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Original Article

Tailoring Psychosocial Risk Assessment in the Oil and Gas Industry by Exploring Specific and Common Psychosocial Risks

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ABSTRACT

Background: Psychosocial risk management [Psychosocial Risk Management Approach (PRIMA)] has, through the years, been applied in several organizations in various industries and countries globally. PRIMA principles have also been translated into international frameworks, such as PRIMA-EF (European framework) and the World Health Organization Healthy Workplace Framework. Over the past 10 years, an oil and gas company has put efforts into adopting and implementing international frameworks and standards for psychosocial risk management. More specifically, the company uses a PRIMA.
Methods: This study explores available quantitative and qualitative risk data collected through the PRIMA method over the past 8 years in order to explore specific and common psychosocial risks in the petroleum industry.
Results: The analyses showed a significant correlation between job resources and symptoms of work-related stress, there was a significant correlation between job demands and symptoms of work-related stress, and there were differences in psychosocial risk factors and symptoms of work-related stress onshore and offshore. The study also offers recommendations on how the results can further be utilized in building a robust system for managing psychosocial risks in the industry.
Conclusion: The results from the analyses have provided meaningful and important information about the company-specific psychosocial risk factors and their impact on health and well-being.

1. Introduction

Many of the changes that have surfaced in recent years in relation to the organization of work have been associated with the emergence of psychosocial risks. The World Health Organization (WHO) and the European Agency for Health and Safety at Work (EU-OSHA) reported that psychosocial hazards are linked to the experience of work-related stress, being the second most prevalent work-related health problem, affecting 22% of workers in the European Union (EU) [1–3].

A poor psychosocial work environment can also be related to the development of ill health due to long-term exposure to poor working conditions. An extensive number of articles have been published on psychosocial factors and how they correlate with psychological and physiological outcomes [3–5]. Psychosocial risks in the oil and gas industry can have a significant impact on health and safety outcomes and must be handled in the same way as other operational risks. Investigations and research related to occupational accidents in recent years have shown them to be associated with underlying factors related to the organization, design, and management of work (also called psychosocial risks) [2,3,6–23]. These results show that psychosocial risks affect not only the health and safety of individuals, but also the health of the organization. The work context differs in the oil and gas industry depending on whether it is onshore or offshore. As such, the risks and its impact on health and well-being are also different; e.g., offshore work is

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physically demanding, employees are exposed to hazards such as noise, vibrations, shift work, long working days, and chemical exposure [24]. A study conducted by Bjerkan [25] showed that offshore workers perceived significantly more hazards associated with the work and experienced less control over the work pace compared to onshore workers. Onshore workers experienced significantly more pressure at work and view their work tasks as more repetitive. Differences in health perceptions were identified in terms of job type in the onshore and offshore groups, respectively [25].

In addition, the management and development of employees are now recognized as one of the main success criteria for organizational performance. A successful organization identifies the importance of investing in human resources [26]. An important contributor to this knowledge is the increasing amount of research exploring the link between job engagement and potential positive consequences on health, productivity, quality, and motivation. The Job Demands–Resources (JD-R) model was introduced as an alternative model of employee well-being to established models such as the job demand–control model and the effort–reward imbalance model [18]. In the JD-R model, working environment factors are divided into job resources and job demands [27]. Job demands refer to physical, psychological, mental, and/or psychological costs (e.g., work overload, job insecurity, and role ambiguity). Job resources refer to physical, psychological, social, or organizational features of a job that help achieve goals at work, reduce job demands, and stimulate employee growth and development [27].

Over the past 8 years, a multinational oil and gas company has put efforts into adopting and implementing international frameworks and standards in the area of psychosocial risk management. The company has implemented a psychosocial risk management system and adheres to good practice according to PAS1010, the first guidance standard on the management of psychosocial risks in the workplace [28,29]. Since 2007, psychosocial risk assessment has been applied in different business areas in the company. Currently, the company is in the process of improving various parts of the management system and is looking at opportunities to simplify and streamline the risk assessment for the psychosocial work environment. In order to ensure organizational learning and improve the way risk assessments are conducted, available qualitative and quantitative risk data collected through psychosocial risk assessments were assessed.

The purpose of this study was to explore the available risk data collected through the psychosocial risk management process over the past 8 years in order to explore specific and common psychosocial risks to the oil and gas industry. Based on the JD-R theoretical model and empirical findings related to psychosocial factors, work-related stress and its impact on health [3], the following four hypotheses were formulated:

Hypothesis 1. There will be differences in the psychosocial risk factors experienced by onshore and offshore workers.

Hypothesis 2. There will be differences in the symptoms of work-related stress experienced by onshore and offshore workers.

Hypothesis 3. There will be a significant correlation between job resources and symptoms of work-related stress, so that increased job resources will be associated with decreased symptoms of work-related stress.

Hypothesis 4. There will be a significant correlation between job demands and symptoms of work-related stress, so that increased job demands will be associated with increased symptoms of work-related stress.

2. Methods

2.1. The company context

This study was carried out in a Norwegian oil and gas company, which included data from offshore and onshore environments. The largest activities for this company are located in Norway, with about 20,000 employees around the globe. It is a license holder in numerous oil and gas fields, and the onshore facilities are active within such areas as gas treatment, crude oil reception, refinement, and methanol production. The activities in this industry involve a range of health and safety risks including fires, falling objects, hydrocarbon leakages, explosions, and work-related illness. When errors are made in these workplaces, the consequences can be devastating [30]. Employees in the oil and gas industry are exposed to a number of physical and psychosocial stressors, including cramped physical environments, long work shifts, isolated location, noise, vessel motion, heavy physical work, hazardous work operations, and lack of privacy [31–34]. These rather challenging work environmental conditions have a potentially adverse influence on well-being and health. However, there are also several positive aspects at platforms offshore. Employees spend a lot of their time with other colleagues with whom they often build social relationships. Employees working offshore have long periods off work and when they are at work they have several benefits such as good-quality food, good fitness facilities, and movie theaters. Furthermore, the work can be perceived as meaningful as the personnel work at the sharp end, seeing the immediate connection between their effort and the result—obtaining the oil and gas from the reservoir. These aspects may positively influence well-being, engagement, and health among the workers [35]. In recent years, the company has worked systematically to integrate principles for managing psychosocial risk [36]. As such, the measures and data used in this study were part of a larger psychosocial risk assessment and follow-up.

The company's psychosocial risk management framework is based on the principle of prevention in line with the control cycle, and it aims at risk reduction. It is a systematic process by which hazards are identified, risks analyzed and managed, and workers protected [28]. The risk assessments and follow-up are applied in order to obtain a more complete risk picture and enable the organization to implement improvement initiatives. The procedures used in the risk assessment are in line with the method originally described by Cox et al in 1983 [37]. The risk assessments assess psychosocial risk factors that may cause work-related stress and ill health. They use various tools, both tailor-made and standardized. A questionnaire survey provides quantifiable data on the antecedents and consequences of work stress. It contains both tailored measures of work organization and practices, and standardized measures of symptoms of general well-being. The risk assessment mainly covers two parts; (1) assesses the possible sources of work stress; (2) measures the possible consequences of a poor working environment, i.e., symptoms of work-related stress [38]. Based on the results from the risk assessment, mitigating actions are initiated and followed up in the respective units.

2.2. Sample

Data selection included 12 different samples from different risk assessments and different locations (offshore and onshore). The sample size varied in the different samples, ranging from 50 to 351 employees. From these 12 samples, there are five offshore (788 respondents) and seven onshore (1,024 respondents) datasets. In total, there are 1,812 respondents. The risk data have been stored in a company's internal database over the past 8 years.

2.3. Measures

The risk data had been accumulated through surveys and were already stored in SPSS files (SPSS version 22.0.; SPSS Inc., Chicago, IL, USA). They were analyzed by using both qualitative and quantitative methods. The analyses used data from tailor-made working environment questions and the standardized General Well-Being Questionnaire (GWBQ) [39]. The tailor-made questionnaire assesses employees' experience of their working environment (job demands and job resources) and the GWBQ measures the possible consequences of a poor working environment, i.e., symptoms of work-related stress. These two questionnaires are described further below.

2.3.1. Psychosocial Working Environment Questionnaire

The psychosocial work environment questions were tailor-made on the basis of data collected through interviews in each workgroup to be able to capture the nature of work in each case. They provided information about the employees' experience of their psychosocial working environment (job demands and job resources) onshore and offshore. The questionnaire items were designed to cover all potential psychosocial hazards identified during familiarization and interviews with the working groups as concisely as possible. The employees evaluated the adequacy of each aspect of their work on a 5-point Likert scale. As far as possible, the tailor-made items followed the psychosocial factor categorization used in definitions put forward by the WHO, PRIMA-EF (European framework), and PAS1010. The categories cover the two dimensions included in the JD-R model. Examples of job demands are work content and workload issues, and those of job resources are control and support issues.

2.3.2. Symptoms of work-related stress—GWBQ

In order to gather information on work-related stress symptoms onshore and offshore, a decision was made to use historical data collected through the GWBQ (31). The GWBQ is a validated instrument used in the company in order to assess important symptoms of work-related stress. The short version of the GWBQ consists of the worn-out scale comprising 12 questions [39]. These relate to symptoms of tiredness, emotional liability, and cognitive confusion. Full details of the scale itself and its development can be found in the work of Cox and Griffiths [40].

A 5-point Likert response scale is used (ranging from 0 = never to 4 = always). Cutoff scores have been established for the GWBQ, and these validated scores are used as a point of reference for the purpose of deciding criticality and condition [29,31]. An average score is produced for the whole group of employees. Average scores of 18 and upward indicate that a group is more worn out than the average. Average scores higher than 20–21 indicate a relatively high level of worn out symptoms. Cutoff scores for professional and factory workers have also been produced (professionals: 15.87; factory workers: 14.16) [39].

2.4. Qualitative analysis

A qualitative analysis of the tailor-made psychosocial work environment questions from all the samples was performed. In order to handle the large dataset practically, it was decided to categorize the working environment questions into main categories. The categorization was performed by using thematic analysis. The analysis first identified the main themes reported through the various questions in the samples, grouping similar questions together, according to good practice on the basis of key guidance [3,41].

The questions from risk assessments were clustered according to the underlying psychosocial hazard dimension they corresponded to according to scientific evidence [41]. Questions related to the main psychosocial hazard dimensions of job demands, job control, interpersonal relationships, social support, and role clarity.

Three experts in the area were involved in the thematic analysis conducted to ensure interrater reliability and reduce bias. Where disagreements arose, a fourth expert in the area but independent to the organization was consulted.

2.5. Quantitative analysis

The results from the qualitative analysis were used as input to the quantitative analysis. In order to combine variables when performing the analysis, it was important to check the data with regard to reliability and random errors [42]. Cronbach's alpha for all samples was therefore calculated to establish the internal reliability of scaled questions [43].

Correlation analysis was subsequently conducted in order to assess the relationship between the various work environment categories (identified through the qualitative analysis) and General Well-Being (GWB) scores in each of the samples. Furthermore, mean GWB scores for offshore and onshore samples were calculated.

The various samples used different response scales on the working environment questions; however, they were all linear. Owing to the different scales used in the samples, it was expected that the direction of the correlations would differ. The different scales used in the samples are provided in Table 1.

An independent *t* test was subsequently conducted to examine whether there was a difference in GWB score for onshore and offshore samples by merging SPSS files.

3. Results

3.1. Qualitative results

From the available samples, five main categories were identified: demands, control, role clarity, support, and social relationships. The demand category included questions related to working conditions and workload issues. All samples (onshore and offshore) included issues related to workload and employees' ability to balance larger assignments and *ad hoc* tasks. However, for the offshore samples this balance is often described as the balance between planned maintenance and urgent tasks. For the offshore samples, the demand category especially contains questions about how time estimates match actual time spent on agreed tasks and the need for extending the offshore period. For the onshore samples, the demand category also comprised questions related to employees' ability to perform tasks within normal working hours and the importance of having an alignment between the competence required and the job that needs to be executed. Table 2 shows the categories and examples of working environment questions related to job demands.

Table 1
Examples of scales for tailor-made items used in the various samples

1 = very unsatisfactory, 2 = unsatisfactory, 3 = neither or neutral, 4 = satisfactory, 5 = very satisfactory, 6 = not applicable
−1 = Not applicable; 0 = not answered, 1 = totally unsatisfactory, 2 = unsatisfactory, 3 = neither or neutral, 4 = unsatisfactory, 5 = totally satisfactory
1 = very poor, 2 = poor, 3 = neither/nor, 4 = good, 5 = very good
1 = very good, 2 = good, 3 = neither/nor, 4 = poor, 5 = very poor

Table 2
Demand items

Demands	How do you rate the: • Balance between planned and unplanned tasks. • Ability to implement tasks during normal working hours. • Working beyond normal working hours.

Table 4
Support items

Support	• Ability to receive professional support from the professional network when needed. • That SAP, PIMS, and ARENA support your daily work*. • The frequency of feedback from my line manager.

* SAP, PIMS, and ARENA are important support systems, related to employees' instrumental support.

The control category included questions related to the individual's ability to influence their own work situation. The analysis of the working environment questions showed that all samples contained questions that addressed the employee's ability to impact and prioritize own work tasks. This was observed in both onshore and offshore samples. For the offshore samples, questions especially addressed the ability to understand the management system and requirements important for executing a job. For the onshore samples, the control category included questions that related to job flexibility and predictability. Table 3 shows the categories and examples of working environment questions related to control.

The support category included aspects related to support from both colleagues and leaders. Four types of support were included: emotional support, evaluation support, information support, and instrumental support. Within the support category, analysis showed that all samples contained questions related to leadership support. This included support related to solving daily tasks such as reducing high workload and the amount and quality of feedback. Questions related to professional support were also included in all samples. Within offshore samples, the support questions were often linked to established work practice, such as support with regard to work permits. The leaders' availability and willingness to help prioritize were particularly highlighted in the onshore samples. Table 4 shows the categories and examples of working environment questions related to support.

The category for role in the organization included questions that related to whether employees experience clarity with regard to their job profile and whether there is an alignment between the job requirements and prescribed role behaviour. Offshore role clarity related to employees' ability to perform their responsibilities in line with their role description. As such, their ability to familiarize themselves with the requirements related to their role was highlighted as important. In the onshore samples, clarity in relation to what employees have responsibility for was highlighted as particularly important. Table 5 shows the categories and examples of working environment questions related to control.

Finally, the questions included in the social aspect category related to organizational culture, interpersonal relationships, and career development. All samples included questions related to conflict handling, communication, and collaboration/interface between units, projects, and disciplines. In the offshore samples, questions often describe issues related to the collaboration between onshore and the installation as well as the quality of the social environment. Questions related to changes were identified in both offshore and onshore samples. However, the onshore samples had fewer questions compared with offshore samples. The questions related to how changes are communicated and whether employees are involved in changes that impact their own work situation. Because the samples varied with regard to how many questions they had related to change, it was decided to include the change aspect into the category social aspects. Table 6 shows the categories and examples of working environment questions related to social aspects.

The results from the qualitative analysis supported hypothesis 1, which states that there will be a difference in how psychosocial factors are perceived onshore and offshore.

3.2. Quantitative results

The Cronbach's alpha values of all questions in each category were checked to establish reliability and to decide whether all the questions should be included in the category (see Tables 7 and 8). When there are few items in an index (variables that contain fewer than 10 questions), this may result in a low Cronbach's alpha [42]. This was observed in some of the samples and, in particular, this was the case for the job demand category. Because of the variation in the number of questions in the indexes, it was decided to use the variables in the analysis even though alpha values in some instances were lower than 0.7. The GWBQ (worn-out score) had a Cronbach's alpha value of 0.826.

Table 9 shows the GWB (worn-out) scores for onshore and offshore. GWB scores varied between 13 and 15. The mean score for all offshore installations was 13.82. The mean score for onshore was 15.11. The GWB scores for offshore installations were right below the established cutoff score for factory workers (14.16). The mean scores for onshore workers were just below the established cutoff score for professionals (15.87) [37,40].

The analysis produced a t value of 4.658 with an associated probability of 0.01 As such, the results from the analysis show that there were differences in GWB scores for the offshore and onshore samples. Table 10 shows the results of the analysis performed in order to compare and assess the differences between onshore and offshore samples. The second hypothesis, which states that there will be differences in the symptoms of work-related stress experienced by onshore and offshore workers, was therefore confirmed.

Both job resources (e.g., social support, job control, and role in the organization) and job demands (e.g., workload) are important for employees' well-being and health. Correlation analysis was performed in order to highlight which working environment aspects are linked to symptoms of work-related stress (see Table 11).

Table 3
Control items

Control	• Ability to control own work pace. • Ability to influence how work tasks should be done. • Ability to influence the units key performance indicators (KPIs).

Table 5
Control items

Role in the organization	• The way tasks are distributed. • Clarification of roles and responsibilities before work commences. • The opportunity to understand why decisions are made.

Table 6
Social aspects items

Social aspects	• Collaboration between onshore and offshore. • The social environment onboard. • That the leaders are aligned when communicating changes.

In the onshore samples, job demands seem to be a psychosocial risk factor that impacts employees' health negatively, e.g., higher demands are linked to lower general well-being. In the offshore samples, there is a similar pattern where the job demand factor is significantly correlated with the GWB score. Demands offshore have the lowest correlation to GWB, and demands onshore have a higher correlation to GWB compared to offshore—thus confirming Hypothesis 4, that there will be a significant correlation between job demands and symptoms of work-related stress, so that increased job demands will be associated with increased symptoms of work-related stress.

Furthermore, the analysis shows that there is significant correlation between job control and GWB score for both onshore and offshore samples. This indicates that employees who perceive a high degree of control at work also have a lower GWB score (e.g., higher overall well-being). It should be noted that, for one of the samples (one onshore—sample 3 in Table 11), there is no significant correlation between control and GWB.

The analysis shows that there is a strong significant correlation between support at work and GWB. Social support is also an important factor that seems to have an impact on employee health. In all offshore samples, support is strongly correlated with GWB. For onshore samples, results also show that support is correlated with GWB.

Employees' experience of having clear roles and responsibilities also seems to have an impact on their health. Results show that in several samples, there is a significant correlation between role and GWB score. A significant correlation between role clarity and GWB can be found in both offshore and onshore samples.

Social aspects seem to be more important for the GWB score in offshore samples than in onshore samples. This may indicate that having good interpersonal relationships and a favorable organizational climate may prevent negative effects on employees' health and well-being. For two of the onshore samples (2 and 3 in Table 3), the p value fell below 0.01 and as such was not significantly related to GWB—thus confirming hypothesis 3, which states that there will be a significant correlation between job resources and symptoms of work-related stress, so that increased job resources will be associated with decreased symptoms of work-related stress.

4. Discussion

In order to have a robust risk management process, it is important to be familiar with the factors that impact employees' health and well-being [29,44]. The results from this study describe the psychosocial factors that are particularly important to this company when they manage psychosocial risk to promote health and well-being among their employees.

All hypotheses formulated in this study were confirmed. The analyses indicate that there are differences between onshore and offshore employees with regard to the various psychosocial risk factors. The two groups place emphasis to specific psychosocial risk factors. For example, the offshore samples appear to have a higher degree of job resources than onshore samples although job requirements seem to be higher offshore. Furthermore, it should be noted that the various working environment questions are expressed differently based on whether the location is onshore or offshore. For example, for the offshore samples workload issues is often described as the balance between planned maintenance and urgent tasks or time estimates match actual time spent on agreed tasks and the need for extending the offshore period. By contrast, for the onshore samples, this aspect is often expressed as the ability to balance larger assignments and *ad hoc* tasks. In addition to differences between onshore and offshore groups with regard to psychosocial factors, the results also show differences with regard to symptoms of work-related stress. This indicates that psychosocial risk and its management is important both onshore and offshore.

In line with research on the JD-R model, the analysis showed that both job resources (e.g., social support, job control, and role in the organization) and job demands (e.g., workload) are important for employees' well-being and health [18,45,47]. The qualitative analysis helped establish social support, control, and role in the organization as key working environment aspects because all the samples raised issues related to support, control, and role in the organization. Furthermore, the correlation analysis showed that employees who report good social support, clear roles, and job control also report better well-being. Results showed that there is a significant relationship between job resources and symptoms of work-related stress, e.g., job support, control, and role clarity are important for employee health and well-being. These results can also be found in other studies [1,3,49]. For example, a study performed by Mache et al. [46] showed that demands and the following resources—influence at work, opportunities for development, degree of freedom at work, sense of community, feedback, quality of leadership, and social support—were significant predictors for work engagement. As reported in the literature, support can also have a buffer effect and protect employees from

Table 7
Cronbach's alpha—onshore results

Samples	Demands	Control	Support	Role	Social aspects
1-ON	0.655	0.729	0.920	0.753	0.556
2-ON	0.611	0.753	0.910	0.752	0.672
3-ON	0.737	0.709	0.762	0.801	0.614
4-ON	0.580	0.566	0.837	0.541	0.741
6-ON	0.803	0.714	0.840	0.776	0.843
7-ON	0.653	0.703	0.708	0.847	0.603

ON, onshore.

Table 8
Cronbach's alpha—offshore results

Samples	Demands	Control	Support	Role	Social aspects
1-OFF	0.538	0.734	0.856	0.835	0.853
2-OFF	0.720	0.800	0.905	0.811	0.735
3-OFF	0.659	0.848	0.919	0.735	0.702
4-OFF	0.771	0.908	0.945	0.796	0.902
5-OFF	0.780	0.853	0.932	0.709	0.675

Established cutoff score for professionals (15.87), (29), and (31).
OFF, offshore.

Table 9
Mean General Well-Being (GWB) score—offshore and onshore

Sample	Mean	Standard deviation
Onshore	15.11	5.84
Offshore	13.82	5.65
Total	14.38	5.77

Table 10
Results from independent sample *t* test

		t test for equality of means						
		t	*df*	Sig. (two-tailed)	Mean difference	Std. error difference	95% Confidence interval of the difference	
							Lower	Upper
GWB score	Equal variances assumed	4.78	1810	0.000	1.30	0.27	0.76	1.82
	Equal variances not assumed	4.75	1665	0.000	1.30	0.27	0.76	1.83

GWB, general well-being.

experiencing work-related stress [47]. Lack of social support leads to negative psychological conditions that can result in poor health either directly through physiological processes or through behavior [3].

Furthermore, all samples raised issues that related to job demands. In a workplace setting, high workload can be stressful and can cause ill health in the workforce. This includes both quantitative workload or overload, qualitative workload, and underload [4,48]. Today, it is well established that high job demands can lead to work-related stress and ill health [1,3,4,49]. It is particularly negative when employees experience high job demands in combination with lack of resources. If prolonged, this may result in reduced job engagement and burnout [18]. It should also be noted that role of job engagement, well-being, and health complaints on action errors and rule violations has also been tested offshore. It was found that job engagement was associated with fewer reports of action errors and violations. Furthermore, findings indicated that job engagement mediated the relationship between well-being and reports of action errors and violations [35].

4.1. Limitations

This study has utilized historical data from internal records in a company, and as such, there are limitations that should be noted. First, the total number of samples has been very large, and each sample size has varied between 50 and 351 respondents. The variations in sample size may affect the results from the correlation analysis—i.e., when the sample size is small, it is less likely that a significant result will be found than when the sample is large [50]. Moreover, the tailoring of the questions at times made it difficult to classify the questions according to categories defined by external frameworks and standards. Often, industrial data do not fully meet the requirements of science, which means they are not used for research at all. From an industry perspective, it also means that scientific data are difficult to compare with their own data, and therefore difficult to use in their practices. In this study, part of the challenge was to make use of existing industrial data in a scientifically sound way. Although this approach has its limitations, it implies a valuable attempt to make scientific use of the large reservoir of existing industry data, and to make industrial practice and scientific research more compatible.

Tailoring questions according to the local context can be an advantage with regard to highlighting particular risk factors for a unit [53]. However, it is difficult to conduct quantitative analysis of all data, trying to identify more general patterns with regard to working environment risks in the company. Furthermore, the flexibility when it comes to designing working environment questions for each risk assessment has resulted in the use of different scales on the working environment questions in the various samples, which has further complicated analysis.

Given that the data were cross-sectional, we cannot draw conclusions about causal relationships. Thus, there is a possibility that poor psychosocial factors cause reduced general well-being among employees. A reciprocal relationship between the variables may of course also exist in that poor employee general well-being may cause them to have a negative experience of their working environment, which in turn leads to even poorer general well-being. However, it is important to note that research over at least the past decade, including longitudinal studies, has shown that psychosocial hazards can have a negative impact on health [3,49,51,52].

In light of the limitations (i.e., having a procedure where the working environment questions are tailor-made for each unit), the company would benefit by standardizing the working environment questions. This would make it easier and more effective to compare and see the relationship between the various sites. However, knowledge from previous risk assessments should be used in order to identify and design the standardized questionnaire ensuring the utilization of local knowledge about specific tasks, jobs, and psychosocial hazards into the assessment process. As argued in the

Table 11
Correlation analysis results for onshore (ON) and offshore (OFF)—work environment aspects and GWB

GWB in each sample	Demand (sig.)	Control (sig.)	Social support (sig.)	Role (sig.)	Social aspects (sig.)
1-ON	−0.473** (0.000)	−0.280** (0.002)	−0.330** (0.000)	−0.114 (0.239)	−0.280** (0.003)
2-ON	0.324** (0.006)	0.262** (0.0)	0.378** (0.001)	0.513** (0.000)	0.017 (0.892)
3-ON	0.299** (0.014)	0.210 (0.091)	0.291* (0.018)	0.304** (0.012)	0.194 (0.119)
4-ON	−0.449** (0.000)	−0.371** (0.000)	−0.298** (0.000)	−0.314** (0.000)	−0.299** (0.000)
6-ON	−0.535** (0.000)	−0.465** (0.000)	−0.416** (0.000)	−0.287** (0.006)	−0.490** (0.000)
7-ON	0.407** (0.000)	0.541** (0.000)	0.542** (0.000)	0.475** (0.000)	0.475** (0.000)
8-OFF	−0.448** (0.000)	−0.413** (0.000)	−0.465** (0.000)	−0.483** (0.000)	−0.452** (0.000)
9-OFF	−0.140** (0.009)	−0.308** (0.000)	−0.302** (0.000)	−0.228** (0.000)	−0.314** (0.000)
10-OFF	−0.382** (0.000)	−0.472** (0.000)	−0.457** (0.000)	−0.415** (0.000)	−0.403** (0.000)
11-OFF	−0.424** (0.000)	−0.490** (0.000)	−0.482** (0.000)	−0.493** (0.000)	−0.445** (0.000)
12-OFF	−0.322** (0.21)	−0.382** (0.006)	−0.495** (0.000)	−0.299* (0.035)	−0.389** (0.005)

*$p < 0.01$, **$p < 0.01$.
GWB, general well-being; ON, onshore; OFF, offshore.

report from the UK regulator, the Health and Safety Executive, organizations need to be much more proactive in devising and thinking through their hazard assessments as only off-the-shelf measures are likely to have limited utility [53]. As such, it is important to balance these two perspectives. In this case, this can be solved by using knowledge and information about internal psychosocial risk in order to create a standardized questionnaire to be used across the units.

4.2. Future directions

A present, the company is in the process of improving various parts of the management system and is looking at opportunities to simplify and streamline the risk assessment for the psychosocial work environment. The findings from these analyses may be used in order to revise and improve the psychosocial preexisting risk assessment processes as well as the in-depth risk assessments in the company. As such, the risk data from risk assessments collected from various sections of the business, e.g., identification of psychosocial work environment factors and their effect on health, will help build more robust tools and methods that are sensitive toward the changes that occur in the organization over time [53,54]. Risk management is an iterative process where the results from previous risk assessments are used as input to continuous improvements. Furthermore, these results support the implementation of the same or equivalent approaches for onshore and offshore groups with regard to following up psychosocial risk assessment findings.

Moving forward, it is important to ensure the involvement, commitment, and ownership from the employees in various locations. Only relying on standardized methods and reducing involvement from employees can result in the development of a gap between procedures and practices. This gap could represent a threat to safety and the opportunity for learning [55]. To build organizational resilience and have robust psychosocial risk management, organizations must take into account the silent dialogue between practices and procedures [53]. As such, it is still important to encourage a basic dialogue and employee involvement in the ongoing efforts to enhance the psychosocial work environment.

5. Conclusion

Psychosocial risks have an important effect on organizations through employee health and behavior, both of which are linked to several organizational outcomes. Therefore, it is important that organizations have methods and tools to deal with this type of risk and that the risk management process used is integrated into the company's existing management systems. The experience with using existing risk assessment tools and methods is utilized as a basis for learning and developing future risk assessment tools. As such, this study explored available quantitative and qualitative risk data collected through the PRIMA method over the past 8 years in order to explore specific and common psychosocial risks in the oil and gas industry in particular. In this context, the analyses in this study have provided meaningful and important information about the company-specific psychosocial risk factors and their impact on health and well-being that can be used to further enhance psychosocial risk management processes in the future.

Conflicts of interest

The authors declare no conflict of interest.

References

[1] European Agency for Safety and Health at Work (EU-OSHA). OSH in figures: stress at work – facts and figures. Luxembourg: Office for Official Publications of the European Communities; 2009. 139 p. Report No.: ISBN 978-92-9191-224-7.

[2] European Agency for Safety and Health at Work (EU-OSHA). Expert forecast on emerging psychosocial risks related to occupational safety and health (OSH). Luxembourg: Office for Official Publications of the European Communities; 2007. 127 p. Report No.: ISBN 978-92-9191-140-0.

[3] Leka S, Jain A. Health impact of psychosocial hazards at work: an overview. Geneva (Switzerland): World Health Organization; 2010. 136 p. Report No.: ISBN 978 92 4 150027 2.

[4] Cox T, Griffiths AJ, Randall R, Thomson LE, Rial-Gonzalez E. Organizational interventions for work stress. Sudbury (UK): HSE Books; 2000. 32 p. Report No.: ISBN 92 4 159047 5.

[5] European Agency for Safety and Health at Work—EU-OSHA. Calculating the cost of work-related stress and psychosocial risks. European Risk Observatory Literature Review; 2014.

[6] Sneddon A, Mearns K, Flin R. Stress, fatigue, situation awareness and safety in offshore drilling crews. Saf Sci 2013;56:80–8.

[7] Bergh LIV, Ringstad A, Leka S, Zwetsloot GIJM. Psychosocial risks and hydrocarbon leaks: an exploration of their relationship in the Norwegian oil and gas industry. J Clean Prod 2014;84:824–30.

[8] Cooper MD. Towards a model of safety culture. Saf Sci 2002;36:111–36.

[9] Flin R, O'Connor P, Crichton M. Safety at the sharp end: a guide to non-technical skill. England (UK): Ashgate Publishing Ltd.; 2008.

[10] Hale AR, Hovden J. Management and culture: the third age of safety. In: Feyer A-M, Williamson A, editors. Occupational injury: risk, prevention and intervention. London (UK): Taylor & Francis; 1998. p. 129–66.

[11] Haukelid K. A history of risk: anthropological reflections on safety, organisational culture and management in the Norwegian Oil Industry Centre for Technology and Human Values. University of Oslo; 1998. Report no.: 32. [in Norwegian].

[12] Haukelid K. Oil Culture and Safety Culture Part 1 Working paper 10. Oslo (Norway): Centre for Technology, Innovation and Culture, University of Oslo; 2001.

[13] Haukelid K. Theories of (safety) culture revisited an anthropological approach. Saf Sci 2008;46:413–26.

[14] Guldenmund FW. The nature of safety culture: a review of theory and research. Saf Sci 2000;34:215–57.

[15] Reason J. Managing the risks of organisational accidents. England (UK): Ashgate Publishing Ltd.; 1997. 243 p.

[16] Reniers GLL, Cremer K, Buytaert J. Continuously and simultaneously optimizing an organization's safety and security culture and climate: the improvement diamond for excellence achievement and leadership in safety & security (IDEAL S&S) model. J Clean Prod 2011;19:1239–49.

[17] Rosness R, Mostue B, Wærø I, Tinmansvik RK. Rammebetingelser som bakenforliggende faktorer for ulykker [Work conditions as root causes for accidents]. SINTEF; 2011. 67 p. Report No.: A19782. [in Norwegian].

[18] Bakker A, Demerouti E. The job demands–resources model: state of the art. J Manage Psychol 2007;22:309–28.

[19] Chan M. Fatigue: the most critical accident risk in oil and gas construction. Constr Manage Econ 2011;29:341–53.

[20] Hofmann DA, Stetzer A. A cross-level investigation of factors influencing unsafe behaviors and accidents. Pers Psychol 1996;49:307–39.

[21] Mearns K, Flin R, Gordon R, Fleming M. Human and organizational factors in offshore safety. Work Stress 2001;15:144–60.

[22] Huynh JY, Xanthopoulou D, Winefield AH. The Job Demands-Resources Model in emergency service volunteers: Examining the mediating roles of exhaustion, work engagement and organizational connectedness. Work and Stress 2014;28:305–22.

[23] Leka S, Cox T, Zwetsloot G. The European framework for psychosocial risk management (PRIMA-EF). In the European framework for Psychosocial risk management: PRIMA-EF. Nottingham: IWHO Publications; 2008. 194 p.

[24] Lie JA, Arneberg L, Goffeng LO, Gravseth HM, Lie A, Lojså CH, Matre D. Arbeidstid og helse Oppdatering av en systematisk litteraturstudie [Work hours and health – an update on a systematic literature study]. Norway: STAMI; 2014. 147 p. Report No.: ISSN 1502 0932. [in Norwegian].

[25] Bjerkan AM. Work and health: a comparison between Norwegian onshore and offshore employees. Work 2011;40:125–42.

[26] Oakland JS. Oakland on quality management. Boston: Elsevier Butterworth-Heinenmann; 2004. 467 p.

[27] Schaufeli WB, Bakker A. Defining and measuring work engagement. Bringing clarity to the concept in work engagement. In: Bakker AB, Leiter MP, editors. Work engagement: a handbook of essential theory and research. Hove (UK): Psychology Press; 2010. p. 10–24.

[28] British Standards Institution (BSI). Guidance on the management of psychosocial risk in the workplace. PAS 1010. London (UK): British Standards Institution; 2011. 48 p. Report No.: ISBN 978 0 580 69839 2.

[29] Bergh LIV, Hinna S, Leka S, Jain A. Developing a performance indicator for psychosocial risk in the oil and gas industry. Saf Sci 2014;62:98–106.

[30] Deacon T, Amyotte P, Khan FI, MacKinnon. A framework for human error analysis of offshore evacuations. Saf Sci 2015;1:319–27.

[31] Gardner R. Overview and characteristics of some occupational exposures and health risks on offshore oil and gas installations. Ann Occup Hyg 2003;47:201–10.
[32] Haward BM, Lewis CH, Griffin MJ. Motions and crew responses on an offshore oil production and storage vessel. Appl Ergon 2009;40:904–14.
[33] Niven K, McLeod R. Offshore industry: management of health hazards in the upstream petroleum industry. Occup Med 2009;59:304–9.
[34] Parkes KR. Shift schedules on North Sea oil/gas installations: a systematic review of their impact on performance, safety and health. Saf Sci 2012;50:1636–51.
[35] Mathisen GE, Bergh LIV. Action errors and rule violations at offshore oil rigs: the role of engagement, emotional exhaustion and health complaints. Saf Sci 2016;85:130–8.
[36] Bergh LIV, Hinna S, Leka S. Sustainable business practice: integrating psychosocial risk management into a company management system. In: Leka S, Sinclair R, editors. Contemporary occupational health psychology: global perspectives on research and practice, vol. 3. Chichester (UK): Wiley-Blackwell; 2014.
[37] Cox T, Tirlaway M, Gotts G, Cox S. The nature and assessment of general well-being. J Psychomet Res 1983;27:795–806.
[38] Cox T, Griffiths A. The nature and measurement of work related stress. In: Wilson J, Corlett N, editors. Evaluation of human work: a practical ergonomics methodology. 3rd rev. ed. Boca Raton, FL (US): CRC Press; 2005. p. 553–73.
[39] Cox T, Gotts G. General Wellbeing Questionnaire (GWBQ) manual. Nottingham (UK): University of Nottingham; 1987.
[40] Cox T, Griffiths A. The nature and measurement of work stress: theory and practice. In: Wilson J, Corlett N, editors. The evaluation of human work: a practical ergonomics methodology. London (UK): Taylor & Francis; 1995.
[41] World Health Organization (WHO). Healthy workplace framework and model: background and supporting literature and practice. Geneva (Switzerland): World Health Organization; 2010. 131 p.
[42] Pallant J. SPSS survival manual. A step by step guide to data analysis using IBM SPSS. 5th ed. London (UK): Open University Press; 2013. 15 p.
[43] Langdrigde D. Psykologisk forskningsmetode. En innføring i kvalitative og kvantitative tilnærminger [Psychological research methods: An introduction to qualitative and qualitative approaches]. Trondheim (Norway): Tapir Akademisk Forlag; 2011 [in Norwegian].
[44] Bailey T, Pignata S, Dollard MF. Psychosocial interventions and worker well-being. In: Burke RJ, Richardsen AM, editors. Corporate wellness programs. Linking individual and organizational health. Cheltenham (UK): Edward Elgar Publishing Ltd; 2014.
[45] Bakker AB, Schaufeli WB, Leiter MP, Taris TW. Work engagement: an emerging concept in occupational health psychology. Work Stress 2008;22:187–200.
[46] Mache S, Vitzthum K, Klapp BF, Danzer G. Surgeons' work engagement: influencing factors and relations to job and life satisfaction. Surgeon 2014;12:181–90.
[47] Karasek RA, Schwartz J, Theorell T. Job characteristics, occupation, and coronary heart disease. Cincinnati, OH (US): National Institute for Occupational Safety and Health; 1982.
[48] Jones JR, Hodgson JT, Clegg TA, Elliot RC. Self-reported work-related illness in 1995: results from a household survey. Sudbury (UK): HSE Books; 1998.
[49] Jensen, Wærsted. Arbeidsforhold av betydning for helse [Work conditions and its impact on health]. Oslo (Norway): STAMI; 2004 [in Norwegian].
[50] Dancey PD, Reidy J. Statistics without maths for psychology. Harlow (UK): Pearson Education Limited; 2002. 607 p.
[51] Mackay CJ, Palverman D, Saul H, Webster S, Packham C. Implementation of the management standards for work-related stress in Great Britain. In: Biron C, Karanika-Murray M, Cooper CL, editors. Improving organizational interventions for stress and well-being: addressing process and context. London (UK): Routledge; 2012.
[52] Rossi AM, Meurs JA, Perrewe PL. Improving employee health and well being. Charlotte, NC (US): Information Age Publishing, Inc.; 2014.
[53] Rick J, Briner RB, Daniels K, Perryman S, Guppy A. A critical review of psychosocial hazard measures. Sudbury (UK): Health and Safety Executive Books; 2001. 148 p. Report No.: 356/2001.
[54] Øien K, Utne IB, Tinmannsvik RK, Massaiu S. Building safety indicators: Part 2 – Application, practices and results. Saf Sci 2011;49:162–71.
[55] Tinmannsvik R. Robust arbeidspraksis — Hvorfor skjer det ikke flere ulykker på sokkelen [Sustainable work practice — Why does any more accidents occur offshore]. Trondheim (Norway): Tapir Akademisk Forlag; 2008 [in Norwegian].