1. Stress among seafarer related articles; **A.** Number of Worldwide Publications: 2001–2020; **B.** Countrywise Percentage of studies: 2001–2020; **C.** Distribution of articles: 2001–2020; **D.** Access based distribution; **E.** Language-based distribution.

However, the categories like computer science, decision science, energy need to be more explored as far the stress among seafarer is concerned. A significant variation of these publication categories has been found. More conferences and symposiums related to the theme are intended to be arranged to disseminate knowledge among young professionals and to motivate them for future research works.

CONTRIBUTION OF UNIVERSITY

Several authors from distinct global universities are working on mining and management of stress among the seafarer. The names of the universities along with the number of articles published in the area of stress among seafarers are presented in Table 2. The Universitätsklinikum Hamburg-Eppendorf und Medizinische found to be a leader for such kind of publications.

Table 1. Statistics

Regression statistics	
Multiple R	0.832314
R square	0.692747
Adjusted R square	0.675677
Standard error	3.494022
Observations	20

Table 2. Universities contribution

University	Article published
Universitätsklinikum Hamburg-Eppendorf und Medizinische Fakultät	20
University of Southern Denmark, Esbjerg	8
Cardiff University	8
Gdanski Uniwersytet Medyczny	7
Università degli Studi di Camerino	7
Australian Maritime College	5
Universität Hamburg	5
Stellenbosch University	4
Akademickie Centrum Medycyny Morskiej i Tropikalnej	4
Trinity College Dublin	4
University of Tasmania	4
University of Zadar	4
Fachhochschule Münster – Abteilung Steinfurt	4
AMET University	3
Univerzita Palackého v Olomouci	3
Kobe University	3
Memorial University of Newfoundland	3
Maynooth University	3
Dalian Maritime University	3
Centre for Risk, Integrity and Safety Engineering	3

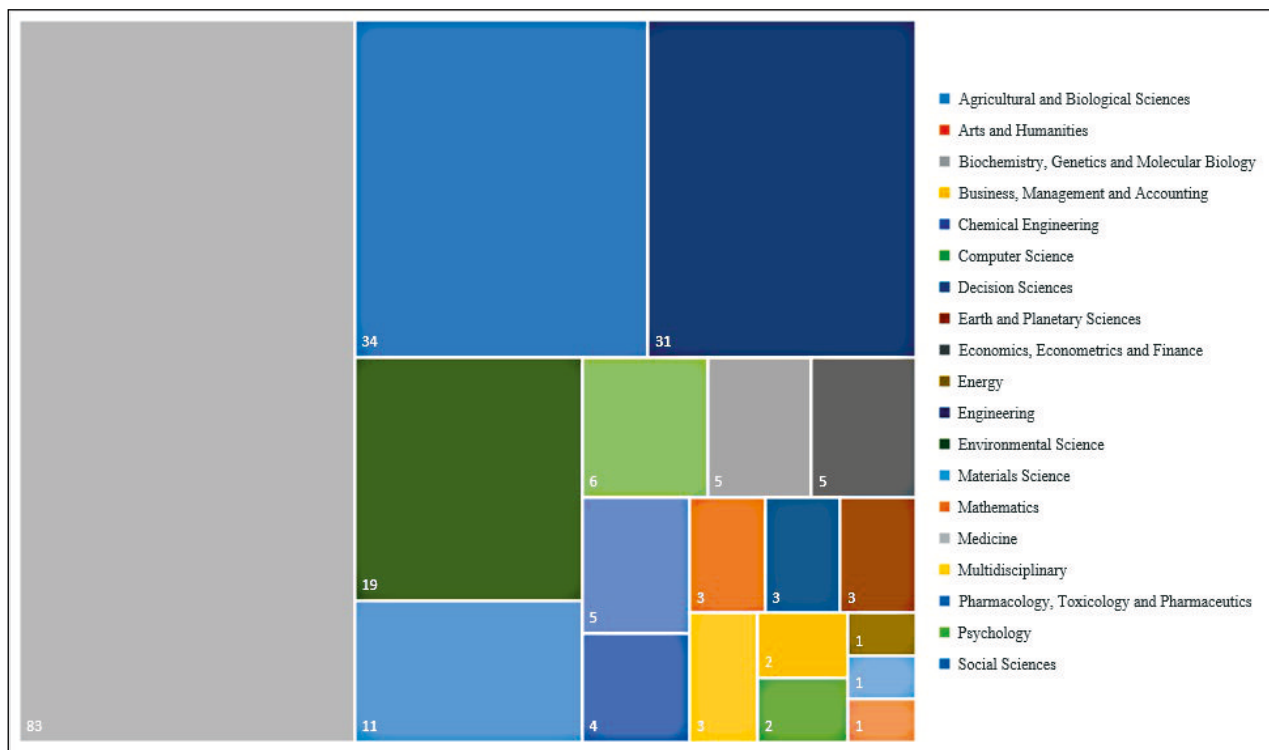


Figure 2. Research categories for stress among the seafarer

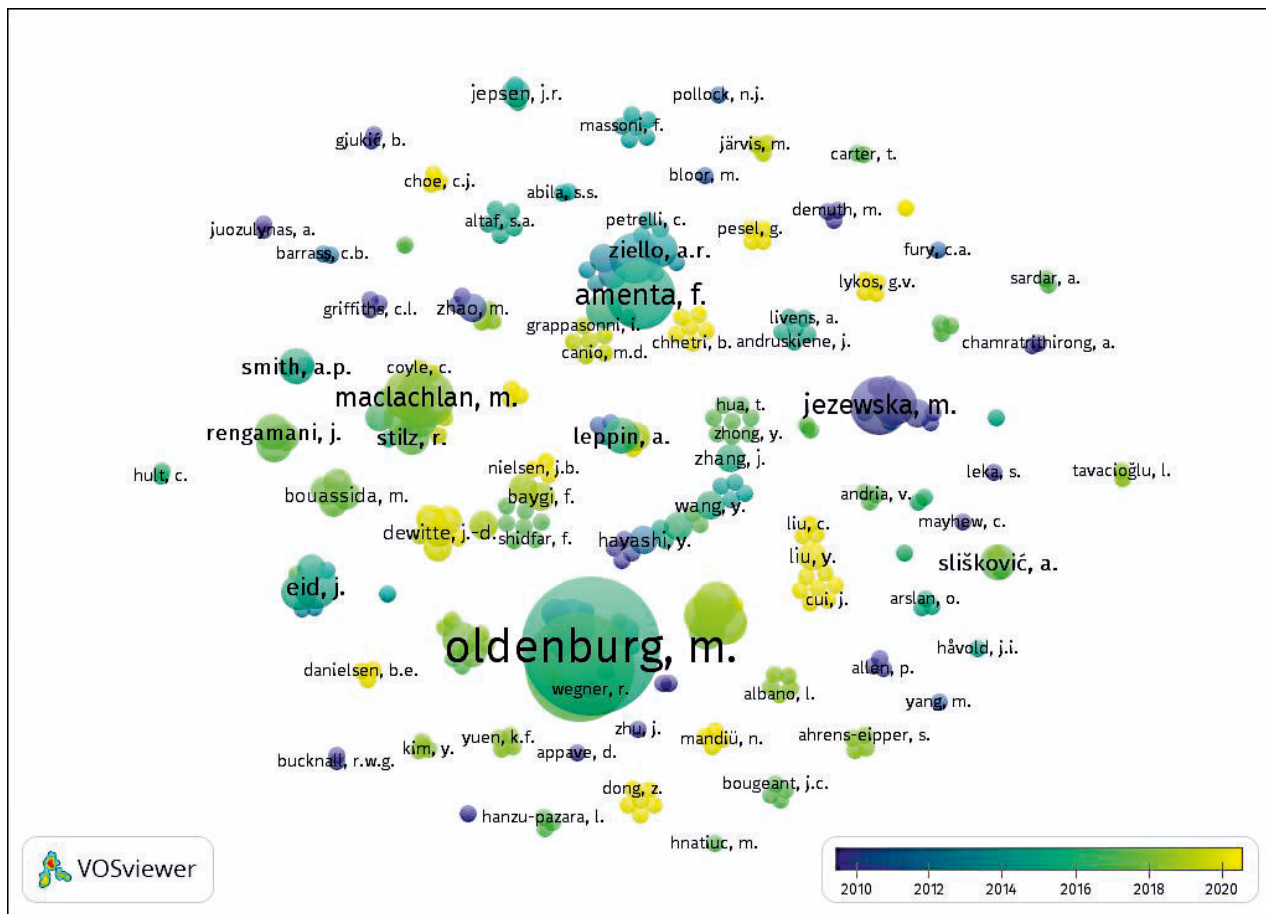


Figure 3. Authors’ network map

AUTHORS’ NETWORK

Several researchers are working in the area of mining and management of stress among mariners. The collaboration of the authors has been presented in Figure 3. This map assists in finding the collaboration network of the authors. This information will be useful for naïve researchers who want to do collaborative research in this domain. The authors map indicates that a total link strength of twenty and greater is observed for six different authors. The highest number of publications (23) has been recorded for the M. Oldenburg.

Table 3 depicts the country-wise international collaboration in mining and management of stress among seafarers. The link strength signifies the rate of international collaboration. The highest level of international collaboration has been asserted for the United Kingdom, followed by Ireland and the United States.

KEYWORDS FREQUENCY

A list of high-frequency keywords (found in the explored publications) has been extracted in the form of triplet i.e. (Keyword, Frequency, Total-Link Strength). The (human, 79,

1062), (ships, 55, 682), (male, 45, 722), (adult, 41, 686), (medicine, 39, 555), (mental-stress, 36,559), (stress, 30, 492), (occupational-health, 28,426), (psychology, 24,386), (occupational-disease, 18, 286), and (mental-health, 15, 196) are some of the instances of the triplets. The keyword distribution map for the same is presented in Figure 4.

JOURNAL AND FUNDING CONTRIBUTION

As per the search strategy, a total of 136 articles have been filtered out that recognise the use of two important keywords viz. stress and seafarer. Out of 136 articles, 94 have been published in different journals. The bifurcation publishing details are shown in Table 4. As per the search strategy (mentioned in section “Search strategy”), the International Maritime Health found to be a top contributed journal. The results witnessed that 30.85% of the articles have been published in this journal alone.

A network map for citations (organisations) has also been created (Fig. 5). The organisation having cumulative citations of less than ten has been excluded from this analysis. Globally, 59 different organisations have met this criterion. As far as organisational citations are considered

Table 3. International collaboration

Country	Documents	Total link strength
Germany	24	0
United Kingdom	18	13
Italy	11	5
Denmark	9	6
Norway	9	1
China	8	5
Australia	6	4
Canada	6	4
Croatia	6	0
Ireland	6	10
Poland	7	0
United States	6	9
India	5	4
South Africa	5	9
South Korea	5	3
France	4	3
Czech Republic	3	7
Japan	3	1
Romania	3	0
Sweden	3	0
Greece	2	1
Iran	2	3
Lithuania	2	0
Philippines	2	4
Singapore	2	1
Tunisia	2	0
Turkey	2	0
Ukraine	2	5
Brazil	1	1
Estonia	1	0
Malaysia	1	1
Spain	1	2
Switzerland	1	0
Taiwan	1	2
Thailand	1	1
Vietnam	1	2

the 'Institute for occupational and maritime medicine, Germany' is on the top followed by 'Statutory accident insurance institution for seafaring, Hamburg', and 'University of applied sciences, Berlin'. Surprisingly, the top three institutes are from Germany.

The work related to the mining of stress among seafarers has been funded by different agencies and universities. The list of funding agencies and the number of works supported during the last two decades have been shown in Figure 6. The maximum amount of work in the concerned area has been supported by the University of Tasmania.

HIGHLY CITED RESEARCHERS

Citation is one of the significant research performance metrics. The list of top 20 cited researchers along with their total number of publication in the concerned area is presented in Table 5. It is found that M. Oldenburg is the top-cited researchers in this area. However, if the articles per citation are considered then X. Baur is on the top.

Likewise, the citation report of the articles explored using the search strategy (mentioned in section "Search strategy") has also been extracted. Some of the highly-cited key articles are mentioned in Table 6 [15–29].

The cumulative country-wise citations related to the theme under consideration are also presented (Table 7). It is found that the highest number of citations has been recorded for Germany followed by the United Kingdom and Canada. The countries where the cumulative citations are below ten have not been considered in this analysis.

PSYCHOLOGICAL DISORDERS AND SEAFARERS

The existing studies recognized that the prolonged or high intensity of the stress may trigger different human psychological disorders. Like stress, other human psychological disorders among seafarers need also to be mined (Table 8). No doubt, research has been carried out to mine and manage different human psychological disorders. The number of articles published for the psychological disorder in general and particularly in context to the seafarers has been extracted using a similar search strategy. The results witnessed a high number of publications in context to a different human psychological disorder in general. However, very few articles related to the mining of human psychological disorder particularly for seafarer has been identified. A minor change can be observed by altering the search strategy. However, the facts will remain same, i.e. as compared to the stress, more effort (research work) is required to mine the state of other human psychological disorders among the seafarer.

CONCLUDING REMARKS AND FUTURE DIRECTIONS

Here, an exhaustive bibliometric trend of international scientific articles for worldwide stress among seafarer has been examined. In the last two decades, stress among seafarer had observed a positive publishing trend. The publishing gap of distinct countries from 2001 to 2020 has

Table 4. Bifurcation publishing details

Journal	Number of articles
International Maritime Health	29
International Archives of Occupational and Environmental Health	6
Marine Policy	4
Safety Science	4
International Journal of Environmental Research and Public Health	3
International Journal of Mechanical Engineering and Technology	3
Journal of Occupational Medicine and Toxicology	3
Maritime Policy and Management	3
PLOS One	3
Work	3
Safety and Health at Work	2
AIDS Education and Prevention	1
Acta Biomedica	1
Advanced Engineering Informatics	1
African Journal of Marine Science	1
Archives Des Maladies Professionnelles Et De L Environnement	1
Archives of Environmental and Occupational Health	1
Arhiv Za Higijenu Rada I Toksikologiju	1
Asia Life Sciences	1
Chronobiology International	1
Entrepreneurship and Sustainability Issues	1
Frontiers in Psychology	1
Gazzetta Medica Italiana Archivio Per Le Scienze Mediche	1
IEEE Transactions on Electrical and Electronic Engineering	1
International Journal of Occupational Medicine and Environmental Health	1
International Journal of Public Health	1
Journal of Loss Prevention in The Process Industries	1
Journal of Occupational Health and Safety Australia and New Zealand	1
Journal of Pacific Rim Psychology	1
Kindheit Und Entwicklung	1
Marine Structures	1
Maritime Studies	1
Medicina Kaunas Lithuania	1
Nase More	1
Occupational Medicine	1
Psychiatria Danubina	1
Ricerca Folklorica	1
Sociology of Health And Illness	1
Transportation Research Part-A Policy and Practice	1
WMU Journal Of Maritime Affairs	1
Zentralblatt Fur Arbeitsmedizin Arbeitsschutz Und Ergonomie	1
Chinese Journal of Industrial Hygiene and Occupational Diseases	1

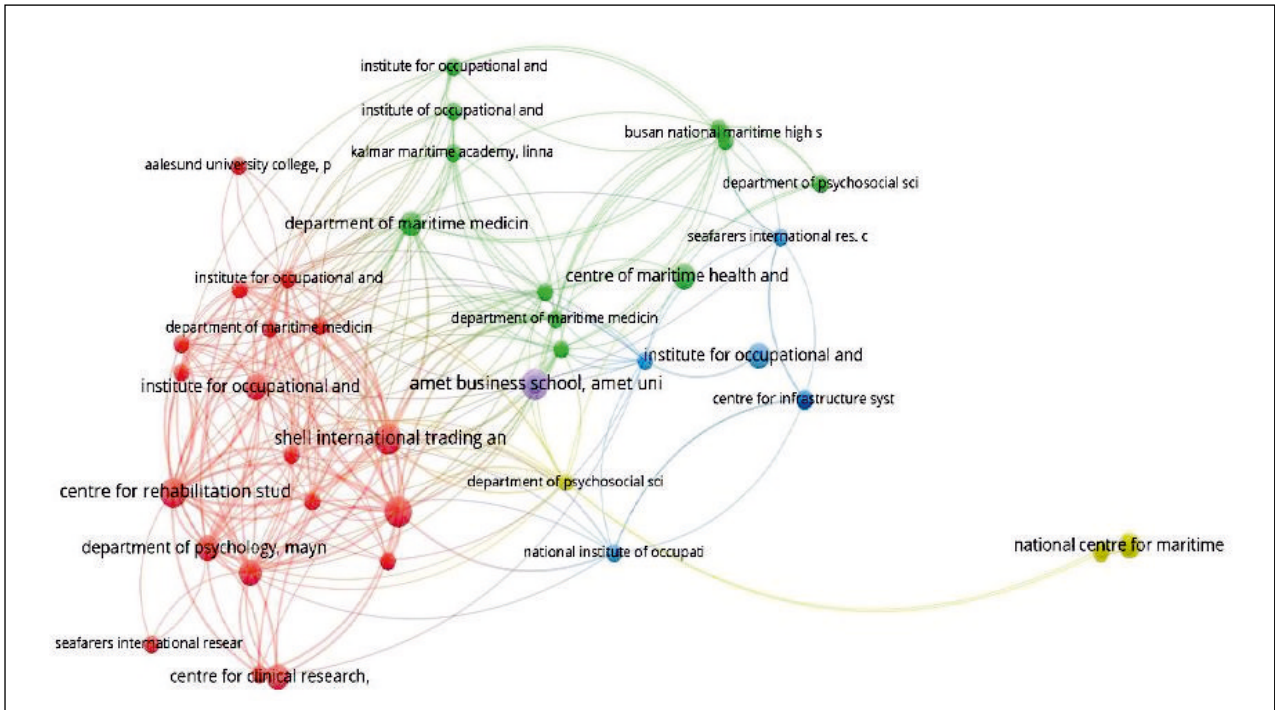


Figure 5. Citations (organisation)

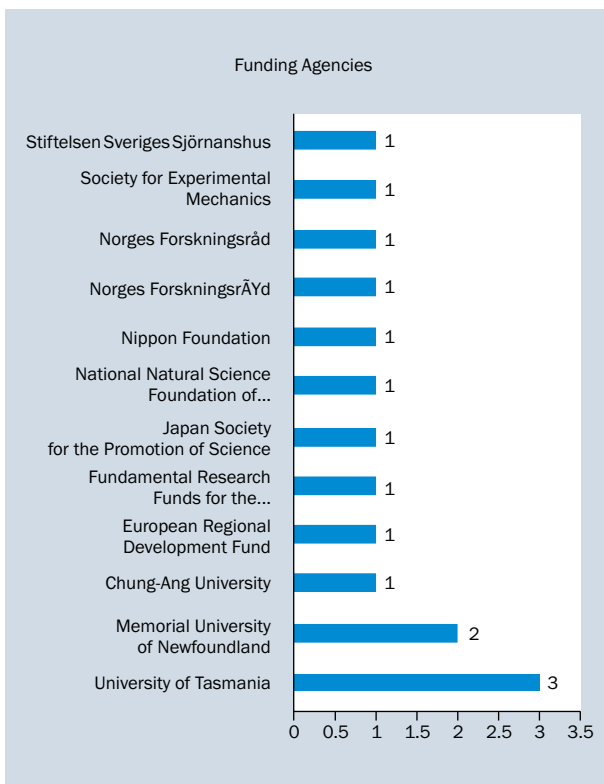


Figure 6. Funding agencies/universities

Table 5. Author's citation report

Author	Documents	Citations
Oldenburg M.	23	289
Baur X.	5	188
Jensen H.-J.	16	165
Amenta F.	8	87
Fasanaro A.M.	5	80
Abbassi R.	3	69
Garaniya V.	4	69
Islam R.	4	69
Khan F.	4	69
Eid J.	4	64
Hystad S.W.	3	44
Maclachlan M.	6	34
Leppin A.	3	31
Mcveigh J.	5	30
Cox H.	3	21
Fraser A.	3	21
Stilz R.	3	21
Jezewska M.	6	20
Sibilio F.	3	19
Šlišković A.	3	19

Table 6. Highly cited article

Authors	Year	Cited by	Document type	Access type
Oldenburg M. et al. [15]	2010	81	Review	Open access
Oldenburg M. et al. [16]	2009	74	Article	Subscription-based
Vickers D., Walsh V. [17]	2005	69	Article	Subscription-based
Carotenuto A. et al. [18]	2012	58	Review	Subscription-based
Thomas M. et al. [19]	2003	58	Article	Subscription-based
Watermeyer K.E. et al. [20]	2008	37	Article	Subscription-based
Oldenburg M. et al. [21]	2013	34	Review	Subscription-based
Islam R. et al. [22]	2018	29	Article	Open access
Hystad S.W., Eid J. [23]	2016	27	Article	Open access
Islam R. et al. [24]	2017	23	Article	Subscription-based
Oldenburg M. et al. [25]	2008	23	Article	Subscription-based
Haka M. et al. [26]	2011	22	Article	Subscription-based
Muraia K. et al. [27]	2009	21	Article	Subscription-based
Nielsen M.B. et al. [28]	2013	20	Article	Subscription-based
Bal E. et al. [29]	2015	19	Article	Subscription-based

Table 7. Countrywide citation

Country	Documents	Citations	Total link strength
Germany	24	282	118
United Kingdom	18	146	77
Canada	6	139	11
Norway	9	100	56
Australia	6	72	13
South Africa	5	64	54
Denmark	9	46	32
Italy	11	37	31
Ireland	6	34	60
China	8	30	35
South Korea	5	28	10
Croatia	6	26	28
Japan	3	23	0
Sweden	3	23	7
Poland	7	31	7
Turkey	2	20	0
United States	6	18	7
India	5	16	2
Thailand	1	16	0
Singapore	2	14	4
Czech republic	3	13	40
Estonia	1	11	0
Taiwan	1	11	6

Table 8. Publication analysis

Psychological disorders	No. of publication	
	General	Seafarer
Bulimia	17726	Nil
Anorexia nervosa	24497	Nil
Obsessive-compulsive disorder	32047	Nil
Schizophrenia	200662	01
Generalised anxiety disorder	14859	Nil
Anxiety	405383	31
Depression	738,227	35
Mood disorder	53900	Nil
Personality disorder	64510	01
Conduct disorder	11324	Nil

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