Safety Climate perceptions in High Reliability Organizations - the role of Psychological Capital

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Scientific environment

The work was carried out within the general PhD-programme and the Graduate School of Clinical and Developmental Psychology, Faculty of Psychology, University of Bergen, where I have been a member of the Operational Psychology Research Group at the Department of Psychosocial Science.

My main supervisor has been Jarle Eid and my co-supervisor has been Morten Birkeland Nielsen, University of Bergen, Department of Psychosocial Science.

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But as for certain truth, no man has known it

Nor will he know it; neither of the gods,

Nor yet of all the things of which I speak.

And even if by chance he were to utter

The perfect truth, he would himself not know it;

For all is but a woven web of guesses

(Xenophanes 570-480 BCE)[1]

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[1] Popper's translation (Dienes, 2008, p. 6).

Abstract

Over recent decades, research on antecedents of safety in High Reliability Organizations (HROs) has shifted from focusing mostly on technical issues to placing greater emphasis on human factors. Although an abundance of research suggests that human factors seem to play an important part in most accidents and near misses, there is still a shortage of research on the underlying mechanisms and processes involved in unsafe acts and safety critical behavior. Thus, many research questions regarding the impact of human factors still remain relatively unexplored. The fairly new direction of Positive Organizational Behavior (POB) has presented a fertile theoretical and methodological foundation for examining safety issues in HROs. One promising new POB perspective is Psychological Capital (PsyCap), a higher order construct that consists of the sub-dimensions: efficacy, hope, optimism, and resiliency. The overall aim of this thesis is to investigate the relationship between PsyCap and safety in HROs.

The current study examines diverse empirical evidence to assess whether PsyCap could represent a potential antecedent to psychological safety climate and loss prevention across three different HROs (i.e., the aviation, shipping and offshore oil and gas industries). More specifically, possible mediators (i.e., positive/negative emotions and job satisfaction) and possible moderators (i.e., work role) of this relationship were examined in Papers 1 and 2. The influence of impression management and self-deception is controlled for in Paper 2, while the potential buffering effect of PsyCap on the relationship between worries about workplace risks and sleepiness is examined in Paper 3.

The first study examined whether PsyCap is related to individual perceptions of safety climate in Air Traffic Control (ATC). The results from an all-Norwegian sample of about 25% of the population of Norwegian air traffic controllers showed that PsyCap was positively correlated with and explained almost 1/3 of the variance in perceived safety climate. In the second part of the study, the mediating effects of positive and negative emotions were controlled for, to see whether the respondents

were "wearing rose tinted glasses" and answered the questions in an overly positive way. The results showed that neither positive nor negative emotions mediated the relationship between PsyCap and safety climate.

The aim of the second study was to replicate and extend the findings from the ATC study in a new sample from a different type of HRO. Thus, the second study was conducted among maritime workers of different nationalities working for three Norwegian shipping companies. Again, the results showed that PsyCap was positively related to perceptions of safety climate. PsyCap contributed to the variance in perceived safety climate, even after adjusting for socially desirable responding. Officers with high scores on PsyCap were found to have a more positive perception of the safety climate than the non-officers with high PsyCap scores. In the second part of the study, a positive relation between perceived safety climate and job satisfaction was established, as well as between PsyCap and job satisfaction. A cross-national difference was discovered in the sample. An indirect effect of PsyCap with perceived safety climate through job satisfaction was valid only for European workers and not for Filipinos. Altogether, PsyCap and job satisfaction explained more than 20% of the variance in perceived safety climate.

The third study shed light on PsyCap as a protective factor in a safety critical work environment. The relationship between worries about accidents and sleepiness was examined in a sample of offshore workers from different nationalities, in order to investigate whether PsyCap could represent a protective factor. The findings indicated a reverse buffering effect in that PsyCap only had a protective impact on sleepiness when worries about accidents were low. The established associations remained consistent after controlling for workers' years of experience as seafarers and their ratings of perceived safety climate.

In conclusion, this thesis extends the previous research by investigating the role of POB in safety. More precisely, it establishes empirical evidence suggesting that the behavioral dispositions of PsyCap are related to perceived safety climate across HROs from the aviation, offshore, and shipping industries. Thus, an increased

emphasis on POB may present a new approach to increasing safety focus and loss prevention in these organizations. Future research should also investigate other HROs. Including PsyCap in the safety research could help create a better understanding of how people make work decisions based on their outlook on work and life in general. Although these results seem promising, more research is still needed, and this dissertation also addresses future research needs and the potential practical implications of these findings. Hopefully, there will be more research on PsyCap and safety aimed at preventing accidents in HROs.

List of publications

This thesis is based on the following three papers:

Paper 1:   Bergheim, K., Eid, J., Hystad, S. W., Nielsen, M. B., Mearns, K., Larsson, G., & Luthans, B. (2013). The role of Psychological Capital in perception of safety climate among air traffic controllers. *Journal of Leadership & Organizational Studies, 20*(2), 232-241.

Paper 2:   Bergheim, K., Nielsen, M. B., Mearns, K., & Eid, J. (2015). The relationship between Psychological Capital, job satisfaction, and safety perceptions in the maritime industry. *Safety Science, 74*, 27-36.

Paper 3:   Valdersnes, K. B., Eid, J., Hystad, S. W., & Nielsen, M. B. (2017). Does Psychological Capital moderate the relationship between worries about accidents and sleepiness? *International Maritime Health, 68*(4), 245-251.

Abbreviations

ATC – Air Traffic Control

BIDR – Balanced Inventory of Desirable Responding

HRO – High Reliability Organization

IMO – International Maritime Organization

I-PANAS-SF – 10-item International Positive and Negative Affect Schedule Short Form

JD-R – Job Demands-Resources Model

JSS – The Job Satisfaction Scale – short version

NORSCI – Norwegian Offshore Risk and Safety Climate Inventory

PCI – PsyCap Intervention

PCQ – Psychological Capital Questionnaire

PCQ-12 –12-item Psychological Capital Questionnaire

POB – Positive Organizational Behavior

POS – Positive Organizational Scholarship

PSCQ-14 – 14-item Psychological Safety Climate Questionnaire

PSCQ-16 – 16-item Psychological Safety Climate Questionnaire

PsyCap – Psychological Capital

RPQ – Risk Perception Questionnaire

SCO – Safety Critical Organizations

SOFI – Swedish Occupational Fatigue Inventory

SPSS – Statistical Package for the Social Sciences

Contents

1. Introduction

1.1 General context

While work provides opportunities for learning, development, and achievement, the workplace also involves several demands (Karasek, 1979). Job demands, whether administrative problems, conflicts, or role ambiguity, require sustained physical and psychological effort, which can have significant physiological and psychological costs including burnout, absenteeism, and decreased performance (Bakker, Demerouti, & Euwema, 2005; Karasek, 1979). In High Reliability Organizations (HROs), other job demands, including exposure to hazardous materials, shift work, long working hours, and cognitively or physically demanding work, are also present. These job demands may lead to an entirely different set of outcomes for employees, such as workplace accidents, injuries, and fatalities (Nahrgang, Morgeson, & Hoffman, 2011). In many cases, even worries and concerns about safety-related factors can influence the well-being of employees. Findings from the offshore oil and gas industry show that about 35% of offshore personnel feel unsafe with regard to risk and hazards (Rundmo, 1996), and several studies have indicated that worries about safety at work are related to mental health problems (Lima, 2004).

Lekka (2011, p. i) refers to HROs as "organisations that are able to manage and sustain almost error-free performance despite operating in hazardous conditions where the consequences of errors could be catastrophic". According to (Ciavarelli & Crowson, 2004, p. 2), "HROs achieve low accident rates through keen awareness of their risks, close monitoring of high-risk operations, and encouragement and use of standardized procedures, and continuous training". Other authors use the term 'Safety Critical Organizations' (SCOs) in their work, Oedewald and Reiman (2007, p. 89) define SCOs as "companies whose operations are important to society but involve risk to it and the environment". They go on to state, "…The safety critical nature of the business affects the daily work and decision making and what kinds of special

demands it puts on the competence and behavior of the personnel" (Oedewald & Reiman, 2007, p. 11). "Safety critical organizations strive to predict also the possible ways in which the system might face an accident" (Oedewald & Reiman, 2007, p. 61). Although the HRO and SCO concepts can be used interchangeably, for the sake of consistency, I will use HRO as the preferred term in this thesis.

Consequently, a thorough understanding of organizational and individual factors and resources that influence both actual and perceived levels of safety will be highly important for improving the work environment of workers in HROs. Organizational measures such as the implementation of – and compliance with – safety standards, protocols and procedures represent important structural factors that promote safety at work (Høivik, Moen, Mearns, & Haukelid, 2009). However, in order to augment the effect of technological and organizational factors, an explicit focus on human resources may be especially important for promoting safety in HROs.

Wagenaar and Groeneweg (1987) analyzed 100 accidents at sea and found that only four occurred without human error causes. Hence, in 96 of 100 cases, the people involved could possibly have prevented the accidents. Despite the importance of human resources in safety, there is a shortage of research on how specific individual capacities and processes among workers can influence safety. In order to fill this gap in our understanding, the overarching aim of this thesis is to examine how PsyCap, conceptualized as "…an individual's positive psychological state of development" and characterized by efficacy, hope, optimism, and resiliency (F. Luthans, Youssef, & Avolio, 2007, p.3), is related to workers' perceptions of safety at the workplace. Specifically, the aims of this thesis will be to investigate HROs in order to: (1) Examine the relationship between the core construct of PsyCap and safety perceptions; (2) Determine factors that may explain *how* PsyCap is related to safety perceptions (i.e., potential mediators); (3) Determine factors that may explain *when and for whom* PsyCap is related to safety perceptions (i.e., potential moderators); and (4) Examine PsyCap as a possible moderator of the association between worry about risk and psychological stress in the form of sleep problems.

Through its inclusion of these associations and variables, this thesis extends previous research on the HRO paradigm (Saleh, Marais, Bakolas, & Cowlagi, 2010), by examining how recent advances in Positive Organizational Behavior (POB: F. Luthans, 2002a) may provide new insights into how successful leaders and organizations promote and ensure safety in complex systems. Findings from three scientific studies, which include data from the aviation, offshore, and maritime industries, will constitute the empirical basis for this investigation. Whereas most previous research on workplace safety has its roots in perspectives on psychology that focus on dysfunctions, the current thesis is based on the positive psychology paradigm. That is, the branch of psychology that uses scientific understanding and effective intervention to aid the achievement of a positive outlook when it comes to subjective experiences, individual traits, and events that occur throughout one's lifetime (Seligman & Csikszentmihalyi, 2014). The remaining parts of this introduction will have the following structure: 1) Briefly present the positive psychology paradigm and discuss the concept of PsyCap and research on this construct; 2) Provide an overview of research on workplace safety, and safety seen in light of the Job Demands-Resources model (JD-R; Bakker & Demerouti, 2007; Demerouti, Bakker, Nachreiner, & Schaufeli, 2001; Xanthopoulou et al., 2007) and elaborate on how PsyCap as an individual resource can influence risk perception, sleep and safety in high reliability organizations; and 3) Present the research questions that constitute the basis for the empirical investigation.

1.2 Positive psychology

Much research in psychology has focused on adverse psychological states and dysfunctions among humans. In a review of the research literature, Schaufeli and Salanova (2007) found a 16-1 ratio between articles focusing on negative rather than positive psychological states. However, in recent years, there has been a shift in focus in that scholars have become steadily more preoccupied with positive aspects of human behavior. Although the concept of "positive psychology" has been around since Maslow (1954) first used the term in his book *Motivation and Personality*, a

profound interest in the topic emerged in the late 1990s. In 1998, Martin Seligman, then president of the American Psychological Association, led the start of the positive psychology movement (Seligman, 1998a). This new movement emphasized that, in addition to treating mental illness and dysfunctional behavior, psychology should focus on growth and development of human strengths, optimal functioning, and self-actualization (Cameron, Dutton, & Quinn, 2003; F. Luthans, Youssef-Morgan, & Avolio, 2015; F. Luthans, Youssef, et al., 2007; Snyder, Lopez, & Pedrotti, 2011). In doing so, the movement wanted to shift focus from the question "What is wrong with people?" to "What is right about people?" (Snyder et al., 2011, p.3). Although the label "positive" may imply that other forms of psychology should be considered "negative", it was emphasized early on that the aim of the positive movement was to complement, not replace or ignore, the traditional areas of psychology. "Simply put, positive psychology is concerned with people's strengths (rather than weaknesses and dysfunctions) and how they can grow and thrive (rather than be fixed or maintained"; F. Luthans, Norman, Avolio, & Avey, 2008, p. 220). Positive psychology is concerned with three issues: positive emotions, positive individual traits, and positive institutions. Positive emotions are concerned with being content with one's past, being happy in the present and having hope for the future. Positive individual traits focus on one's strengths and virtues. Finally, positive institutions refer to strengths to improve a community of people (Seligman, 2007).

Following from the interest in positive psychology, two parallel movements emerged within work and organizational psychology: Positive Organizational Scholarship (POS), which originated at the University of Michigan (See Cameron & Caza, 2004), and Positive Organizational Behavior (POB), which was developed at the University of Nebraska (See F. Luthans, Youssef, et al., 2007). The POS approach to organizational behavior is mainly concerned with *positive* states and processes that occur in *organizational* contexts, i.e., positive attributes of members and positive outcomes for the organization (Cameron et al., 2003). The *scholarship* part refers to the theoretical foundation and the focus on scientific methods to investigate social phenomena. POS extends beyond self-help publications and seeks to develop a

systematic and theory-based foundation for positive phenomena (Cameron et al., 2003). POS has its focus on the macro level of the organization.

While POS is more of an umbrella concept, POB focuses on specific positive constructs (F. Luthans & Youssef-Morgan, 2017). The primary focus of the POB approach is the study of positive human resources and psychological capacities in organizations. It is defined as "the study and application of positively oriented human resource strengths and psychological capacities that can be measured, developed, and effectively managed for performance improvement in today's workplace" (F. Luthans, 2002b, p. 59). To be included in POB, a capacity must be relatively unique to the field of organizational behavior, be theory and research-based, have a reliable and valid measurement, be state-like and open to development, and also be linked to positive attitudes and work performance outcomes (F. Luthans, 2002a, 2002b; F. Luthans et al., 2015; F. Luthans, Youssef, et al., 2007). F. Luthans, Youssef, and colleagues (2007, p. 11) proposed that "POB can represent a paradigm shift that has the potential to transform organizational behavior and human resource management research and practice". In contrast to the POS approach, POB is more focused on the micro, or individual, level (F. Luthans, Youssef, et al., 2007).

1.3 Psychological Capital

To date, the positive psychological constructs that have been determined to best meet the POB criteria are the first-order constructs of efficacy, hope, optimism, and resiliency (F. Luthans, Avey, Avolio, & Peterson, 2010). Together, these have been termed the core (second-order) construct Psychological Capital (PsyCap). F. Luthans, Youssef, and colleagues (2007) define PsyCap like this:

> PsyCap is an individual's positive psychological state of development and is characterized by: 1) having confidence (self-efficacy) to take on and put in the necessary effort to succeed at challenging tasks; 2) making a positive attribution (optimism) about succeeding now and in the future; 3) persevering toward goals and, when necessary, redirecting paths to goals (hope) in order to succeed; and 4) when beset by problems and adversity, sustaining and bouncing back and even beyond (resiliency) to attain success. (p.3).

According to F. Luthans, Youssef, and colleagues (2007), PsyCap was based on the need for a new approach for attaining sustainable sources of competitive advantage in organizations. They found that it is not enough merely to focus on factors like economic capital and technology; human resources would also be highly important. As a construct, PsyCap goes beyond human capital ("what you know") and social capital ("who you know"), into "who you are" and "what you can become in the future" (F. Luthans et al., 2015, p. 6). The four resources that comprises PsyCap are not as stable as personality traits nor as changing as states (F. Luthans et al., 2015). Although states and traits are often considered dichotomous constructs, it is actually more reasonable to describe a continuum from the trait end with fixed characteristics (i.e. personality traits such as introversion, sensation seeking, conscientiousness), which are very difficult to change, to easily changeable emotions (for example, anger, joy, excitement) at the state end (F. Luthans et al., 2010). Like economic capital, PsyCap is open to investment and development for the return of performance improvement and competitive advantage (F. Luthans, Vogelsang, & Lester, 2006). Later in this introduction, I will present emerging research indicating that PsyCap is subject to development and change, due to feedback, performance appraisal and attribution processes. PsyCap is therefore seen to reflect your potential for growth from the actual self to the possible self, or your "best self" (Avolio & Luthans, 2006; F. Luthans et al., 2015; F. Luthans, Youssef, et al., 2007). Stajkovic (2006, p. 1208) explains PsyCap as being your "core confidence".

F. Luthans and colleagues (2015, p. viii) refer to the four PsyCap resources as "the HERO within", where "HERO" is an acronym for Hope, Efficacy, Resilience[2], and Optimism. In line with the state-trait continuum described above, these resources can be strengthened and developed to improve your work performance, as well as your general well-being. Your "HERO" is part of your resources for handling stress in your everyday work life. F. Luthans, Youssef, and colleagues (2007) claim that PsyCap is something more than the sum of its parts. The four resources, efficacy,

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[2] 'Resilience' and 'resiliency' are used interchangeably

hope, optimism, and resiliency, work together and become something more. "Psychological resources (e.g., efficacy, hope, optimism, and resilience) can be best understood and treated as manifestations of a larger underlying phenomenon" (F. Luthans et al., 2010, p. 48). "They have distinct dimensions, which are indicators of a "higher-order" construct or an overall core factor" (F. Luthans, Avolio, Avey, & Norman, 2007, p. 549). This is why PsyCap is mainly viewed as an overarching construct in the research literature. Sweetman, Luthans, Avey, and Luthans (2011, p. 4) found that "Overall PsyCap predicted creative performance over and above each of the four PsyCap components".

The core construct of PsyCap is "one's positive appraisal of circumstances and probability for success based on motivated effort and perseverance" (F. Luthans, Avolio, Avey, et al., 2007, p. 550). Additional positive capacities like creativity, courage, authenticity, emotional intelligence, and mindfulness may be included in PsyCap at a later point in time, if research finds that they fully meet the criteria for inclusion (theory based, valid measurement, open to development, and linked to positive performance; F. Luthans et al., 2015). Although I will mainly consider PsyCap as a second-order phenomenon in this thesis, a description of the four capacities that constitute the construct is necessary, to obtain a better understanding of what PsyCap is:

1.3.1 PsyCap: Efficacy

Of the four factors in PsyCap, efficacy has been most researched. Famous thinkers like Locke, Hume, and James focused on *willfulness* in human thinking, and similar ideas about social learning, personal competence and satisfaction can be found in the theories and research of, for instance, Rotter and Skinner (Snyder et al., 2011). Bandura, however, is the researcher most often associated with *self-efficacy*. Since publishing the article, "Self-Efficacy: Toward a Unifying Theory of Behavior Change" (Bandura, 1977), he has conducted a lot of research on this topic. Bandura defines self-efficacy as "people's beliefs in their capabilities to produce desired

effects by their actions" (Bandura, 1997, p. vii). Snyder and colleagues (2011, p. 168) elaborate: "Self-efficacy[3] is based on the premises of social cognitive theory, which holds that humans actively shape their lives rather than passively reacting to environmental forces". Sweetman et al. (2011, p. 4) explain it this way: "Efficacy is not related to a person's actual skills, but rather the beliefs one possesses regarding what he or she can do with those skills". Self-efficacy is the question of efficacy expectancies: "I think I can" (Snyder et al., 2011, p. 167). Bandura (1997, 2000) proposed that efficacy can be developed through: 1. Previous mastery/success in similar situations; 2. Vicarious learning/Modeling others in the same situations; 3. Imagining yourself behaving effectively; 4. Positive feedback/Social persuasion of relevant others; and 5. Psychological and physiological arousal and well-being (See also F. Luthans, Youssef, et al., 2007; Snyder et al., 2011).

Drawing from Bandura's theory (1986, 1997), and from Parker (1998), F. Luthans, Youssef, and colleagues (2007) use the word *efficacy* to describe your confidence in your abilities. They argue that that efficacious people are highly self-motivated and set high goals for themselves. They tend to self-select into difficult tasks because they thrive on challenge (F. Luthans, Youssef, et al., 2007). F. Luthans, Youssef, and colleagues (2007) build on Bandura's theory and argue that efficacy is built on the five cognitive processes: symbolizing, forethought, observation, self-regulation, and self-reflection. Planful thinking is crucial for efficacy; you must believe in your abilities to mobilize the cognitive resources to reach your goal (Snyder et al., 2011).

1.3.2 PsyCap: Hope

Hope is "the will and the way" (F. Luthans, Youssef, et al., 2007, p. 63) to get where you want to go. The PsyCap factor *hope* is based on the work of Snyder (2000) and Snyder and colleagues (1996), and implies having the willpower to use your skills and the ability to generate multiple paths to reach your goal (F. Luthans, Youssef, et al., 2007). Snyder and colleagues (2011, p. 185) define hope as "… goal-directed

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[3] 'Self-efficacy' and 'efficacy' are used interchangeably

thinking in which the person utilizes pathways thinking (the perceived capacity to find routes to desired goals) and agency thinking (the requisite motivations to use those routes)". Hope is a cognitive state where you are able to set realistic and challenging goals and expectations and reach out for those goals with determination and energy, as well as a perception of internalized control. This may include "regoaling" from obsolete goals or goals that have proven over time to be unachievable (F. Luthans, Youssef, et al., 2007, p. 78). Snyder and colleagues (2011) argue that the goals must be of considerable value to the individual to be considered applicable to hope.

Hope must be realistic in order for the individual to succeed. If hope is unrealistic – and individuals or organizations commit their energy and resources to goals beyond their reach – performance may decline (F. Luthans, Youssef, et al., 2007). Another pitfall for high-hope organizations is a mentality of "The end justifies the means" (F. Luthans, Youssef, et al., 2007, p. 79). F. Luthans, Youssef, and colleagues (2007) describe how personal goals may be self-serving and not beneficial for the organization, and that different organizational goals may also be conflicting. A hopeful person may be tempted to cut corners and compromise ethical values or social responsibility in order to reach their goal. *Realistic* hope is positively related to outcomes like work performance, job satisfaction, and organizational commitment, and hopeful individuals are generally independent thinkers who are creative, resourceful, and highly autonomous (F. Luthans, Youssef, et al., 2007).

1.3.3 PsyCap: Optimism

The PsyCap factor, optimism, is the expectation of positive outcomes and builds on the work of Scheier and Carver (1985, p. 219), who defined optimism as the belief "that good rather than bad things will happen". A stable tendency to think this way is what defines an optimist (Snyder et al., 2011). Scheier and Carver (1985) believed that, if a goal is of sufficient value to you, you will produce an expectancy of reaching that goal (Snyder et al., 2011). An optimist builds motivation through positive expectancies and feels that earlier success can be replicated, through his

power to control the outcome (F. Luthans & Youssef, 2007; Scheier & Carver, 1985; Snyder et al., 2011).

F. Luthans, Youssef, and colleagues (2007) argue that their perspective of optimism, as state-like and open to development, differs from the traditional perspectives of optimism. Their operationalization of optimism focuses on optimism as an attributional style, but it does not exclude the emotional dimensions, future orientation, and motivational benefits. Seligman (1998b) also argues that optimism is an attributional style, where optimists explain negative events as external, variable, and situation-specific, and positive events as internal, stable, and global. People with a pessimistic explanatory style will explain negative events as personal, permanent, and pervasive, and positive events as caused by external, temporary and situation-specific factors. Optimists distance themselves from negative outcomes in the past and link themselves to positive outcomes in the future (Snyder et al., 2011). However, in order for this optimism to be effective, it must be *realistic* (Seligman & Csikszentmihalyi, 2000). Pessimists have self-doubt and negative expectancies, blame themselves for the negative aspects of their lives, and do not give themselves credit for the positive aspects (F. Luthans & Youssef, 2007). They assume that negative things will keep on happening, not only in similar situations but across all domains of their lives (F. Luthans, Youssef, et al., 2007).

Optimists, on the other hand, take credit for the positive aspects of their lives and feel that they have control and power over the causes of positive events. They internalize the positive aspects of their life and expect these causes to be present across other life-domains, as well as in the future (F. Luthans, Youssef, et al., 2007). When something goes wrong, an optimist may use rationalizations to explain why it happened. However, it could be dangerous to be an unrealistic optimist. F. Luthans, Youssef, and colleagues (2007) argue that "flexible optimism" (Peterson, 2000, p. 51) should be used, meaning that, after correctly appraising the situation, the individual chooses when to use an optimistic explanatory style, and when a pessimistic style should be used (F. Luthans, Youssef, et al., 2007). F. Luthans, Youssef, and colleagues (2007, p. 100) argue that "Organizational leaders with a high level of

PsyCap optimism are risk-takers, but because they are realistic and flexible, they tend to take only calculated and necessary risks". According to Schneider (2001), leniency towards the past, appreciation of the present, and opportunity seeking for the future are particularly important factors, in order to develop realistic optimism in the workplace (F. Luthans, Youssef, et al., 2007). Leniency towards the past does not mean denial, it is a positive reframing or attribution technique, in which the realities of the situation are acknowledged and the uncontrollable aspects of the situation seen in the best possible light (Carver & Scheier, 2002; F. Luthans, Youssef, et al., 2007).

1.3.4 PsyCap: Resiliency

The PsyCap factor, resiliency, is built on the theory of Wagnild and Young (1993). F. Luthans, Youssef, and colleagues (2007, p. 112) define resiliency as "the capacity to rebound or bounce back from adversity, conflict, failure, or even positive events, progress, and increased responsibility". This positive adaption has a positive relationship with workplace performance outcomes and job satisfaction (F. Luthans, Youssef, et al., 2007). While the other three PsyCap factors are more proactive, resiliency has a more reactive mode, as it is often a reaction to something that is happening (Avey, Luthans, & Youssef, 2010). Resiliency is the ability to adjust to new circumstances.

Resilient organizations are characterized by "The seven 'C's': Community, competence, connections, commitment, communication, coordination, and consideration" (Horne & Orr, 1998; F. Luthans, Youssef, et al., 2007, p. 134). Resiliency is not just the ability to get through changes but to potentially thrive on them and adjust positively (Masten & Reed, 2002). "… Resilience enables people to feel at ease outside of their normal comfort zone" (Sweetman et al., 2011, p. 7). Resilient people are able to adjust and recover well after changes, while people lacking resiliency could remain devastated and unable to move on (Block & Kremen, 1996). F. Luthans, Youssef, and colleagues (2007) suggest that resiliency research should focus not only on the individual level but also on the group level. They

propose that groups that are well-functioning and have worked together over time, might have developed a unique "personality" that will make them more resilient.

1.4 Previous research on PsyCap

Despite the fact that PsyCap is a relatively new perspective within organizational research, the concept has been examined in several studies. In his recent review of PsyCap studies, Nolzen (2018) summarizes that higher levels of PsyCap are beneficial for e.g. employees' organizational commitment, work motivation, job satisfaction, and job performance. PsyCap also provides individuals with more confidence and positive thinking, as well as feelings of empowerment and intrinsic motivation (Nolzen, 2018). B. C. Luthans, Luthans, and Jensen (2012) linked PsyCap to academic outcomes. An understanding of the potential effects of PsyCap on other variables is important in order to understand how PsyCap may be related to safety. In the following, I will review some of the main findings from previous research, before turning to how PsyCap relates to safety-specific variables.

Avey, Reichard, Luthans, and Mhatre (2011) conducted a meta-analysis of more than 50 independent samples and 12,500 employees. Their findings indicated positive relationships between PsyCap and desirable employee attitudes like job satisfaction, organizational commitment, and well-being, as well as between PsyCap and behavior and performance measures. A negative relationship was found between PsyCap and undesirable employee attitudes and behaviors like job stress and turnover intention (Avey, Reichard, et al., 2011). They found that the relationship between PsyCap and employee outcomes was strongest in the service sector and in studies from the United States, which may indicate that there could be some cultural differences between national and/or organizational cultures. Avey and colleagues (2010, p. 430) found PsyCap to be "positively related to desired extra-role organizational citizenship behaviors (OCBs) and negatively associated with undesired outcomes, such as organizational cynicism, intentions to quit and counterproductive workplace behaviors". A study of Chinese bankers implies that PsyCap could be a mediator between occupational stress or work-family conflict and depressive symptoms. Kan

and Yu (2016) found a significant negative relationship between PsyCap and depressive symptoms. PsyCap has been demonstrated to be open to human resource development and performance management (Avey, Reichard, et al., 2011), and employees' PsyCap has been proposed to serve as a mediator between a supportive organizational climate and individual employee performance (Avey, Wernsing, & Luthans, 2008; F. Luthans et al., 2008).

The above evidence shows that PsyCap is associated with a range of desirable individual and organizational factors, something that suggests that having a strong PsyCap may influence perceptions, behaviors and attributional processes among employees. Taking the developmental characteristics of PsyCap into consideration, this could suggest that positive psychological capacities are particularly relevant to safety critical workplaces that must frequently adapt to a fast-paced, unpredictable, and often hostile environment in order to function safely and effectively (Eid, Mearns, Larsson, Laberg, & Johnsen, 2012). Emerging empirical research suggests that PsyCap is associated with a desirable safety climate and relevant risk outcomes (Hystad, Bartone, & Eid, 2014). Specifically, since PsyCap represents a person's outlook on his/her (work) life; it is relevant to examine how PsyCap may influence employee perceptions of risk and safety in their workplace, and how this may reinforce safety-focused attitudes and behavior. This proposed association between PsyCap and desirable safety outcomes will also raise the issue of whether PsyCap could be developed through PsyCap interventions (PCI). There are four characteristics of an effective PCI: 1) Recognized, desirable outcomes clearly caused by the PCI; 2) Focus on manipulating malleable strengths aligning with the state-like nature of PsyCap; 3) Added value beyond existing mainstream programs or interventions; and 4) The benefits of the PCI outweigh the costs (F. Luthans & Youssef-Morgan, 2017; Youssef-Morgan & Sundermann, 2014).

Following from this, the next sections in the dissertation will present an overview of workplace safety, focusing especially on perceived safety climate, and continue with explanations of how PsyCap could have an impact on safety at work.

1.5 Workplace safety

HROs is a term used to describe organizations where risks and hazards are present and where a focus on safety is therefore crucial (M. B. Nielsen, Mearns, Matthiesen, & Eid, 2011). HROs are organizations like the emergency services, the oil and gas industry, the shipping industry, aviation, and other high risk industries that have many technological, environmental, and human challenges and opportunities (Eid et al., 2012; Hystad et al., 2014). In such organizations, significant hazards are present, and, even if they are rarely realized, accidents may occur (Flin, Mearns, O'Connor, & Bryden, 2000). In HROs, operating companies and their regulators pay considerable attention to safety assessment (Flin et al., 2000). A definition of workplace safety may thereby be an organization's policies and procedures for ensuring the safety, health and well-being of employees within the workplace (See Barlow & Iverson, 2005). Although actual accidents may only occur on an irregular and infrequent basis, the perception of risk from work-related hazards and dangers is continuous and persistent. Several studies have emphasized perception of risk as an important stressor in HROs; it has also been shown to be strongly related to the health and well-being of employees (e.g. Fleming, Flin, Mearns, & Gordon, 1998; Mearns & Flin, 1995; Rundmo, 2000). Risk perception is the perceived likelihood of the individual experiencing danger (Short, 1984). We know that risk perception can vary extensively between individuals. Consequently, exposure to the exact same events may therefore have significantly different consequences within a work group in terms of safety outcomes. Although accurate and reliable risk perception may be adaptive in motivating workers to comply with safety regulations and adjust to challenging work environments, worries and rumination about potential risk and adversties may also have negative consequences.

1.6 Safety climate

As described above, members of the same work group may differ in their perception of safety. Thus, safety is at least partly a function of individual differences in personality attributes, perceptions and cognitions. Reflecting the importance of perceptions in safety, the concept of perceived safety climate refers to workers' overall impression of available safety resources and whether the organization truly prioritizes safety (Zohar, 2010). In a similar manner, Griffin and Neal (2000) argue that safety climate comprises the employees' perceptions of policies, procedures, and practices related to safety. It is generally agreed that safety climate is the predominant antecedent to actual safety behavior and thereby to the potential occurrence of accidents and injuries (Barlow & Iverson, 2005).

Various factors influence occupational accident and injury rates. Among health and safety practitioners, it is commonly accepted that safety climate plays an important role and that companies with higher levels of psychological safety climate might present lower accident and/or injury rates. Perceived safety climate has become a leading indicator of safety performance (Leitão & Greiner, 2016). Safety climate is often used interchangeably with the related construct, safety culture, which may cause confusion when reading the literature (Zohar, 2003). Christian, Bradley, Wallace, and Burke (2009) argue that much of the safety research suffers from unclear conceptualizations of constructs, as well as lack of theory and weak methodology. Guldenmund (2000, p. 215) states: "Although safety culture and climate are generally acknowledged to be important concepts, not much consensus has been reached on the cause, the content and the consequences of safety culture and climate in the past 20 years". He uses the differentiation based on Schein's (1992) work on organizational culture, in which basic assumptions form the core of safety culture, and espoused values equal safety climate (Guldenmund, 2000). 'Safety culture' is often used when discussing the underlying values, beliefs and assumptions, while 'safety climate' is used to describe the surface features of the safety culture, the workforce's attitudes and perceptions of the organizational atmosphere (Flin et al., 2000). Guldenmund (2007) argues that the questionnaires measuring safety culture

seem to measure only the attitudes that are shared within the organization (for example, the management's concern for safety or safety as a value). In this way, safety culture and safety climate are different approaches to the goal of measuring safety within an organization (Guldenmund, 2007).

In this thesis, the safety climate concept is chosen because it is seen as a more specific and measurable aspect of safety culture (Cox & Flin, 1998; Zohar, 2008). Clarke (2006, p. 315) describes how some researchers view safety climate as a "current-state reflection of the underlying safety culture". Hetherington, Flin, and Mearns (2006, p. 408) define safety climate this way: "Organization safety climate is like a snapshot of selected aspects of organization safety culture at that particular point in time". Mearns and Flin (1999, p. 5) offer further explanation of the content of the safety climate concept: "The term 'safety climate' best describes employees' perceptions, attitudes, and beliefs about risk and safety, typically measured by questionnaire surveys and providing a 'snapshot' of the current state of safety".

Zohar (2010) makes a distinction between the organizational level and the group level of safety climate, in which the organizational level is policies and procedures, and the group level is the implementation and prioritizations of these procedures (Hetherington et al., 2006). A common definition of safety climate is "procedures as patterns", where consistent procedures make patterns, reflecting the prioritization of safety over competing goals (Zohar, 2000). Christian and colleagues (2009) differentiate between psychological safety climate and group safety climate. They define psychological safety climate as "individual perceptions of safety-related policies, practices, and procedures pertaining to safety matters that affect personal well-being at work" (Christian et al., 2009, p. 1106). When these perceptions are shared among individuals in a particular work environment, a group-level climate emerges, and, in accordance with Zohar (2010), this is conceptualized as shared perceptions of work environment characteristics as they pertain to safety matters that affect a group of individuals. In line with this, I will use the expression *perceived* safety climate in this thesis to emphasize that it is the workers' individual perceptions of the safety climate that we are measuring. The purpose of measuring safety climate

is to provide an opportunity for developing the organization's safety performance (Cooper & Phillips, 2004). A measure of the safety climate can be used as a safety performance indicator and predictor (Hetherington et al., 2006).

Perceived safety climate is found to be the best predictor of unsafe behavior, and many studies link perceived safety climate to performance and safety outcomes (Mearns, Whitaker, & Flin, 2003). If the safety climate is perceived as bad, it can lead to worry and increased risk perception among the employees (Rundmo, 1996). However, Sjöberg (1998) argues that worry and perceived risk are not the same thing, and therefore these two factors are not necessarily strongly correlated. While perceived risk is an intellectual judgment of the risk, worry is a more emotional condition, "to be in an unpleasant state of mind" (Sjöberg, 1998, p. 85).

Research has shown that, when it comes to occupational health and safety issues, poor attitudes cause many safety problems (Håvold, 2005). Where the safety climate is positive, workers are less likely to engage in unsafe acts (Hofmann & Stetzer, 1996). Positive safety climate perceptions are related to lower risk for accidents, fewer workplace injuries and rule violations, and improved safety performance (Clarke, 2006; Mearns et al., 2003). Safety climate can differ between organizational units. Even if the organization has one set of rules and procedures, the practice can vary greatly between different units, for example between different vessels in the same shipping company. Zohar (2010) concludes that the relationship between safety climate and safety outcomes is well established in the literature, but our understanding of the antecedents, mediators and moderators of these safety factors is limited. There is, therefore, a need for further research that can add to the knowledge about workplace safety. In the following, I will discuss how human factors influence organizational safety and thereafter elucidate on how PsyCap as a personality disposition may play an especially important role with regard to this context.

1.7 The human factor in workplace safety

As mentioned previously, human factors consistently seem to play an important part in accidents and near misses that happen at work (Guldenmund, 2000; Zohar, 2010). In line with this understanding, there has been a shift of focus from technical failures causing accidents to the inclusion of human factors as well (Weick, Sutcliffe, & Obstfeld, 1999). Perrow (1984) argues that human errors are inevitable because of the increased complexity of systems in organizations. Individual or collective judgment and decisions may cause human errors, and these are often the root causes or significant contributing causes of system failure (French, Bedford, Pollard, & Soane, 2011). For instance, according to the review by French and colleagues (2011), more than 70% of aviation accidents and 75% of marine casualties are caused by human error. Rothblum (2013) writes that a U.S. Coast Guard report states that 75-96% of marine accidents are caused at least in part by some kind of human error. In general, accidents are caused by more than one human error. This is in line with "The Swiss cheese analogy" (Reason, 1990), in which latent failures, psychological precursors and unsafe acts make "holes" in the layers of the defense against accidents. Trigger events, defects and atypical external conditions may provide the opportunity for loopholes in all of the defense layers at the same time, and an accident can happen (Dekker, 2006; Reason, 1990).

**Reason's "Swiss cheese" model
of accident causation**

Some holes due
to active failures

Hazards

Losses

Other holes due to
latent conditions

Successive layers of defences, barriers and safeguards

System defences
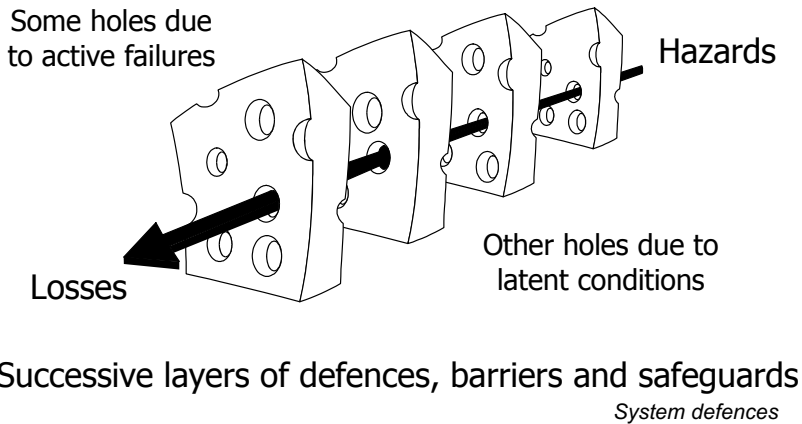
Figure 1. The Swiss cheese model (Reason, 1990) [4]

The significant impact of human error has led to the development of *human reliability analysis*, methods to account for human errors in risk analysis. It may be too narrow to just study human *errors*; perhaps the focus should be on human *behavior* in general (French et al., 2011). Human behavior, like the decision-making process, is not always rational and analytical. Automatic and quick thinking without much effort or sense of voluntary control is referred to by psychologists as *System 1 thinking. System 2 thinking*, on the other hand, is effortful thinking, associated with concentration and choice. While System 1 thinking is more of a "gut feeling" or intuition, System 2 involves detailed evaluation of information to find the correct answer. Our thinking can be biased, and we often use the "wrong system" when we

[4] Reason's model, found at https://goo.gl/images/eogSRq

make decisions (Chaiken, Liberman, & Eagly, 1989; French et al., 2011; Kahneman, 2011; Stanovich & West, 2000). According to the new view of human error, it is insufficient to reveal *which* bad judgments and wrong decisions that were made. We should investigate *how* those judgments and decisions made sense at the time, given the circumstances (Dekker, 2006). Our information-processing capacity is limited, and when the amount of information is more than we can process, we get what Gross (1964) calls "information overload". When this happens, we delay making decisions or make the wrong ones. Individual differences influence the decisions we make, and our personality characteristics could be one element that influences the judgments we make.

Knowing that workplace safety is highly dependent upon the humans involved, a penetrating question is whether there are specific individual characteristics that may be especially important with regard to handling risks and hazards. Following from theories such as the Transactional theory on stress and coping (Lazarus & Folkman, 1984) and the Conservation of Resources theory (Hobfoll, 1989), it is important to have the right resources available in order to cope with external demands. PsyCap is one form of personal resources that could help cope with work stressors. F. Luthans and colleagues (2010) state that:

> … human resource development may be able to facilitate organizational leaders and their associates to become more resilient to increasing adversity, more efficacious in getting the job done, more optimistic about the future, and more hopeful in determining plans and alternative pathways to accomplish goals (p. 61).

Building on the principles of both the Transactional model of stress and coping and the Conservation of Resources theory, the well-established JD-R model may serve as a theoretical framework for understanding how PsyCap can influence risk perception and safety-relevant behavioral outcomes such as sleep and recuperation. Safety can be seen as a demand and PsyCap as a resource, which may influence the well-being of the employees. In the following this will be elaborated in more detail.

1.8 The Job Demands-Resources model

The JD-R model emerged as an extension of Karasek's (1979) Job Demand-Control model. As described by Brauchli, Schaufeli, Jenny, Füllemann, and Bauer (2013), it was initially applied to burnout (Demerouti et al., 2001) but the extended version also included work engagement (Schaufeli & Bakker, 2004). In recent years, the model has also been applied in research on workplace safety (M. B. Nielsen et al., 2011). The JD-R model rests on two main assumptions. The first includes the main assumption that in any job there are two characteristics which (both directly and interacting) relate to employee health and work engagement: job demands and job resources (Brauchli et al., 2013; Brough et al., 2013). Job demands are physical, psychological, social, and organizational job aspects that require prolonged physical and psychological effort and costs (Van Doorn & Hülsheger, 2015). Examples of job demands are emotional demands, workload, and work-home conflict (Bakker, Demerouti, & Verbeke, 2004; Bakker, van Veldhoven, & Xanthopoulou, 2010; Demerouti, Geurts, Bakker, & Euwema, 2004). Following from the introduction, the job demands in HROs may also include additional and unique aspects such as danger, threats, uncertainty, and fatigue. Job resources are physical, psychological, social, and organizational job aspects that may help meet job requirements and could therefore reduce physiological and psychological costs and stimulate personal growth and development. Resources can be grouped at different levels: the individual, the group, leadership, and organization (K. Nielsen et al., 2017). Examples of job resources are coping strategies, supervisor support, role clarity, job security, skill variety, and autonomy (Brauchli et al., 2013). Following from the previous discussion, one could see PsyCap as an index of personal resources that may augment or sustain job resources that are highly valued and needed when faced with the special job demands of HROs. The other main assumption of the JD-R model is that the well-being of employees is the result of two relatively independent processes (Xanthopoulou et al., 2007): 1. The health impairment process; and 2. The motivational process. While job resources are related to both burnout and work engagement, job demands are strongly related to burnout but only weakly or not at all related to work engagement (Hu,

Schaufeli, & Taris, 2011). It has been suggested that there is a buffer effect where job resources moderate the effect of job demands on health and well-being (Xanthopoulou et al., 2007), but in most cases the moderating effect received only partial support (Bakker et al., 2005). Xanthopoulou and colleagues (2007) also claim that there is an interacting effect where a high level of job demands, in combination with a high level of resources, results in higher levels of work engagement, but the interaction effect is typically weak (Hu et al., 2011). High demands and low resources produce the highest levels of burnout and strain (Bakker et al., 2010).

In the context of workplace safety, occupation-specific working conditions can also be categorized as job demands and resources (Nahrgang et al., 2011). Working conditions categorized as job demands in the context of safety include risks and hazards present in the workplace, physical demands associated with the work, as well as the complexity of the work. Risks and hazards constitute the environmental and workplace conditions or exposures, which include possible loss of life, injury, or chance of danger. Examples include noise, heat, dust, chemicals, and hazardous tools and equipment (Nahrgang et al., 2011). Although employees may avoid some risks and hazards, the mere presence of risks and hazards is likely to increase their perceptions of danger in the workplace and thereby determine how they perceive the levels of safety and the management's commitment to safety (i.e., perceived safety climate). Hence, on the one hand, safety climate may be an outcome of how employees experience job demands. However, on the other hand, safety climate may also be a determinant of other outcomes, including individual health and well-being. It has been established that employees who perceive their work environment as dangerous, and the safety climate as poor, experience higher levels of psychological distress (M. B. Nielsen, Tvedt, & Matthiesen, 2013) and lower levels of job satisfaction (M. B. Nielsen et al., 2011). Safety perceptions have also been associated with higher absence and turnover (Barlow & Iverson, 2005) and reduced sleep quality (Hystad, Nielsen, & Eid, 2017).

How an employee copes with safety-related demands will depend on the resources available. Following the JD-R model, having the right resources to handle the

situation will work as a buffer, and the job demands will not lead to strain (Van Doorn & Hülsheger, 2015). While there may be many potential resources available, PsyCap may be especially beneficial. That is, considering that PsyCap has been identified as a positive resource for coping with potentially challenging work-life situations, it is plausible that PsyCap can also have a protective effect with regard to safety demands. In a review of resource-based theories of organizations, Newman, Ucbasaran, Zhu, and Hirst (2014) noted that PsyCap has been linked to desirable employee attitudes, workplace behavior and performance indicators at different levels of analysis. Following from the resource-based perspective, PsyCap may be positively associated with safety motivation and performance in safety critical organizations (Eid et al., 2012). This is much in line with the general theory of PsyCap as resources that could bring out "your best self" in a challenging situation (*efficacy* - believing in your skills, *hope* - working your way to the goal even if hindrances occur, *optimism* - a realistic belief in your ability to change things for the better, *resiliency* - bouncing back even after changes and difficult situations). Still, it is not clear how PsyCap will be associated with perceived risk and how this will influence safety-relevant behavior such as sleep and recovery. The thesis will provide an empirical basis to inform this issue.

1.9 Sleep

One factor that is relevant for perceived risk and safety is sleep. Lack of sleep could lead to sleepiness and fatigue at work, which in turn may cause a lack of the vigilance needed to conduct work tasks in a safe manner. Fairclough and Graham (1999) found that sleep-deprived drivers experienced subjective discomfort, as well as an awareness of reduced performance capability. Sneddon, Mearns, and Flin (2013) found a positive correlation between high levels of stress, sleep disruption, and fatigue with poor work situation awareness. Those who rated the work situation awareness as poorer also reported more safety violations. The workers with lower work situation awareness had increased participation in unsafe behavior (Sneddon et al., 2013). Because workers with poor work situation awareness take risks, this could

lead to increased accident involvement (Hystad et al., 2017). A stressful work environment and long work hours can also impair sleep (Parkes, 2017). Hystad and colleagues (2017) found that perceived safety climate predicted sleep quality and fatigue. They also found that risk perception increased when the seafarers were fatigued. In a HRO, where safety is crucial, worrying about safety hazards at work, insufficient safety equipment, lack of training and the consequences this may have could represent worries that influence quality of sleep and rest, hence decreasing the perceived safety climate at work. Hystad and Eid (2016) found PsyCap to be a robust predictor of fatigue and sleep quality in two samples of sailors and offshore workers[5].

1.10 Cross-national differences and safety outcomes

Many, if not most, HROs are assumed to operate in an international context. Furthermore, the operational settings of ATC or maritime operations require the command of internationally recognized procedures and language, in most cases the English language. The maritime industry is well known to employ workers from different nationalities, and they often work aboard the same ship. The adequate understanding and management of culturally diverse human resources will therefore constitute a significant part of the safety climate on a merchant ship (Progoulaki & Theotokas, 2016). The present thesis provided an opportunity to follow up on potential national differences in the maritime sample. In an earlier study, Johnsen and colleagues (2012) investigated cultural differences in emotional intelligence among top officers aboard merchant ships. The study provided empirical data, indicating notable differences between Asian and European top officers, in that the Asian officers scored more highly on emotional intelligence than their European colleagues. More so, the Asian officers revealed a stronger preference for sensitivity in handling

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[5] Hystad and Eid (2016) reanalyzed the data in my third manuscript (Valdersnes, Eid, Hystad, & Nielsen, 2017) and extended the research on PsyCap and fatigue/sleep quality by comparing the offshore sample with a different sample from ro-ro ships. By adding a second sample of maritime workers from a different maritime trade, the results clearly indicate that PsyCap turns out to be a robust predictor with statistically significant relations to fatigue and sleep quality in both samples.

interpersonal relations and self-control (Johnsen et al., 2012). In another study we found that "… European and Filipino respondents differ with regard to safety perceptions, laissez-faire leadership, authentic leadership, exposure to harassment, team cohesion, and intentions to leave" (M. B. Nielsen, Bergheim, & Eid, 2013, p. 80).

2. Aims and theoretical approach of the thesis

The overall aim of this thesis was to examine associations between workplace safety and PsyCap in HROs. Building on the above presentation of concepts, theoretical models, and empirical evidence, Figure 2 presents an overview of the main variables and their proposed associations. The variables and their relationships were explored in three separate studies. The direct relationship between PsyCap and safety climate was examined across all industries (Studies 1-3). The mediating role of emotions, social desirable responding (Study 1) and job satisfaction (Study 2) in the relationship between PsyCap and safety climate was investigated in two studies. Furthermore, the potentially moderating effect of a managerial work role on PsyCap and safety climate was examined in Study 2. Study 2 also allowed for determining cross-national differences between European and South-East Asian maritime workers. Finally, Study 3 investigated PsyCap as a potentially protective factor in the relationship between worries about accidents and sleepiness among seafarers. The hypothesis was that PsyCap directly or indirectly might influence perceived work-related risk factors and sleepiness to be associated with safety outcomes in HROs. In addition, it was expected that PsyCap would moderate the impact of worries about safety, since the PsyCap factors probably help in coping with stressful events.
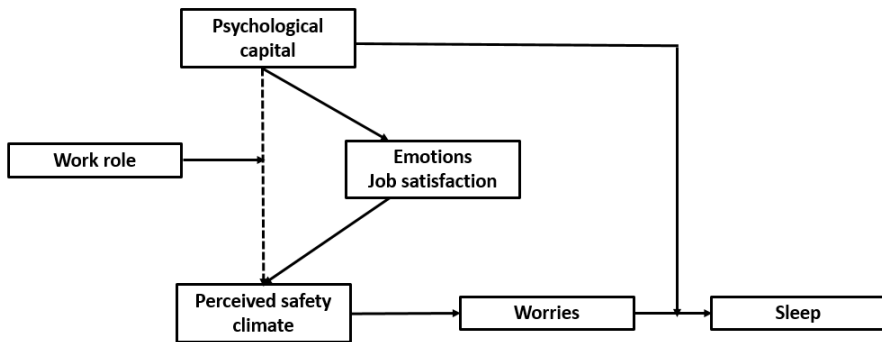
Figure 2. Graphical presentation of the relationships between psychological capital and safety climate as examined in the current thesis

The direct effect of PsyCap on perceived safety climate, shown in Figure 2, is based on Luthans et al.'s (2008) research regarding PsyCap's influence on *organizational* climate. Their results showed that PsyCap was positively related to performance, satisfaction and commitment among the employees, and, following Eid and colleagues (2012), these results, as well as research linking PsyCap to positive work attitudes and behaviors (Avey et al., 2010), makes it interesting to look into the connection between PsyCap and *safety* climate across different HRO settings. The assumption is that the positive coping mechanisms of PsyCap would make the employees *view* the safety climate as more positive and *make it* more positive through their efficacy, hope, optimism, and resiliency. People with a positive view on their own psychological resources and what they can do with them, may feel more in control over their work situation and therefore perceive the safety climate as better than will a person feeling unsure of his capacities and his influence on the work situation.

The effect of work role (leaders vs. non-leaders) on the relationship between PsyCap and perceived safety climate is seen as a possible moderating factor in the model because it is assumed that leaders have better access to current information and in

general have more experience and training. These contextual factors will interact with their perceived role and personal motives and ambitions associated with their role as a leader.

When it comes to the potential mediators of the relationship between PsyCap and perceived safety climate, emotions were included to check for those employees who just look at the world through rose-tinted glasses and are overly positive in general. Job satisfaction was added, because it is assumed that job satisfaction could also influence the way one perceives the safety climate, and also influences it, or is influenced by it. Job satisfaction is the extent to which people like or dislike their jobs (Spector, 1997) and has been suggested to be an important outcome of workplace safety (M. B. Nielsen et al., 2011).

Following from what I have previously emphasized, the very explicit focus on safety and loss prevention is a core aspect of the aviation, offshore and maritime industries. Workers are selected and trained to observe and report abnormalities or deficiencies that may pose a threat to security. In the offshore and maritime industry, workers also spend their off-duty resting hours at the unit, leaving them exposed to potential hazards and danger 24/7 while at work (Hystad & Eid, 2016). In line with the JD-R model, the constant awareness of the risk involved in these industries may therefore present an example of job demands in the form of emotional demands and worry, workload, and work-home conflict due to the nature of shift work. Worry about safety issues may lead to sleep disturbances and sleepiness as an outcome. If this is a potential mechanism, it could be possible that PsyCap would act as a protective resource and represent a positive psychological state of development where the individual will be able to mobilize resilience and goal directed behavior in response to adverse events and a worrisome work environment. Taken together, the following research aims will be addressed in this thesis:

Research aim 1: To examine the relation between PsyCap and individual perceptions of safety climate (Papers 1-3).

Research aim 2: To examine emotions and social desirable responding as mediators and work role as a possible moderator in the relationship between PsyCap and individual perceptions of safety climate across nationalities (Papers 1 & 2).

Research aim 3: To examine PsyCap as a possible protective factor in the relationship between worries about workplace risks and sleepiness among seafarers (Paper 3).

3. Method

This inquiry into PsyCap and work-related outcomes is based on multiple survey data collections from different sample nationalities and organizations with a strong focus on the safety aspects of work (i.e., the ATC, maritime and the offshore industries). Table 1 below presents a brief overview of the five data collections that inform the three studies in this project. The method section provides a summary of the procedures, samples, ethical considerations, instruments, and statistical analyses used in the three papers in this thesis.

Table 1. Participants in the three studies

Study	*Sample*	*Survey submitted*	*Survey returned*	*Response rate*	*Gender (Male %)*	*Age (Mean)*
Study 1						
	Air Traffic Control (I)	119	77	65%	79%	39
	Air Traffic Control (II)	85	38	45%	97%	38
Study 2						
	Maritime/Cargo (I)	499	486	97%	100%	41
	Maritime/Cargo (II)	817	594	73%	99%	40
Study 3						
	Maritime/Offshore (III)	926	402	43%	N/A	N/A

3.1 Procedures

The data in all three studies were collected using paper and pencil questionnaires. Study 1 was conducted within the aviation industry, an international industry with a long tradition in safety focus (Flin, O'Connor, & Mearns, 2002). In the first part of Study 1, questionnaires containing measures of PsyCap and psychological safety climate were sent to 119 employees from two Norwegian air traffic control centers. A total of 77 valid questionnaires were returned, yielding a response rate of 65%. The second part of Study 1 was conducted two years later. New questionnaires were sent to 85 air traffic controllers from eight air traffic control centers in Norway, which were not included in the first part of the study. This questionnaire included measures of PsyCap, psychological safety climate, and positive and negative affect. A total of 38 valid questionnaires were returned, yielding a response rate of 45%.

In order to replicate and extend the results from the first study, Study 2 took place in the maritime industry. Safety focus is also highly relevant in this industry, but the maritime industry is more diverse and less subject to industry standards compared to the aviation industry; thus, safety has not been given as much attention in the maritime industry. However, during recent decades, there has been an increasing focus on loss prevention and improving safety standards in the maritime industry. The U.N.-associated International Maritime Organization (IMO: Brayfield & Rothe, 1951) is the global standard-setting authority for safety at sea. The IMO codes serve as guidelines and benchmarks for safety in the maritime sector, and the survey was designed to mirror the importance of human behavior in loss prevention seen in the latest version of the IMO codes (Brayfield & Rothe, 1951). The aim of the second study was also to advance our understanding of how formal work roles might influence the relationship between PsyCap and perceived safety climate, using two samples of workers from the maritime industry. In the first part of Study 2, data were collected from a Norwegian shipping company. Questionnaires measuring demographic data (i.e. gender, nationality, and age), PsyCap, psychological safety

climate, and desirable responding were sent to all 499 sailors[6] working on the 23 vessels in the company. A total of 486 valid questionnaires were returned, giving a very high response rate of 97%.

In the second part of Study 2, all sailors employed in two other Norwegian shipping companies were invited to participate. Questionnaires measuring demographic data (i.e. gender, nationality, age, and formal work role), PsyCap, psychological safety climate, and job satisfaction were sent to 817 sailors. Altogether, 594 sailors from 40 different vessels returned completed questionnaires, giving a response rate of 73%.

In Study 3, data were collected from a Norwegian company in the offshore oil and gas industry. Questionnaires measuring PsyCap, psychological safety climate[7], sleepiness, and risk perception were sent to 926 sailors working on 22 different vessels in the North Sea and Southeastern Asia. Altogether, 402 sailors replied, giving a response rate of 43%. In both Studies 2 and 3, the crew members were asked to wait until they had been aboard for at least 30 days before answering the questionnaire. This was to ensure they had spent enough time at work to be able to experience the psychological safety climate aboard before they responded.

3.2 Samples

Study 1. The first sample of Study 1 consisted of 77 respondents working in two Norwegian air traffic control centers. The average age in this sample was 39 years (range 27-65 years). Men (79%) were overrepresented in the sample.

The second sample of Study 1 consisted of 38 respondents from eight Norwegian air traffic control centers. The average age of the respondents was 38 years (range: 24-56 years). As in the first sample, participants were predominantly male (97%). Together,

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[6] 'Sailor' and 'seafarer' are used interchangeably

[7] 'Psychological safety climate' and 'perceived safety climate' are used interchangeably to better explain what is often referred to as just "safety climate" in the literature

the samples from the two parts of Study 1 include about 25% of all the air traffic controllers in Norway.

Study 2. The first sample of Study 2 consisted of 486 Filipino workers on 23 ships from a Norwegian shipping company. The average age was approximately 41 years (range 18-62 years). All the participants in this study were male. About 38% were officers. The mean time they had been working for the company was 7.4 years (range 0-26 years). Only 7.6% had less than three years' experience in the company.

The second sample of Study 2 consisted of 594 workers on 40 ships from two Norwegian shipping companies, of whom 55% were Filipino, 26% Norwegian, and 19% of other European origin. The average age was 40 years (range 18-63 years). The sample was predominately male (99%). About 8% of the sample were captains. About 24% had less than one year of service in the company, 32% had between one and three years, and 41% had three years or more seniority.

Study 3. The sample in Study 3 consisted of 402 sailors on 22 vessels in the North Sea and Southeastern Asia. The age distribution of the seafarers was: Under 25 years: 12%, 25-29 years: 17%, 30-39 years: 33%, 40-54 years: 28%, over 54 years: 10%. Because there were very few women working aboard the vessels, gender was not recorded, in order to protect the anonymity of these women. The nationalities of the participants were Norwegian (ca. 34%), other European countries (ca. 24%), Filipino (ca. 36%), and other Asian and Australasian countries (ca. 4%). In this sample, about 11% were captains. The mean time working for the company was 3.7 years (range 0-29 years). The average experience as a sailor was 14.8 years (range 0-55 years).

3.3 Ethical considerations

The surveys were approved by The Norwegian Social Science Data Service. Since the studies did not include data on health or identifiable personal information, approval from The Ethics Committee were not required. Participation was voluntary, and the responses were returned anonymously to the researchers in sealed envelopes to ensure the privacy of the respondents. In one of the maritime samples, however,

the captains wanted to receive aggregated data on safety indicators on their own ship, in order to learn from the report and to improve safety. Therefore, these captains could not be anonymous to the researchers, but their names were recoded and later deleted.

3.4 Instruments

Table 2 presents an overview of the survey instruments included in the five data collections. The questionnaires for the air traffic controllers were administered in Norwegian, and the maritime questionnaires in English and Norwegian. For questionnaire modules that were translated from English to Norwegian, a back-translation method was used to ensure that the concept was understood and translated correctly. The Psychological Capital Questionnaire (PCQ) was used with the permission of www.mindgarden.com (F. Luthans, Avolio, & Avey, 2007). *Demographical variables*. The demographical variable included in all the studies was age. Gender was included in all studies except the third one. In the second and third studies, rank/department and work experience were also included, and the third study contained questions about nationality, education, task, type of employment, and leadership.

Psychological Capital. In Studies 1 and 2, PsyCap was assessed with the *Psychological Capital Questionnaire* (F. Luthans, Avolio, & Avey, 2007). This 24-item instrument measures efficacy, hope, optimism, and resiliency. Examples of items are: "I feel confident presenting information to a group of colleagues" (efficacy), "At the present time, I am energetically pursuing my work goals" (hope), "When things are uncertain for me at work, I usually expect the best" (optimism), and "I can get through difficult times at work because I've experienced difficulty before" (resiliency), (See F. Luthans, Avolio, Avey, et al., 2007 for validation of this scale). Cronbach's alpha for the PsyCap scale was .86 and .87 in Study 1 and .78 and .83 in Study 2.

In Study 3, PsyCap was measured with the short version of the PCQ instrument – The *12-item psychological capital questionnaire* (PCQ-12; see Avey, Avolio, & Luthans, 2011 for validation of this short version of the instrument). This instrument consists of 12 statements concerning how the respondent is feeling right now about his job situation. Examples of items are: "I feel confident presenting information to a group of colleagues" (efficacy), "I can think of many ways to reach my current work goals" (hope), I always look on the bright side of things regarding my job" (optimism), and "I usually take stressful things at work in stride" (resiliency). Cronbach's alpha for this scale was .90.

Psychological safety climate. In Study 1, a Nordic questionnaire on work-related safety in the building and construction business was used as a point of reference (Holte, 2007). From this instrument, 14 items were extracted. General aspects of psychological safety climate were preferred over domain-specific items, in order to avoid potential measurement errors due to cultural misconceptions (Reis, 2009). Both group level and management level commitment to safety were measured. Examples of statements are: "We who work here have confidence in the management's ability to handle safety", and "We who work here help each other to work safely". A total psychological safety climate index was used in the subsequent analyses. Cronbach's alpha for the psychological safety climate scale was .92.

In Study 2, psychological safety climate was measured with *The Norwegian offshore risk and safety climate inventory* (NORSCI; Hope, Øverland, Brun, & Matthiesen, 2010; Høivik, 2009; Tharaldsen, Olsen, & Rundmo, 2008). The instrument includes 35 statements concerning individual conditions, behavior characteristics, and situational aspects that influence safety. Examples of statements are: "I have the necessary competence to perform my job in a safe manner", "Risk-filled operations are always carefully planned before they are begun", "Deficient maintenance has caused poorer safety", and "I feel uncomfortable pointing out breaches of safety rules and procedures". Cronbach's alpha for the NORSCI scale was .88.

In Study 3, psychological safety climate was measured with 16 items from the *Psychological Safety Climate Questionnaire* (Zohar & Luria, 2005). The items cover

different interaction modes between supervisors and group members, by which supervisors can indicate the priority of safety versus competing goals such as production speed or schedules (Zohar & Luria, 2005). Examples of statements are: "My direct supervisor discusses how to improve safety with us", and "My direct supervisor is strict about working safely when we are tired or stressed". Cronbach's alpha for the scale was .96.

Positive and negative affect. In the second part of Study 1, a Norwegian translation of the *10-item International Positive and Negative Affect Schedule Short Form* (I-PANAS-SF; Thompson, 2007) was used to assess affectivity among the respondents. The respondents were asked to rate the extent to which they experience different emotions. The questionnaire includes five negative emotions (nervous, afraid, upset, hostile, and ashamed) and five positive emotions (alert, active, determined, attentive, and inspired). Cronbach's alpha was .60 for Negative Affectivity and .79 for Positive Affectivity.

Desirable responding. In the first part of Study 2, *The Balanced Inventory of Desirable Responding* (BIDR; Paulhus, 1984, 1991) was used to control for self-deceptive positivity and impression management. Examples of statements are: "I am very confident of my own judgments" (self-deceptive positivity), and "I never cover up my mistakes" (impression management). The instrument consists of 40 questions. The dimensions were used as a combined measure in the analysis. Cronbach's alpha for the BIDR scale was .81.

In the second part of Study 2, three items from *The Job Satisfaction Scale – short* version (JSS; Brayfield & Rothe, 1951) were included to measure job satisfaction among the respondents. Examples of statements included are: "I feel fairly satisfied with my present job", "Most days I am enthusiastic about my work," and "I find real enjoyment in my work". Cronbach's alpha for this scale was .70.

Risk perception. In Study 3, a *Risk Perception Questionnaire* (RPQ) was included. This instrument is based on the categories used in official reports from the Norwegian

Maritime Directorate (2012). The participants were asked to assess the probability of experiencing injuries themselves in the next year. The questions included seven different injuries, for example "Physical trauma/crush injury" and "Fall injury". Cronbach's alpha for the scale was .90.

Sleepiness. In Study 3, sleepiness was measured with one of the subscales of the *Swedish Occupational Fatigue Inventory* (SOFI; Åhsberg, 2000), which includes feelings of sleepiness: *falling asleep, drowsy, yawning,* and *sleepy*. The workers were asked how tired they usually feel at the end of their work shift. Cronbach's alpha for the scale was .88.

Table 2. Instruments used in the three studies

Instrument	Study I		Study II		Study III
	a	b	a	b	
PsyCap:					
PCQ	X	X	X	X	
PCQ-12					X
Safety Climate:					
PSCQ-14	X	X			
NORSCI			X	X	
PSCQ-16					X
Other:					
I-PANAS-SF	X				
BIDR			X		
JSS- Short scale				X	
RPQ					X
SOFI					X

3.5 Statistics and analyses

In all studies, statistical analyses were conducted with IBM Statistical Package for the Social Sciences (SPSS) versions 20.0 through 22.0. Descriptive statistics were determined by means frequency and descriptive analyses. Associations between variables were examined with correlation and linear regression analyses, after testing assumptions for normality (skewness and kurtosis), linearity, homogeneity, and multicollinearity.

In Studies 1 and 2, a multiple mediation analysis was conducted. The guidelines described by Preacher and Hayes (2008) to analyze direct and indirect paths were followed. This is an approach that can be used on small samples (N >25) and one that is more rigorous than the typical stepwise regression techniques, as all paths are measured simultaneously rather than step by step. The approach allows for multiple mediators, statistical control of covariates, pairwise comparisons between indirect effects, as well as bias-corrected and accelerated bootstrap confidence intervals (Preacher & Hayes, 2008).

For the test of two-way interaction effects in Studies 2 and 3, we followed the recommendations provided by Baron and Kenny (1986). In accordance with Aiken and West (1991), the predictor variables were centered prior to analysis. The SPSS macro "Interaction and simple slopes test with one continuous and one dichotomous variable" (Aiken & West, 1991; Newsom, 2015) was used to generate the regression estimates, plots, and simple slopes analyses.

4. Results

The overall aim of the present project was to examine data on PsyCap, safety and work-related outcomes from workers in different safety critical industries. In the following, a general overview and summary of the results from the three studies will be presented, to inform the research questions. For a more detailed presentation of the results, see the three papers in Appendixes 1-3.

Extending previous research indicating that PsyCap is associated with desired employee behavioral and performance outcomes, the aim of Study 1 was to examine whether PsyCap could represent a factor to assess in HROs to improve the safety climate. In the first part of Study 1, the relationship between PsyCap and psychological safety climate among air traffic controllers was investigated. The hypothesis was that air traffic controllers' levels of PsyCap would be positively related to individual perceptions of group and management safety climate. In general, the air traffic controllers rated their PsyCap as very good, and PsyCap was significantly related to psychological safety climate. The first part of Study 1 confirmed that air traffic controllers in general are highly focused on safety issues. With the exception of efficacy, all the components of PsyCap were significantly correlated with psychological safety climate. The final model showed significant relationships between gender and psychological safety climate (the female air traffic controllers rated the psychological safety climate significantly higher than the male participants did), as well as between PsyCap and psychological safety climate, whereas no relationship was established between age and psychological safety climate.

The second part of Study 1 examined whether response outcome expectancies or favorable self-ratings could explain the results in the first part of the study. I tested whether the relation between PsyCap and safety climate was mediated through positive and negative affectivity among the air traffic controllers. PsyCap was also positively related to psychological safety climate in this second part of the study. In

addition, a significant positive correlation was established between PsyCap and positive affectivity, whereas a significant negative correlation was found between PsyCap and negative affectivity. A multiple mediation analysis, with negative and positive affectivity as the mediators, was performed to investigate the indirect effect of PsyCap on psychological safety climate. Neither positive nor negative affectivity mediated the relationship between PsyCap and psychological safety climate. Altogether, PsyCap, positive and negative affectivity and control variables (age and gender) explained 15.5% of the variance in psychological safety climate.

Following from Study 1, the objective in Study 2 was to replicate and extend the findings from the ATC samples to another safety critical industry: the maritime industry. In the first part of Study 2, one aim was to find out whether PsyCap was positively related to perceptions of safety climate in the maritime industry. A positive correlation was also found in this sample. Since the maritime samples were predominantly male, possible gender differences were not looked into. However, the maritime industry is a quite standardized and well-structured organization and therefore presents an opportunity to examine PsyCap across work roles, in particular the work roles of officers and subordinates. The main and moderating effects of work role and PsyCap on psychological safety climate were therefore also explored in the sample of maritime workers. Work role moderated the relationship between PsyCap and perceptions of safety climate, in that officers with a high PsyCap score rated the psychological safety climate higher than the non-officers with high PsyCap scores did. After controlling for impression management and self-deception, PsyCap was still positively related to self-reported perceptions of safety climate in maritime workers and thus replicated the findings from the ATC study.

Data analysis in the second part of Study 2, performed on a new independent maritime sample, confirmed that PsyCap was positively correlated with both psychological safety climate perceptions and job satisfaction. Furthermore, a positive association was also established between safety climate perceptions and job satisfaction, and a weak, but significantly positive, association was found between age and PsyCap with older workers. This is in line with previous research, in which

older people score higher on PsyCap than younger people (Nolzen, 2018). Finally, when cross-national differences were observed, the findings indicated that European respondents reported significantly higher scores on PsyCap and psychological safety climate than the Filipino respondents did, whereas no difference was found for job satisfaction. Earlier studies have also found significant cross-national differences in PsyCap levels (Nolzen, 2018).

An analysis of indirect effects, with job satisfaction as the mediator, was performed to investigate whether PsyCap has an indirect relationship with psychological safety climate perceptions through job satisfaction. In line with the findings from the correlation analyses, a significant association between PsyCap and psychological safety climate emerged, indicating that PsyCap has a direct relationship with psychological safety climate. PsyCap alone explained 12% of the variance in psychological safety climate. Because the direct relationship between PsyCap and psychological safety climate attenuated when including job satisfaction in the equation, the findings support the hypothesis that the effect of PsyCap on psychological safety climate is mediated by job satisfaction.

The aim of Study 3 was to examine how PsyCap could represent a potentially beneficial or protective factor in HROs such as the maritime industry. Following from our third sample of maritime workers (see Table 1); Study 3 examined the relationship between PsyCap and sleepiness, while adjusting for psychological safety climate. Worries about risk, psychological safety climate, but not PsyCap, had direct relationships with sleepiness. The predictor variables explained 17.3% of the variance in the dependent variable. Worries about risk and PsyCap explained a variance in sleepiness over and above the impact of psychological safety climate in normal working conditions. PsyCap moderated the relationship between worries about risk and sleepiness, in that high levels of PsyCap had a reverse buffering effect on the association between worries about risk and sleepiness. That is, PsyCap was found to be proactive against sleepiness only in cases of low degree of worry about risk. When worry about risk was high, respondents with high and low PsyCap reported equally high levels of sleepiness.

5. Discussion

The first and overarching aim of this thesis was to examine the relationship between PsyCap and individual perceptions of safety climate. Taken together, the findings from all three studies suggest that PsyCap is consistently and positively related to psychological safety climate in HROs such as air traffic control, the maritime industry, and the offshore oil and gas industry. The findings of this direct association remained consistent after controlling for impression management and self-deception. Hence, this thesis provides evidence for an association between PsyCap and perceived safety climate.

The second aim of the thesis was to examine some possible moderators and mediators of the relationship between PsyCap and individual perceptions of safety climate. With regard to moderators, the conditional effect of work role on the relationship between PsyCap and psychological safety climate was explored in the sample of maritime workers. It was found that officers and non-officers with low PsyCap perceived the safety climate as similar, but that officers with high levels of PsyCap had a more positive perception of the safety climate than non-officers with high levels of PsyCap. Furthermore, the results from the studies showed that the effect of PsyCap on psychological safety climate is mediated by job satisfaction.

The third aim of the thesis was to elucidate the impact of PsyCap as a moderator of the relationship between worries about workplace risks and sleepiness among seafarers. In line with expectations, worries about workplace risks were positively related to sleepiness. Although PsyCap served as a moderator of this relationship, PsyCap only moderated the association between worries about accidents and sleepiness when levels of worries were low. In cases of high levels of worries, respondents reported high levels of sleepiness, irrespective of their PsyCap. Hence, the findings suggest a reverse buffering effect of PsyCap in the relation between worries and sleepiness.

5.1 The results seen in light of previous research

The present thesis provides new empirical findings that replicate and extend previous research, which has shown that PsyCap is related to desirable organizational outcomes (F. Luthans et al., 2015). Specifically, the findings show that PsyCap also represents an important factor to be considered in the search for improved safety in HROs. It is notable that PsyCap is consistently and positively related to different measures of psychological safety climate in multiple HROs. These findings are evident in independent samples from different industries and (with workers from different) nationalities.

It has been suggested that PsyCap, along with other constructs from positive organizational behavior, may be subject to self-presentation bias and positive affectivity (Podsakoff, MacKenzie, & Podsakoff, 2012). Nevertheless, after controlling for positive and negative affectivity, the results indicate that PsyCap explains about 16% of the subjective perception of safety climate and about 10% after controlling for age, work role and desirable responding. This is a significant finding, indicating that it is valuable to understand how PsyCap could be bolstered or sustained to reduce risk of loss and accidents in HROs.

The finding that job satisfaction mediates the effect of PsyCap on psychological safety climate indicates that workers with high scores on the PsyCap factors, efficacy, hope, optimism, and resiliency, have a higher degree of job satisfaction and a more positive cognitive appraisal of safety issues. Job satisfaction serves as a vehicle for this association. Because seafarers work and live in the same confined environment 24/7, maybe the positive aspects of work (e.g. job satisfaction) or negative aspects of work (e.g. work stress) exert more influence on work performance in the maritime industry (Doyle et al., 2016; Hystad & Eid, 2016). Comparative studies from other HROs are needed to examine this issue further.

The finding that PsyCap moderated the association between worries and sleepiness, even after controlling for safety climate, could be interpreted to adhere with the JD-R

model, in that PsyCap serves a positive role as a job resource and moderates the impact of worry on sleepiness *across low or no worry* situations. If worries about safety are high, PsyCap seemingly has little or no effect as moderator. These findings extend previous research by Hystad and Eid (2016), who found PsyCap to be a robust predictor of fatigue and sleep quality in two maritime samples, suggesting that PsyCap has a reversed buffer effect on the relationship between fatigue and poor sleep quality. Seafarers with high levels of PsyCap will be attentive when the threat level is serious but will not be bothered when exposed to everyday strain and hassles associated with their work situation. This is in line with the understanding that scoring high on PsyCap does *not* mean wearing "rose tinted glasses", it means being realistic and considering the situation you are in when planning ahead. Nevertheless, this finding needs to be replicated in separate studies, and it will be valuable to determine the boundaries and thresholds associated with this moderating effect of PsyCap on the job demand–resource relationship.

5.2 Methodological considerations

5.2.1 Strengths

This thesis contributes to the expanding research field of POB by assessing empirical data on PsyCap as a correlate of psychological safety climate in HROs. To my knowledge, these studies are among the first scientific inquiries to address this issue. What also could be considered a strength of the thesis is that the number of respondents, as well as the response rates, in the different studies are quite high (compared to the overall populations). The external validity should therefore be high, and it could be possible to generalize the findings to the larger populations of the specific HROs. The combination of different HROs could also be seen as an advantage, as it provides insight into different realities of HROs. Furthermore, the variables were assessed with well-established and psychometrically sound measurement instruments: something, which should strengthen the reliability and validity of the data.

5.2.2 Limitations

Despite several strengths, there are also some methodological challenges concerning this project that need to be addressed. As the data is cross-sectional, the studies do not account for the causal relationships between the study variables. Although I have investigated the theoretical assumption that PsyCap is an antecedent to safety climate, and that this association is influenced by mediating and moderating variables, other kinds of relationships are also likely. The cross-sectional design has limitations as it does not show causality. Poor safety climate may lead to less optimism and hope, which again could reduce job satisfaction. On the other hand, low job satisfaction could lead to poor safety climate, which could decrease PsyCap levels. To provide indications of causality, a study with time-lagged data should be performed, in order to measure the development within individuals and not just compare results between them. The level of analysis was individual and not organizational. It should therefore be noted that the findings only reflect the participants' perceptions of risks and safety. Since the employees included in the samples are organized in workgroups, data are likely to be nested, and a group-level analysis would be appropriate. In order to add to the understanding of how group dynamics influence safety perceptions, future studies should therefore also assess the variables at a group level. As for the current thesis, the lack of group-level data suggests that the findings should be interpreted with caution. Still, as this is one of the first studies to investigate associations between PsyCap and safety, as well as moderating and mediating variables, the study provides a novel and important contribution to our understanding of the relationships between the variables.

5.2.3 Bias

Selection bias: The fact that participation was voluntary increases the risk of some people not participating in the studies. These people might differ from the participants; one possibility is that the most negative workers would not participate. The lowest response rates were in Study 1 b (45%), and Study 3 (43%), and one

could speculate as to whether those people not responding differ from those responding. Even though the response rate is much lower than in Study 2 a (97%) and 2 b (73%), it is still higher than the average response rate in organizational studies, which is 35.7% (Baruch & Holtom, 2008)

Information bias: The information is based on self-reported data from questionnaires, and, even though self-presentation bias is controlled for in Study 2, this was not controlled for in the other studies.

In one of the maritime studies, we offered survey feedback, in which the participating captains had the opportunity to receive reports, with their individual results compared to the mean for the other captains and ships in the company. This might have been of importance for the results, as the participants could have "sugar coated" their answers. However, we found that the captains' ratings of themselves were mostly in line with how their crews rated them. All the captains used the opportunity to obtain their individual report, and they got to discuss their interpretations of the results with a researcher from the psychology department at the university. They had the opportunity to explain the thoughts behind their answers and to discover possible misunderstandings.

5.2.4 Reliability

The internal reliability or internal consistency of the scores is measured using Cronbach's alpha, which, for most of the scales, was acceptable (between .70 and .95, see Tavakol & Dennick, 2011). The negative affectivity part of the instrument I-PANAS-SF used in the second part of Study 1 was the only one with lower Cronbach's alpha (.60). This could be due to a low number of questions (only five for the scale), but it may also indicate poor inter-relatedness between the items or that the constructs are too similar (Tavakol & Dennick, 2011). The only scale with a slightly higher Cronbach's alpha (.96) was the PSCQ-16 used in Study 3. According to Tavakol and Dennick (2011), a Cronbach's alpha that is too high could indicate that some items are redundant (i.e. measuring the same thing). Hence, the high

Cronbach's alpha indicates that this Psychological Safety Climate scale could be the subject of further investigation and validation.

5.2.5 Generalization

Because these participating organizations mainly comprised male workers, the individual participants were predominantly men from quite specialized occupational settings. With regard to external validity, this means that the generalization to the overall working population is limited, and a more gender-balanced study from other occupational groups should be conducted in order to draw conclusions about workers in general. However, as the response rates from the individual studies were relatively high, the results from this thesis should be generalizable to the occupation-specific populations from which they are drawn.

5.2.6 Validity

The question regarding internal validity is whether the instrument measures what it is supposed to measure; hence, the validity is dependent on the language in the questionnaires and the respondents' understanding of the questions in the instrument.

The aviation and the maritime industries are very different when it comes to hierarchy, organizational culture and safety tradition, and there are also differences in language and culture *within* the samples. The air traffic control centers differ greatly in size, from the smallest to the largest, and the ships have different combinations of nationalities and languages – from all Filipinos in one study to a mixture of European and Asian nationals in another. Their understanding of the language in the questionnaires could also differ considerably, and some of the psychological concepts might be understood differently – for example in Europe and Asia. Which qualities (and hence answers) that are considered desirable could also differ between different national cultures (for example, hierarchy in Asia, equality in Europe).

Even though the samples differ and are difficult to compare, the results still indicate that PsyCap could be important for perceived safety climate across HROs.

5.2.7 Voluntary participation

The questionnaires were answered by people working in hierarchical organizations, and this might have affected how they answered questions concerning their leader's handling of safety-related issues. In the first maritime sample in Study 2, the response rate was very high (97%), and this may reflect the hierarchical system. The participation was voluntary, but the degree to which participation is voluntary might be questioned when it is your leader who asks you to participate. On the other hand, workers in the maritime industry are quite used to filling out forms, reporting on work duties or documenting their work performance. Based on feedback from the company and the captains, the survey seemed to be considered important and relevant and welcomed as an opportunity to express personal opinions about the work situation.

The fact that the surveys were sent from a university presented the respondents with a neutral and external third party. On the other hand, this might also imply that the researchers were given the role of "experts", whom the participants might have seen as authorities, which could cause a high response rate. The fact that the questionnaires were distributed to the workers by the company management may also have influenced the participants' responses in a more favorable direction to questions about loyalty to the company or their assessment of their immediate supervisor. In order to ensure confidentiality, all survey forms were accompanied by envelopes, and respondents were instructed to hand in their completed forms in sealed envelopes marked with the university address and logo.

5.2.8 Questionnaire and language

The PsyCap questionnaire used in the air traffic control studies was translated into Norwegian, using a back-translation method. The translators were English scholars. However, they did not have much knowledge about psychology and the setting in which the research was taking place, which Hofstede argues is of great importance: "Translators should be familiar not only with both languages but with the context of the material to be translated" (Hofstede, 2001, p. 21). Even though they were not familiar with organizational psychology, the translators' version was edited by psychology scholars where it was found necessary. It must be noted that the back-translation came back a little different from the original, and we cannot rule out that there could have been some misunderstandings amongst the participants due to language differences and misinterpretations. Although we used a back-translation method, words and phrases may be understood differently across cultures (Avey, 2014). The aviation questionnaire on safety climate was made for another industry (building and construction), and this must be taken into consideration. Maybe some of the questions were not sufficiently adjusted to the aviation industry. The maritime questionnaires, on the other hand, included instruments measuring safety climate that have been tested more, also in the maritime sector (offshore).

The shipping questionnaires were in Norwegian and English, with the non-Norwegian participants receiving the English version, which is their work language but not necessarily their mother tongue. Bennett (1977) conducted research on Filipino managers' work situation and tested both an English and a Tagalog version of his questionnaire. He found that for some questions the scores were independent of language but for questions on communication and interaction processes, the native language answers were more favorable. His conclusion was that the managers communicated and interacted more easily with people who speak their native language, they evoke a reference group, which leads to them giving more favorable responses about these issues (Hofstede, 2001). In light of this, a question about English language knowledge was included in the questionnaires to ensure proper

language skills. The PsyCap questionnaire has been tested on Asian samples, but the original validation was in the United States (Avey, 2014).

The questionnaires might include concepts that are interpreted differently between cultures, and differently than intended. Comparing the results from two different questionnaires in two different organizations could lead to errors. The analysis is therefore the relation between PsyCap and safety climate *within* each organization, not the comparison of safety climate *between* the organizations.

5.2.9 Cultural differences

Cultural differences should be taken into consideration, and these differences can be found in everything from our deep values and traditional rituals to our everyday practices (Hofstede, 2001). Norms and values are often so internalized that we are not fully conscious of them. Kuhn (1962) argued that we all see the world through a filter, depending on which paradigm we belong to:

> A paradigm is a filter through which we perceive, interpret and understand our reality and our options. For example, if you were born with red sunglasses on, everything you see would be tinted red. But suppose you met a man wearing green sunglasses. You wouldn't know that he saw the world differently from you. Everything you see is red. Each of you would experience reality in a different color and not know it. You'd say the world is red. He'd say the world is green (Mapes, 2003, p. 73).

It is common to acknowledge a difference between Eastern and Western cultures in the individualist focus versus the collectivist focus. Most Western cultures emphasize competition and personal gain, and the individual as most important. In collectivistic cultures, cooperation is the focus, and the group is valued above the individual (Snyder et al., 2011).

The hierarchical structure in organizations also differs somewhat between Eastern and Western cultures. For example, Scandinavian countries are known for having low power distance and a somewhat flat structure in their organizations, while Asian organizations are traditionally more hierarchical, with a larger power distance and the

leader on top of the pyramid (Hofstede, 2001). In Southeast Asia, the leader is more of a *head* authority figure and father figure than in Scandinavia (Moxnes, 2002). Despite the company being Norwegian, the all-Asian sample in Study 2 might bring along values, which lead to a more pyramid-like structure. The all-Norwegian air traffic sample probably has a flatter power structure.

The maritime sample presented an opportunity to observe cross-national differences, indicating that European respondents reported significantly higher scores on PsyCap and psychological safety climate than the Filipino respondents. This may indicate that the concept of PsyCap is more likely to be endorsed by workers from a more individualistic European or North American culture compared to a more collectivistic and long-term orientation embedded in Southeast Asian culture. PCIs have been found to be more effective in individualistic rather than collectivistic cultures (Sin & Lyubomirsky, 2009). This may indicate that future research needs to take into consideration these cultural differences, not only as control variables but also to consider cultural dimensions in the training and leverage of PsyCap across cultures and organizations (F. Luthans & Youssef-Morgan, 2017). There are also many other social dimensions in which we vary, even though we belong to the same national culture (Brewer, 2010). One such dimension is *organizational* culture.

5.2.10   Organizational culture

"Organizational cultures are the collective programming of the mind that distinguishes the members of one organization from another" (Hofstede, 2001, p. 391). We assume that the organizations in the study have very different organizational cultures. Aviation is an industry that traditionally has a high focus on safety. The shipping industry, on the other hand, is far behind but is turning things around with an increased focus on safety and the importance of the human factor. Air traffic controllers are used to working "on their own", making decisions alone, with their leader not even present in the tower. Sailors are used to the captain being the

leader and that they must work their way up the system, all the way from being a deck boy. Air traffic controllers have an expert role after just a couple of years' education. They have an important role, crucial to all people travelling by plane. Being a sailor gives high status in the Philippines. Being an air traffic controller in Norway gives a high salary, but, due to high sick leave numbers and conflicts in the organization some years ago, their reputation still suffers.

As we can see, there are some important organizational differences between the two groups as well as cultural differences. In addition, we as researchers have our personal and cultural "filters" through which we see the world. Scientific facts and theories are produced by human beings, whose minds cannot be completely cleansed of biases and individual interests (Ziman, 2000). "Though we can never know if we have the truth, we can always try to improve on what we have" (Dienes, 2008, p. 6).

6. Implications and conclusions

This thesis is among the first to examine whether, how and when PsyCap is related to workplace safety. The main conclusion is that the PsyCap levels among workers are highly important individual factors that are connected to safety perceptions, and that both research and practitioners should take PsyCap into consideration in the assessment of safety. I have shown that PsyCap relates to safety across different safety critical occupations, that the association is not likely to be influenced by social desirability responding, that emotional aspects of both the individuals (affect) and the job (job satisfaction) influence the association between PsyCap and safety, and that there are some moderating factors that should be considered. Consequently, PsyCap is a measure that is useful for assessing the worker's positive capacities, and that may also be important in relation to safety climate and, hence, also safety outcomes.
The results have important implications for further research and for practice. In order to extend what has been established in this thesis, studies could be conducted in other HROs, such as the emergency services, to further look into PsyCap's role in perceptions of safety climate. One could also include objective physiological measures like heart rate variability, to get a better understanding of the relationship between PsyCap and stress, as well as the relation between perceived safety climate, sleep problems, worries about safety and stress-related physiological measures. The reversed buffering effect found on worries and sleepiness related to PsyCap could also be investigated further, as this was a surprising finding. Longitudinal studies should be conducted to gain more knowledge about this relationship. Further studies could compare different HROs and look into differences in type of organization, industry, and work role, as well as cultural differences. It would also be interesting to look into PsyCap and safety climate in relation to safety outcome measures like near-miss recordings and reported injuries and accidents. Experimental and longitudinal research could also better investigate the desirable outcomes of PsyCap over time. Test-retest reliability could also be investigated (Youssef-Morgan, 2014). How PsyCap works in groups is also an interesting focus, to see whether the level of

PsyCap of each team member is equally important or if some key players could drag the rest of the team down or lift them up. It could also be interesting to look into what the best mix of PsyCap profiles in a team is (Kozlowski & Klein, 2000; F. Luthans & Youssef-Morgan, 2017), and whether PsyCap could spread and become "contagious": "The contagion mechanisms through which PsyCap spreads downward (from leaders to followers), upward (from followers to leaders), or laterally (among team members) remain largely unexplored" (F. Luthans & Youssef-Morgan, 2017, p. 16). Some support has, however, been found for the positive contagion effect from leaders to followers (see the review by Nolzen, 2018) .

PsyCap and perceived safety climate measures could be part of safety assessments in HROs, which can identify areas for improvement and training. Training in SCOs "make human activities more predictable" and "standardize practices and performance" (Oedewald & Reiman, 2007, p. 95). They use "training to increase and maintain expertise in addition to a way to control behavior" (Oedewald & Reiman, 2007, p. 96). Investing in the health and well-being of the employees can also have a positive impact on the safety climate (Mearns, Hope, Ford, & Tetrick, 2010). This may benefit the organization, when it comes to both human and economical capital. Since PsyCap seems to be one of the factors related to safety perceptions, PsyCap could be developed to improve safety in HROs.

In closing, it should be noted that emerging research on PCIs could present a new approach to developing human resources in HROs. A PCI usually lasts two to three hours and is customized to the specific workplace context, with goal-settings, generation of pathways, mental rehearsals, and contingency planning (F. Luthans & Youssef-Morgan, 2017). This can be done through short training sessions online, video games and gamification techniques (F. Luthans & Youssef-Morgan, 2017; F. Luthans et al., 2015), which it may be possible to adapt for workers in HROs. PCIs have been found to increase the individual's level of PsyCap as well as his/her job performance (F. Luthans et al., 2010; Nolzen, 2018). PCIs could have a "…a significant positive impact on the bottom line of a company" (Nolzen, 2018, p. 14).

PCIs should increase PsyCap and be financially beneficial to the company, in return for their PsyCap investment (F. Luthans, Avey, Avolio, Norman, & Combs, 2006; F. Luthans et al., 2015).

Source of data

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II

The relationship between psychological capital, job satisfaction, and safety perceptions in the maritime industry

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ABSTRACT

In two studies we examine whether Psychological Capital (PsyCap) is related to perceptions of safety climate and job satisfaction among maritime workers from three Norwegian shipping companies. Results from Study 1 ($N = 486$) and Study 2 ($N = 594$) showed that PsyCap was positively associated with – and explained between 10% and 12% of the variance in perceptions of safety climate. PsyCap contributed to the variance in safety climate after adjusting for social desirable responding. An interaction analysis indicated that officers and non-officers perceived the safety climate as similar when their PsyCap is low, but that officers with high levels of PsyCap have a more positive perception of the safety climate than non-officers with high levels of PsyCap. In Study 2 a positive association was established between safety perceptions and job satisfaction, as well as between PsyCap and job satisfaction in a multicultural sample of maritime workers. Findings from analyses of indirect effects suggest that PsyCap has an indirect (mediating) relationship with perceptions of safety climate through job satisfaction. Altogether, PsyCap and job satisfaction explained 21% of the variance in safety climate. Cross-national differences were established in that the indirect effect was only valid for European workers, and not for Filipinos. An important implication of these findings is that safety focused interventions could benefit from taking PsyCap into account in training and motivating for safety.

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1. General introduction

In safety critical organizations (SCOs) workers are faced with significant hazards. The maritime industry represents a SCO where maritime workers[1] are exposed to a number of risk factors in combination, for instance weather conditions, navigation failure or accidents during cargo operations. The maritime industry has high potential for accidents and catastrophes due to the nature of the working environment.

The maritime industry is regulated by the International Maritime Organization (IMO). Still there can be significant differences in the organizational cultures and safety practices onboard ships due to national and/or company specific characteristics. The well-known expression "happy ship" indicates that job satisfaction and individual motivation are considered crucial elements in maritime organizations. *Organizational culture* is used to capture more generic, trait like aspects of maritime organizations. *Organizational climate* is more often used about specific, state like capacities that may index a "happy" or "unhappy" ship. Organizational climate is made up of shared perceptions among workers concerning the procedures and practices that are rewarded within a specific organization (Mearns et al., 1998). In SCOs like the maritime industry, safety climate in the form of shared perceptions of safe behavior and loss prevention should have high priority (Zohar, 2010).

In the following we will refer to safety climate as "a coherent set of perceptions and expectations that workers have regarding safety in their organization" (Gyekye, 2005, p. 291). According to Mearns et al. (2003) one may see safety climate as a snapshot of selected aspects of organization safety culture at a particular point in time. In the maritime industry it is a vital part of the culture to maintain safety barriers to prevent hazards and accidents from occurring. To keep a safe distance and to detect and defer potential hazards below the surface, have literal and very specific implications in the maritime domain. This focus on potential threats to safety is well illustrated by Reason (1990) in his so-called "Swiss Cheese Model". This model shows how there could be a number of threats to safety barriers in the form of organizational factors (e.g. conflicting goals and priorities), active failures (e.g. mistakes

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[1] The terms "maritime worker" and "crew member" are used interchangeably throughout the paper.

and procedural violations) and latent conditions (e.g. decisions made by designers or senior management). When the "holes" in the different safety systems coincide, a hazard can pass through all of the defense layers, leading to failure (see Dekker, 2006, for a further explanation of Reason's model).

Despite the obvious risks associated with the maritime industry, research has devoted little attention to antecedents, moderators and mediators of safety climate in the shipping industry, compared to other industries (Håvold, 2005). Over the years, improvements in technology, ship design and navigation aids have reduced the frequency and severity of shipping incidents, leaving the influence of human error open to investigation (Hetherington et al., 2006). The risk potential from human error is significant and some researchers claim that as many as 96% of marine accidents are caused in part by some form of human error, or multiple causes involving human misjudgment (Hetherington et al., 2006; Rothblum, 2013).

These observations are well in line with the awareness that organizational, managerial and human factors are prime causes of accidents in safety critical organizations (Weick et al., 1999). In addition to failures in the management and safety systems, work pressure and (lack of) competence in the workforce are frequently seen as predetermining factors in work related accidents (Flin et al., 2000). Håvold (2007) has suggested that laissez-faire culture and fatalism are examples of factors that influence negative safety behavior in the shipping industry. Factors that influence positive safety behavior are employees' satisfaction with safety activities and management safety attitudes (Håvold, 2007).

Through two independent studies of maritime workers we wanted to extend and complement the focus by Håvold (2007) on attitudes and behavior by examining how positive work motivation and job satisfaction could influence safety perceptions in crew members. From a review of the literature, the core construct of *Psychological Capital* (PsyCap; Luthans et al., 2007a, 2007c) emerged as a promising index of positive work motivation. Over the last decade an accumulating body of research has suggested that this motivational state is linked to organizational effectiveness and desired work outcomes (Newman et al., 2014; Youssef and Luthans, 2012).

PsyCap resources are most often referred to as "more stable than states such as moods or emotions, but not as fixed as personality traits such as conscientiousness or core self-evaluations" (Luthans et al., 2010, p. 44). According to Luthans et al. (2013), PsyCap is best described as falling into the middle ground of the trait-state continuum in between transient states, which are momentary and changeable, and 'hard wired' traits, which are stable and difficult to change (Luthans et al., 2007b). This conceptualization of PsyCap as a developmental state is supported by a growing number of studies indicating that PsyCap can be developed through training interventions (Newman et al., 2014).

A person's PsyCap profile can be described along four core dimensions. The first dimension is the belief (*efficacy*) in one's abilities to successfully execute and accomplish tasks. The second dimension is the tendency to make positive attributions and have positive expectations (*optimism*) about future events. The third dimension is the tendency to persevere toward goals and, when necessary, redirecting paths to goals (*hope*) in order to succeed. A final aspect is related to positive coping and the ability to bounce back and even beyond (*resiliency*) when beset by problems and adversity (Luthans et al., 2007c).

In a recent conceptual model of the associations between PsyCap and safety it was argued that PsyCap may represent a positive motivational state that will facilitate and encourage safety focused behavior and practices in safety critical organizations (Eid et al., 2012). This idea is supported by empirical evidence from our study of air traffic controllers (ATCs; Bergheim et al., 2013) which found

that individual differences in PsyCap explained about 15.5% of the variance in perceived safety climate among ATCs. The positive resource of hope had the highest unique contribution in explaining air traffic controllers' perceptions of safety climate. This is noteworthy since hope is a positive psychological resource that is related to higher work performance outcomes across a number of independent studies (Peterson and Byron, 2008). These outcomes includes organizational commitment, employee performance and job satisfaction (Luthans et al., 2007b; Youssef and Luthans, 2007).

Our main objective of this two-part study was to investigate if PsyCap was related to crew members' perceptions of safety climate across two samples from different segments of the maritime industry. Specifically, the aim of Study 1 is to replicate and extend the previous findings on PsyCap and safety climate among air traffic controllers (Bergheim et al., 2013), to the maritime industry. In Study 2 we will expand our focus by examining if job satisfaction mediates the relationship between PsyCap and safety climate in the maritime industry, and determine whether cross-cultural factors influence this association.

2. Study 1

2.1. Introduction

Shipping represents a unique occupational setting in that maritime workers are onboard 24/7, and the ship is therefore a closed social milieu. There is also a very hierarchical structure onboard, and often crews with people of different nationalities (Håvold, 2005). The multicultural and multinational aspects of the maritime industry might contribute to differences in safety climate across ships in the same trade or even from the same company.

According to Zohar (2010), safety climate is an expression of how well safety focused behaviors and priorities are rewarded and supported in the organization. Zohar (2010) considers safety climate to be the workers' shared perceptions of safety, which is heavily influenced by managerial practices and the social norms in the work group. It is therefore not surprising that safety climate has been shown to predict safety outcomes across different industries and countries (Nahrgang et al., 2011; Zohar, 2010). Few studies have to date examined antecedents of safety climate and explored how worker perceptions and motivation for safety might be shaped and sustained in this industry. Previous reviews of the safety literature have identified symbolic social interaction and supervisory leadership as the two primary antecedents likely to promote the emergence of shared climate perceptions (Ostroff et al., 2003; Zohar, 2010). In the maritime industry symbolic interactionism would imply that the meaning and reality of work onboard is socially constructed, arising from social exchanges among workers seeking to comprehend their environment and the organization they live in (Stryker, 2008). In other words, the meaning of work and the interpretation of safety related events and dilemmas arise from the interplay between one's own perceptions and those of others in the same situation.

According to symbolic interactionism, workplace socialization and learning involves constant comparison of bits of information and cues, discussing possible interpretations, and attempting to reach consensual interpretation of the meaning of events, procedures and practices at the workplace. As a result group members' perceptions are expected to converge over time, resembling the processes of newcomer socialization (Schneider and Reichers, 1983). Because workers within a ship by nature will interact more often with each other than with workers on other ships, their individual perceptions of safety climate will over time shape safety focused behavior onboard (Schneider and Reichers, 1983; Zohar, 2000, 2002, 2010).

Applying this symbolic interactionism perspective to the maritime industry, it seems reasonable to assume that when some workers display a consistent pattern of action in regard to safety, this will promote shared perceptions among other workers concerning the priority of safety. If a maritime worker lacks direct personal experience with something it often makes sense to imitate, or learn from others who have similar attitudes and experiences to his own, hence reinforcing his existing attitudes (Eiser, 2012). A crucial issue relates to how one could inspire and motivate maritime workers to adhere to safety focused behavior. PsyCap is a relatively new and promising construct that has been successfully used to index increased organizational effectiveness and desired work outcomes (Youssef and Luthans, 2012). Building on a conceptual model which describes the association between PsyCap and safety climate (Eid et al., 2012), we will in the following outline how PsyCap, through its factors efficacy, hope, optimism and resiliency, could be related to individual level perceptions of safety climate in the maritime industry.

Efficacy is the most researched of these factors, and it has been conceptualized and validly measured both as a generalized and domain specific construct (Bandura, 1997; Schwarzer and Jerusalem, 1995). According to Sweetman et al. (2011, p. 4): "Efficacy is not related to a person's actual skills, but rather the beliefs one possesses regarding what he or she can do with those skills". With regard to safety focused behavior we assume that a worker with high efficacy will be more likely to report dangers and speak up when confronted with safety critical work situations in his professional domain. In the same vein, *hope* relates to the willpower of workers to use their skills and to generate multiple paths to accomplish the same goal (Luthans et al., 2007c). In SCOs this could imply the ability to seek alternative solutions to unsafe work behavior and to explore more safe procedures to accomplish work operations. *Optimism* as part of PsyCap is both seen as generalized positive expectancies and an event-based positive explanatory style (Luthans et al., 2013). "An optimistic explanatory style leads to individuals feeling in control of their destiny; it produces a self-fulfilling prophecy wherein positive explanations become reality" (Sweetman et al., 2011, p. 7). Although realistic optimism may produce a will to take on difficult tasks, overconfidence or unrealistic optimism can be conducive to risky behaviors or lead workers to disregard early warning signs (Youssef and Luthans, 2012). The final element in PsyCap is *resiliency*, which enables an individual to thrive on positive adjustment to change. In SCOs this capacity is highly valued because resiliency will enable workers to feel at ease outside their normal comfort zone and challenge personal assumptions and external obstacles (Sweetman et al., 2011).

Luthans et al. (2007b) argue that the four factors of PsyCap form a higher order construct that is a better predictor of performance and satisfaction than its parts. We assume that the PsyCap dimensions together will identify maritime workers who believe in their professional skills, are goal oriented and confident with a strong ability to adjust to change and hardships. From the very nature and inherent dangers of their workplace, we expect that PsyCap will contribute to identify maritime workers with a strong focus on work performance, including the core aspect of safety and loss prevention. From this we will examine the following hypothesis:

H1. Psychological capital is positively related to perceptions of safety climate in the maritime industry.

A common problem in concurrent measurement of psychological constructs such as attitudes and personality is socially desirable responding (SDR), often referred to as impression management and self-deception (Paulhus, 1984, 1991). "The tendency for people to present a favorable image of themselves on questionnaires (…) confounds research results by creating false relationships or

obscuring relationships between variables. Social desirability (SD) scales can be used to detect, minimize, and correct for SDR in order to improve the validity of questionnaire based research" (Van de Mortel, 2008, p. 40). For a more thorough description of social desirability, see Crowne and Marlowe (1960), or Paulhus (1984, 1991). In order to control for response bias in this sample, we will test the following hypothesis:

H2. After controlling for impression management and self-deception, psychological capital is still positively related to self-reported perceptions of safety climate in maritime workers.

One characteristic aspect of the maritime industry is its emphasis on professional experience and on-the-job training as preconditions for promotion to senior positions. For instance, the captain must have obtained sufficient experience as navigation officer and first officer before he is considered for promotion. In the same way the chief engineer has qualified over many years in different work roles before being promoted to chief engineer. Recent meta-analysis indicates that the core aspects of PsyCap are correlated with desirable employee attitudes and behavior (Avey et al., 2011). We would therefore assume that the individuals who are promoted to senior positions in the maritime industry will reveal higher levels of PsyCap, and that promotion to senior positions in itself will bolster individual PsyCap. From this we derive our third hypothesis:

H3. Work role moderates the relationship between PsyCap and perceptions of safety.

To the best of our knowledge, this is one of the first empirical studies examining the relationship between PsyCap and individual level perceptions of safety climate in the maritime industry. Hence, the study will contribute to the existing literature by adding to the understanding of how relatively stable individual resources among maritime crew are related to perceptions of safety. The study hypothesis will be tested in a sample of Filipino workers from a Norwegian shipping company. By having an all-Filipino sample, we can rule out the potential impact of cross-cultural differences on PsyCap and safety. Furthermore, as the crew-members in this sample are onboard the vessel for an average of 9 months at a time, and the captains for 6 months, it seems reasonable to assume that the findings from the study are not influenced by factors such as changes in the work environment, influence from family and social issues outside of work environment.

2.2. Method

2.2.1. Design and procedure

The data was collected from a Norwegian shipping company. The questionnaires were sent to all of the 499 maritime workers from the 23 vessels which belonged to the company at the time of the survey. Participation was voluntary, and the participants could withdraw from the survey at any time without further notice. The Norwegian Social Science Data Service approved the survey. Altogether 486 maritime workers returned completed questionnaires, giving a response rate of 97.4%. The respondents were anonymous, with the exception of the captains, who were informed beforehand that they could be identified. Each questionnaire was coded and the respondent's name and code number were kept separately, and data without names were used in the analysis. The crew members were asked to wait until they had been onboard for at least 30 days before they answered the questionnaire. This was to ensure they had experienced the safety climate onboard before they responded.

2.2.2. Sample

The sample consisted of male Filipino workers from a Norwegian shipping company. The mean age was 40.8 years ($SD = 10.84$) with a range from 18 to 62 years. The work roles in this sample were recoded as officers (37.9%: i.e., captains, chief officers, chief engineers, jr. officers, and first engineers) and other crew-members (62.1%: i.e., cadets, technicians, and ratings). The mean time the maritime workers had been working for the company was 7.4 years ($SD = 5.6$). Their work experience from the company varied from less than a year to 26 years. Only 7.6% had less than three years' experience in the company.

2.2.3. Instruments

The measurement instruments used in the current study were part of a larger organizational survey comprising demographical background questions and other work related factors.

Safety climate perceptions were measured with the "Norwegian offshore risk and safety climate inventory" (NORSCI; Hope et al., 2010; Høivik, 2009; Tharaldsen et al., 2008). The respondents were asked to rate their agreement with 35 statements concerning individual conditions for safe work execution, behavior characteristics relevant for safety, and situational aspects that influence safety behavior. The ratings were given on a five-point scale, ranging from 1 = *fully disagree* to 5 = *fully agree*. To counteract response style bias, both positively (e.g. "I have the necessary competence to perform my job in a safe manner", and "Risk-filled operations are always carefully planned before they are begun") and negatively (e.g. "Deficient maintenance has caused poorer safety", and "I feel uncomfortable pointing out breaches of safety rules and procedures") keyed items are included in the inventory. The negatively formulated items were reversed. Hence a score of 1 would indicate negative perceptions of safety onboard, whereas a score of 5 would indicate positive perceptions. Cronbach's alpha for the NORSCI scale was .88. Skewness was −.23, kurtosis was −.50.

The NORSCI scale has been validated on a large representative sample of Norwegian offshore workers. According to Hope et al. (2010), the NORSCI has sound psychometric properties as indicated by acceptable reliability and construct validity. The scale consists of the following five dimensions; safety prioritization, safety management and involvement, safety versus production, individual motivation, and system comprehension (see Tharaldsen et al., 2008, for a more thorough description). The NORSCI scale is used by the Petroleum Safety Authority Norway [Petroleumstilsynet] to index the safety climate in the Norwegian petroleum industry. In the present study we adopted their recommended approach and used the total NORSCI scale as an index of safety climate onboard.

Psychological capital (PsyCap) was assessed with the *Psychological Capital Questionnaire* (PCQ; Luthans et al., 2007a). The PCQ draws from widely recognized published standardized measures for each of the dimensions that make up PsyCap: (1) Hope (Snyder et al., 1996); (2) Resiliency (Wagnild and Young, 1993); (3) Optimism (Scheier and Carver, 1985); and (4) Self-Efficacy (Parker, 1998). The PCQ has demonstrated high reliability and construct validity in earlier studies (Luthans et al., 2007a, 2008b, 2007c). The 24-item PCQ has six items for each subscale of efficacy, hope, optimism, and resiliency. Responses are scored on a 6-point scale with anchors of 1 = *strongly disagree* and 6 = *strongly agree*. Reversed items were recoded according to the instructions in PCQ (Luthans et al., 2007a). To reflect the state-like quality of PsyCap, the questions were framed to ask the participants how they felt "right now". Moreover, questions were adapted to make the target context specific to the workplace. The instrument can be found in Luthans et al. (2007c, pp. 237–238). Sample items include: "I feel confident contacting people outside the company (e.g., suppliers, customers) to discuss problems" (efficacy); "At the present

time, I am energetically pursuing my work goals" (hope); "When things are uncertain for me at work I usually expect the best" (optimism), and; "I can get through difficult times at work because I've experienced difficulty before" (resiliency). The internal consistency (Cronbach's alpha) for the overall PsyCap scale was $\alpha = .78$. Skewness was .03 and kurtosis .28.

Desirable responding. The Balanced Inventory of Desirable Responding (BIDR; Paulhus, 1984, 1991) was used to control for self-deceptive positivity and impression management. Self-deceptive positivity is "the tendency to give self-reports that are honest but positively biased" (Paulhus, 1984, 1991, p. 37; e.g., "I am very confident of my own judgements"). Impression management is "deliberate self-presentation to an audience" (Paulhus, 1984, 1991, p. 37; e.g., "I never cover up my mistakes"). The answers are given on a seven-point scale ranging from 1 = not true to 7 = very true. The instrument consists of 40 questions, 20 on self-deceptive positivity and 20 on impression management. The correlation between the two dimensions was $r = .69$, $p < .01$ and the dimensions were therefore used as a combined measure in the following analysis. The 20 questions keyed in the negative direction were reversed. Responses from 1–5 on the scale were recoded to 0, and responses from 6–7 were recoded to 1 before conducting the analysis. The internal consistency (Cronbach's alpha) for the overall BIDR scale was .81. Skewness was −.17 and kurtosis −.43.

2.2.4. Statistical analysis

Statistical analyses were conducted with IBM SPSS 20.0 and the supplemental "PROCESS" macro script (Hayes, 2012). The level of significance was set to $p < .05$. For the test of a two-way interaction effect between PsyCap and work role on safety climate, the recommendations provided by Baron and Kenny (1986) were followed, and, in accordance with Aiken and West (1991), the predictor variables were centered prior to analysis.

2.3. Results

The means, standard deviations and inter-correlations for all measures used in the present study are reported in Table 1. To explore main and moderating effects of work role and PsyCap on safety climate, we conducted a hierarchical regression analysis, including the control variables age and desirable responding, to test for linear and interaction effects. To investigate the main effects of age, work role, PsyCap and desirable responding on safety climate, the independent variables were entered in a series of stepwise linear regression analyses with safety climate as the outcome variable. In the first analysis the independent variables were entered in two steps: Age and work role were entered in the first step and total PsyCap was entered in the second step. Finally, the analysis was repeated with desirable responding bias (e.g., BIDR scores) being entered in the final step to estimate the effect of desirable responding.

The results of the first equation revealed that only work role contributed to the model and explained 12% of the variance in safety climate $F_{(2,310)} = 22.28$, $p < .001$. Officers had a more positive perception of the safety climate than non-officers. In the sec-

Table 1
Means, standard deviation, inter-correlations (Pearson's r) and Cronbach's alphas (in bold along the diagonal) for continuous measures in Sample 1 ($N = 359$).

	Variables	M	SD	1	2	3	4
1.	Age	40.15	10.98	–			
2.	Psychological capital	4.72	.43	−.04	**.78**		
3.	BIDR	20.70	6.50	.25	.30	**.81**	
4.	Safety climate	4.00	.36	−.09	.32	.47	**.88**

Note: $N = 313$. All $r \geqslant .19$, $p < .01$.

ond equation, controlling for the effects of age and work role, Psy-Cap increased the explained variance in safety climate by 10%. [$F(3,309) = 30.16$, $p < .001$]. Together work role and total PsyCap explained 22% of the variance in safety climate. In the final equation desirable responding was added to the model, increasing the explained variance in safety climate to 33%. The final model [$F(4,308) = 39.32$, $p < .001$], revealed that work role, PsyCap, and desirable responding all contributed significantly to the overall model (see Table 2).

After adjusting for the main effects of age, gender, social desirability, PsyCap and work role, the interaction term between PsyCap and work role ($B = -.22$; $p < .05$) added 1.2% to the total variance in safety climate. The overall model was significant [$F(5,307) = 5.88$, $p < .05$]. To examine the form of the interaction, a graphical display was created, based on the recommendations by Cohen et al. (2003), and Frazier et al. (2004). As shown in Fig. 1, the results indicate that officers and non-officers perceive the safety climate as similar when their PsyCap is low, but that officers with high levels of Psy-Cap have a more positive perception of the safety climate than non-officers with high levels of PsyCap.

2.4. Discussion

The results indicate that PsyCap is positively correlated with safety climate in the maritime industry. After controlling for age, work roles, and desirable responding, PsyCap explained 10% of the variation in maritime workers' perceptions of safety climate. Officers had a more positive perception of the safety climate than non-officers. This is in line with earlier findings from other industries indicating that leaders are more attuned to organizational priorities, such as compliance with safety regulations in SCOs (Gyekye and Salminen, 2010).

The present study replicates and extends previous research from the aviation industry (Bergheim et al., 2013), indicating that PsyCap is positively associated with safety climate perceptions across different work sectors and age groups. In the previous study of ATCs, the PsyCap factors of optimism and hope explained unique variation in safety climate (Bergheim et al., 2013). The positive inter-correlation and underlying shared variance of the factors in the PsyCap construct (Luthans et al., 2007b) indicate that positive work motivation in the form of PsyCap is related to perceptions of safety climate in both air traffic control and in maritime organizations. This is interesting since maritime workers are a more heterogeneous group with a broader range of work roles, educational requirements and competencies compared to air traffic controllers who have more or less the same formal education, training, and job requirements. This could indicate that safety climate perceptions are more than just reflections of formal education and on the job-training, it also mirrors individual differences in motivational state that could be subject to training and leadership processes.
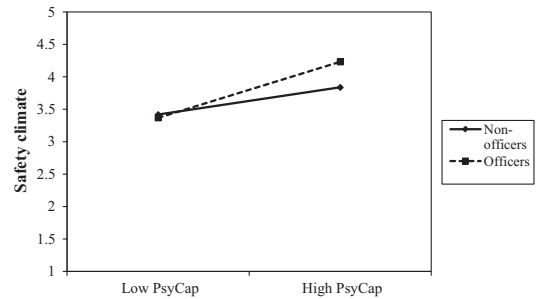
Fig. 1. The interaction between PsyCap and work role with regard to safety climate.
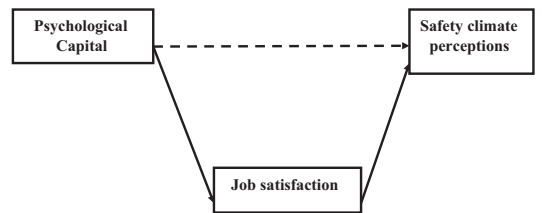
Fig. 2. Conceptual model of the investigated relationship between psychological capital, job satisfaction, and safety perceptions.

Christian et al. (2009) did a meta-analysis where they found that both person and situational factors are important when it comes to workplace safety.

It should be noted that despite the obvious cross national differences between Norwegian ATCs and Filipino maritime workers, PsyCap emerged as a construct that could explain individual differences in perceptions of safety climate across national samples. In a study of individual differences in emotional intelligence in European and Filipino maritime workers (Johnsen et al., 2012), significant differences in controlling emotions and using emotions in social situations were found between European and Filipino top-officers. Cross national differences in emotional self-regulation and sensitivity to emotional aspects of interpersonal relations may for instance delay or withhold information and communication about safety critical aspects of work. Thus, emotional aspects of work life, such as job satisfaction, could be related to safety climate onboard.

A noteworthy finding of this study is that a significant interaction between PsyCap and work role was established with regard to the respondents' perceptions of safety. The interaction indicates

Table 2
Hierarchical multiple regression predicting safety climate ($N = 313$).

Variables model 1	β_{Step1}	β_{Step2}	β_{Step3}	Final model estimates		
				B	$SE (B)$	95% C.I.
Step						
1. Age	−.06	−.02	−.04	−.001	.002	[−.004,.002]
2. Rank	.36**	.25**	.21**	.16	.04	[.08,.23]
3. PsyCap		.34**	.24**	.22	.05	[.13,.31]
4. Desirable responding			.35**	.02	.00	[.02,.03]
ΔR^2		.10	.11			
R^2	.13	.23	.34			
Adjusted R^2	.12	.22	.33			

Note: C.I. = Confidence interval. Rank onboard is scored as follows: officers = 1, other crew members = 0.
** $p < .01$.

that the association between PsyCap and perceptions of safety are dependent upon work role with high levels of PsyCap being more strongly associated with perceptions of safety among officers compared to non-officers. Yet, work role has no impact on perceptions of safety when the respondents' PsyCap is low. This finding suggests that the effect of PsyCap on safety is conditioned by formal position in the organization.

3. Study 2

3.1. Introduction

The results from Study 1 and previous research from Bergheim et al. (2013), suggest a positive relationship between PsyCap and perceptions of safety climate. Yet, it is still unclear *how* PsyCap and safety climate are related. Building on social exchange theory, job satisfaction has been suggested to function as a mediator in the relationship between various antecedent variables and perceptions of different workplace outcomes (Crede et al., 2007). In order to add to the understanding of the mechanisms that may explain the association between PsyCap and safety climate perceptions among crew-members, the main aim of Study 2 is to examine the role of job satisfaction as a potential mediator of this relationship. The variables will be investigated in a randomized and multinational sample of maritime workers. By testing both the direct effect of PsyCap on safety climate perceptions as well as the indirect effect through job satisfaction, Study 2 will both replicate and extend the findings from Study 1.

Job satisfaction reflects how content an individual is with his or her job, and is considered a reliable indicator of work-related well-being (Judge et al., 2002). Formally, job satisfaction is defined as "a pleasurable or positive emotional state resulting from the appraisal of one's job or job experiences" (Locke, 1976, p. 1304). Individual difference theory claims that some variability in job satisfaction is due to the individual's personal tendency to enjoy what he or she does across situations. Some people are generally satisfied and motivated while others more easily turn to frustration and dissatisfaction (Aamodt, 2013). Several studies have investigated the link between individual dispositions and job satisfaction (e.g., Judge et al., 1998). In a meta-analysis article focusing on the five factor model of personality and job satisfaction, it was established that neuroticism ($r = -0.29$) conscientiousness ($r = 0.26$) and extraversion ($r = 0.25$) were most strongly correlated with job satisfaction (Judge et al., 2002). The relationship between neuroticism and job satisfaction suggests that employees with high scores on this trait are likely to carry a rather negative world view that influences everything they do, making them less likely to be happy in general, and more specifically at the workplace.

According to Harms and Luthans (2012) PsyCap represents a state like disposition reflected through a "positive appraisal of circumstances and probability for success based on motivated effort and perseverance" (Luthans et al., 2007b, p. 550). Hence, with regard to job satisfaction, one can expect that workers with high levels of psychological capital in general perceive their work in a more positive manner and therefore are more satisfied with their working situation. The idea of PsyCap as a predictor of job satisfaction is substantiated by a growing body of research which has found that the factors that constitute psychological capital are positively associated with both job satisfaction and related constructs such as performance and commitment (Luthans et al., 2007b, 2008b; Peterson et al., 2011; Youssef and Luthans, 2012).

Job satisfaction has also been associated with indicators of safety and safety perceptions (Gyekye and Salminen, 2006; Kim et al., 2002; Kirkcaldy et al., 1997). For instance, in a large scale study of platform personnel employed in the Norwegian petroleum

industry, Nielsen et al. (2011) found a positive correlation ($r = .33$; $p < .01$) between job satisfaction and safety climate, thus suggesting that workers who expressed more job satisfaction also had positive perceptions of the safety climate. A similar relationship was established by Gyekye (2005). In this latter study, it was suggested that if workers perceive their organizations to be supportive and are satisfied with the organizational structures in place, they are more likely to recognize that the organizations value their safety and well-being as well.

Although alternative causal explanations for the relationships between psychological capital, job satisfaction, and safety perceptions may exist, research findings suggests that job satisfaction could be considered as a mediator of the relationship between dispositional factors and job characteristics (Crede et al., 2007). Building on this perspective, as well as on the research findings presented above, we suggest that job satisfaction mediates the established association between PsyCap as a disposition, and perceptions of safety as an indicator of job characteristic (see Fig. 2). More specifically it is expected that persons with high levels of PsyCap are more satisfied with their job content and the organization of the workplace due to their positive appraisal of external circumstances and that they therefore also perceive the organization's facilitation of safety as better. This leads to the following hypotheses:

H1. Level of psychological capital is positively related to individual perceptions of safety climate.

H2. Psychological capital is positively related to job satisfaction among employees.

H3. Perceptions of safety climate is positively related to job satisfaction among employees.

H4. Perceptions of job satisfaction mediates the association between psychological capital and perceptions of safety.

3.2. Method

3.2.1. Design and procedure

The data is based on a survey among 817 crew members working on vessels from two Norwegian shipping companies typical for the maritime industry in Norway (i.e. relatively large and well established companies that specialize within several segments of the industry). None of these companies or respondents were included in Study 1. All crew-members employed in the two companies were invited to participate in the survey. Participation in the survey was voluntary, and respondents could withdraw from the study at any time without further explanation. The Norwegian Social Science Data Service approved the survey.

Questionnaires were distributed to crew members during their working period on the vessels, and the respondents were asked to complete the questionnaire toward the end of their stay onboard. The length of the work period varied between respondents, with captains working shorter periods than subordinates. Altogether 594 individuals from 40 vessels returned completed questionnaires, giving a response rate of 73%.

3.2.2. Sample

The sample consisted of 55% Filipino, 26% Norwegians, and 19% of other European origin. The mean age was 40 years ($SD = 10.0$) with a range from 18 to 63. The sample was predominately male (99%). Altogether 30% had a permanent employment in the com-

pany, 4% had temporary employment, and 66% were employed through an employment agency. About 24% had less than one year service in the company, 32% between one and three years, and 41% had three years or longer seniority. Overall, the length of service under the current captain was relatively short, as 68% had sailed with the captain for less than a year. About 8% ($N = 48$) of the respondents were captains, and 27% of the respondents had a position as employee representatives.

3.2.3. Instruments

The measurement instruments used in the current study were part of a larger organizational survey comprising demographical background questions and other work related factors.

Safety perceptions were measured according to Study 1, with the 35-item "Norwegian offshore risk and safety climate inventory" (NORSCI; Hope et al., 2010; Høivik, 2009; Tharaldsen et al., 2008). Cronbach's alpha for the NORSCI scale was .85. (for a fuller description of the inventory, see Study 1). Skewness for the total NORSCI scale was −.74, and kurtosis 1.16.

Psychological capital (PsyCap) was assessed with the *Psychological Capital Questionnaire* (PCQ; Luthans et al., 2007a) as described in Study 1. The internal consistency (Cronbach's alpha) for the overall PsyCap scale in the present study was α = .83. Skewness for the total PsyCap scale was −.04, while kurtosis was .33.

Three items from the Job Satisfaction Scale – short version (Brayfield and Rothe, 1951), were included to investigate *job satisfaction* among the respondents. This inventory was chosen because it is a reliable and commonly used indicator of job satisfaction (Rafferty and Griffin, 2009). The version of the inventory that was used in this survey comprises the following items: "I feel fairly satisfied with my present job", "Most days I am enthusiastic about my work," and "I find real enjoyment in my work". For each item, respondents gave their answers on a 5-point Likert scale, where 1 = "strongly disagree" and 5 = "strongly agree". The internal consistency of the scale was satisfactory (Cronbach's alpha = .70). For the total PsyCap scale skewness was −.04, and kurtosis .33.

3.2.4. Statistical analyses

Statistical analyses were conducted with IBM SPSS 20.0 and the supplemental "PROCESS" macro script (Hayes, 2012). The level of significance was set to $p < .05$. Data was analyzed by means of correlation and regression analysis methods. To test the hypothesis about mediating effects of safety climate perceptions, we followed the guidelines described by Preacher and Hayes (2008). This approach has high statistical power and several advantages compared to traditional approaches for testing mediators (Hayes, 2009): This non-parametric method is considered more rigorous than typical stepwise regression techniques as all paths are measured simultaneously rather than step by step. This approach allows for multiple mediators, statistical control of covariates, pair wise comparisons between indirect effects, as well as bias-corrected and accelerated bootstrap confidence intervals (Preacher and Hayes, 2008).

3.3. Results

The means, standard deviations and inter-correlations for all measures used in the present study are reported in Table 3. Correlation results show that PsyCap relates positively with both safety climate perceptions ($r = .41$; $p < .001$) and job satisfaction ($r = .35$; $p < .001$). A positive association was also established between safety climate perceptions and job satisfaction ($r = .26$; $p < .001$). A weak, but significantly positive association, was found between age and psychological capital ($r = .09$; $p < .05$). No significant correlations were found between age and the other study variables. The directions of the correlations between PsyCap, safety climate, and

Table 3
Means, standard deviation, inter-correlations (Pearson's *r*) and Cronbach's alphas (in bold along the diagonal) for continuous measures in sample 2 ($N = 552$–576).

	Variables		SD	1			4
1.	Age	40.4	10.01	–			
2.	Psychological capital	4.82	.47	.09[*]	**.83**		
3.	Safety climate	4.18	.41	.00	.41[**]	**.85**	
4.	Job satisfaction	4.17	.62	.03	.35[**]	.26[**]	**.70**

[*] Correlation is significant at the 0.05 level.
[**] Correlation is significant the 0.01 level.

job satisfaction are in line with the proposed hypotheses about how the variables are related. Independent sample *t*-tests were used to investigate differences in PsyCap, safety climate perceptions, and job satisfaction among respondents from Europe and the Filipinos. In short, the findings show that European respondents report significantly higher scores on PsyCap and safety climate, whereas no difference was found for job satisfaction (see Table 4). Effect size, as measured by Cohen's *d* in this study, is an indicator of the magnitude of the relationship between two variables used as a supplement to significance values. According to Cohen (1988), *d*-values in the area of 0.2 reflects small effect sizes, whereas those in the area of 0.5 are medium and those in the area of 0.8 and above are large.

An analysis of indirect effects, with job satisfaction as the mediator, was performed to investigate the hypothesis that PsyCap has an indirect relationship with safety climate perceptions through job satisfaction. Bootstrapping followed the default setting of 10,000 resamples. In line with the findings from the correlation analyses, a significant association between PsyCap and safety climate emerged ($B = .47$; $p < .001$), thus indicating that PsyCap has a direct relationship with safety climate. Alone, PsyCap explained 12% of the variance in safety climate. When dividing this total effect into the direct effect of PsyCap and the indirect effects through job satisfaction, the direct relationship between PsyCap and safety climate remained significant but attenuated ($B = .34$; $p < .001$). A significant indirect effect was established through job satisfaction ($B = .08$; $p < .01$). Altogether, the variables explained 19% of the variance in safety climate perceptions. Because the direct relationship between PsyCap and safety climate attenuated when including job satisfaction in the equation, we can conclude that the findings support our hypothesis that the effect of PsyCap on safety climate is mediated by job satisfaction.

In order to determine whether cultural characteristics between the respondents influence the associations between PsyCap, safety climate, and job satisfaction, the mediation analysis was re-run separately for European ($N = 221$) and Filipino ($N = 260$) respondents (see Table 4). In the European sub sample, a significant direct association between psychological capital and perceptions of safety climate was established ($B = .53$; $p < .001$) in the first step of the analyses. This effect ($B = .37$; $p < .001$) attenuated when job satisfaction was controlled for ($B = .11$; $p < .05$), thus indicating an indirect effect of PsyCap on individual safety climate perceptions through job satisfaction. The independent variable and the

Table 4
Cross-cultural differences in study variables.

	Europeans		Philippines		T-value	Cohen's *d*
	M	SD	M	SD		
Safety climate	4.20	.46	4.13	.33	2.2[*]	.20
Psychological capital	4.86	.48	4.77	.48	2.09[*]	.19
Job satisfaction	4.22	.65	4.13	.61	1.54	.14

[*] *T*-value is significant at the 0.05 level.

mediator explained 21% of the variance in safety climate perceptions. A direct effect of PsyCap on safety climate ($B = .37$; $p < .001$) was also established in the Filipino sub sample. However, the test for an indirect effect through job satisfaction (unstandardized $B = .04$; $p > .05$) gave no indications for a mediated relationship in this group. Altogether, PsyCap and job satisfaction explained 8% of the variance in safety climate perceptions among Filipino respondents.

3.4. Discussion

Our results from a cross-national sample of European and Asian workers in the maritime industry replicate Study 1 in that a direct association was established between psychological capital and safety climate perceptions. This finding is important, since it concurs with, and supports, the reliability of the results from Study 1. Furthermore Study 2 also indicates that the effect of PsyCap on individual perceptions of safety climate is mediated by job satisfaction. Hence, this suggests that persons with high levels of PsyCap have positive impressions of safety because they are satisfied with the content and organization of their work. Yet, it should be emphasized that cross national differences seem to play a role in this relationship. The job satisfaction measure might be culturally biased to Europeans. "(...) the frame of reference one brings from his culture or subculture influences the way he perceives his job and those facets of it which are satisfying and dissatisfying" (O'Reilly and Roberts, 1973, p. 295).

Due to the cross-sectional nature of the data, our findings cannot be used to determine the actual causal associations between the investigated variables. Based on theory and previous empirical findings we have suggested that job satisfaction mediates the effect of psychological capital on safety climate perceptions. Yet, other explanations may be equally plausible. For instance, it may be that persons with high levels of psychological capital have more positive perceptions of safety and that they therefore also are more satisfied with their job. Alternatively, it could also be that a positive impression of an organization's safety standards increases the psychological capital of employees by making them more optimistic and self-efficient and that this subsequently also make them more satisfied with their jobs. In order to determine the validity of the different explanations, future studies should investigate relationships between the variables using longitudinal study designs with at least three measurement points.

4. General discussion

This two-study paper from the maritime industry replicates the findings from the aviation industry by Bergheim et al. (2013), indicating that PsyCap is associated with worker perceptions of safety climate in SCOs. Secondly, our findings extend previous research by providing empirical evidence suggesting that job satisfaction may represent a mediating mechanism between PsyCap and individual perceptions of safety climate in maritime workers.

The results in Study 2 indicate that for the Europeans a high degree of PsyCap leads to more job satisfaction which again leads to a positive perception of the safety climate. This mediation through job satisfaction is not found in the Filipino group. Given the multinational nature of the shipping industry it may have significant practical as well as theoretical implications if different factors that influence safety climate depend on culture. Filipinos are more collectivistic than Europeans (Hofstede, 2001), and their high score on job satisfaction could be explained by their more collectivistic culture, which emphasizes work group cohesion and peer relations. Thus their job satisfaction might be associated with work group relations and not primarily work factors such as safety climate.

Some potential limitations of the studies should be noted. The 97% response rate in Study 1 and 73% in Study 2 might indicate that the maritime workers felt obligated to participate in the study, even though participation was voluntary. (The average response rate from organizational surveys is 35.7%; Baruch and Holtom, 2008). It is also higher than the response rate for surveys conducted among employees in similar industries such as the offshore petroleum industry (Mearns et al., 1998, 2001). The high scores on the impression management scale show that the maritime workers want to give a good impression, and they might have answered in an overly positive manner. The questionnaire was in English, which is the language the maritime workers use at work, but not their native language. This might have led to misunderstandings of some English expressions and hence some answers that did not reflect the maritime workers' actual opinions. The samples for Study 1 and Study 2 were collected independently of each other, social desirability was not considered as an issue at the time of the data collection of Study 2. In retrospect, and in light of the findings from Study 1, we could have benefited from including this measure in Study 2 as well. The results in Study 2 should therefore be considered bearing this in mind.

That being said, the strengths of this two-study paper are that it includes two quite large and independent samples with standardized measures from different nationalities and maritime organizations. The focus on PsyCap presents a new perspective on individual state-like motivational factors and how they may represent a new avenue for management interventions and training to improve safety. Further research is clearly needed, but together with previous findings across different safety critical organizations it indicates that PsyCap is an interesting construct to include in future research on safety related issues. Since the measurements were made at the same time, there can be alternative explanations when it comes to the direction of impact. One possibility could be that safety climate influences PsyCap, not the other way around. Future studies should consider cross-cultural differences, as well as differences based on work and organization. For Europeans improving PsyCap could lead to higher degree of job satisfaction and more positive perception of safety climate. For Filipinos it might not have the same effect. Future studies should also look into differences in work motivation and work role experience when it comes to PsyCap and safety focused behavior in the workplace. The maritime industry could prove a fertile ground to encourage and include PsyCap development as one critical element in work place safety management and in ship management training. A salient aspect of the maritime industry is the very different work environment surrounding management in the home office at shore and the managers or captains on board the ships or offshore installations. In order to develop PsyCap, managers at the company office one could apply structured micro interventions (PsyCap Interventions; PCIs) aimed at developing hope, optimism, efficacy, and resiliency (Luthans et al., 2006). PCIs typically would include both individual assessment and learning opportunities, like focused group discussions, sharing personal experiences and building management culture. According to Luthans et al. (2006) the PCI will expose managers to brief training sessions where they are encouraged to explore personal work related experiences, review video-clips, and receive personal feedback and guidance aimed at developing their goal orientation (hope), a more positive attributional style (optimism), increased confidence in work processes (efficacy), and ways to enhance personal assets (resiliency) in work related situations. In the maritime industry, the offshore managers and captains will be an important, but difficult group to include in a traditional management training program, due to their extended time at sea and often at dispersed and isolated locations. In this

case structured web based or computer based training programs could prove an ideal and cost effective way to distribute training opportunities during their off duty hours on board. So far, computer based PsyCap training has showed promising results, and in a controlled study Luthans et al. (2008a) showed that a brief 2-h web-based intervention produced a significant increase in Psy-Cap in the experimental group. These results are promising, and a future step could be to design and field-test a computer based intervention to develop PsyCap and safety orientation specifically targeting the maritime workplace.

Acknowledgement

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III

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ORIGINAL ARTICLE

Does psychological capital moderate the relationship between worries about accidents and sleepiness?

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ABSTRACT

The present study investigated psychological capital (PsyCap) as a protective factor in the relationship between worries about accidents and sleepiness among seafarers. The hypothesis that strong PsyCap weakens the relationship between worries about accidents and sleepiness was tested in a cross-sectional sample of 397 maritime workers. In contrast to expectations, the findings indicated a reverse buffering effect in that PsyCap only had a protective impact on sleepiness when worries about accidents were low. For workers that were highly worried, a strong PsyCap was associated with increased levels of sleepiness. The established associations remained consistent after controlling for workers' years of experience as seafarers, and their ratings of psychological safety climate. An interpretation of this finding is that seafarers with high levels of PsyCap will be attentive when the threat level is serious, but will not be bothered when exposed to everyday strain and hassles associated with their work situation.

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Key words: psychological capital, psychological safety climate, risk perception, sleep quality, maritime

INTRODUCTION

Seafaring is a dangerous occupation due to the combination of several physical and psychosocial exposures and hazards [1, 2]. With regard to physical risk factors, seafarers are expected to perform safety critical tasks despite changing temperatures, various weather conditions, noise, vibrations and movements of the ship. As for psychosocial risks, seafarers work in 24-7 shift work schedules and are separated from family and friends for prolonged periods. Ideally, workers in high-risk occupations, such as seafaring, should be vigilant and well rested. This is not always the case when workers are worried and concerned about safety issues at work. Actually, stress is considered the primary cause of persistent psychophysiological insomnia [3], and both theoretical models and existing empirical evidence suggest that work-related stress and worries disturb sleep [3–6]. For instance, Lichtstein and Rosenthal [7] found that individuals with insomnia were ten times more likely to attribute their sleep disturbances to cognitive factors, including worrying, than to somatic complaints. Further, it has been argued that physiological and psychological responses to work-related exposures are incommensurate with the deactivation that characterizes sleep [3, 8].

However, workers do not necessarily react to exposures and worries to the same degree. Following from Lazarus and Folkman's [9] transactional model of stress and coping, the consequences of environmental stressors are dependent upon how the individual interprets and judges the threat, as well as on the resources the individual has at his or her disposal to deal with the threat. One newly established individual resource for coping with potentially challenging work life situations is psychological capital (PsyCap) [10–12]. PsyCap is a higher order construct that consists of the core elements: *self-efficacy*, *optimism*, *hope* and *resiliency*. Individuals with a high *self-efficacy* will generally have stronger beliefs in their ability to control outcomes and succeed in addressing more difficult challenges than those low in efficacy [13]. *Optimistic* workers will be more likely to build positive outcome expectancies that help them deal with difficult situations [14]. Individuals with a higher level of *hope* will show greater goal-directed energy and be more likely to find alternative ways to accomplish their goals [15]. Finally, people with a higher score on *resiliency* tend

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to adapt better when they experience changes or setbacks [16]. These factors can be measured, developed and maintained for performance improvement in the workplace [11]. Findings show that PsyCap has a direct positive association with safety, explaining about 20% of the variance in safety perceptions among maritime workers [17]. With regard to PsyCap as a protective resource, a study by Schaubroeck and colleagues [18] found that PsyCap plays an important role in differentiating between people who are more or less adaptive to extremely stressful environments. Hence, there are reasons to expect that PsyCap can be a potential moderator of the outcomes of work-related stressors.

Despite the importance of the maritime industry around the globe, there is a lack of studies that have examined how stressful work exposures are related to workers' well-being in seafaring. Adding to the current knowledge base, the present study examined how the occupation specific stressor of worries about accidents and the individual resource attribute of PsyCap, are related to levels of sleepiness (i.e., difficulty in maintaining the wakeful state so that the person falls asleep if not actively kept aroused) among seafarers. Specifically, the aims of the study were to determine 1) whether worries about accidents are associated with increased sleepiness among seafarers, and 2) whether PsyCap is a protective resource that buffers this relationship.

MATERIALS AND METHODS

DESIGN AND PROCEDURE

The data was collected in 2012 from a Norwegian company in the offshore oil and gas industry. Questionnaires were sent to all workers employed in the company at the time of the survey. The total number of employees comprised 926 seafarers from 22 vessels operating in the North Sea and Southeastern Asia. Altogether 402 seafarers replied, giving a response rate of 43.3%. Participation was voluntary and anonymous. The questionnaires were sent from the shipping company, answered by the seafarers when working at the vessels, and returned in sealed envelopes to the principal researcher. The questionnaires were written in Norwegian (for the Norwegian seafarers) and English (for all other seafarers). English is the work language in this shipping company. As all employees were invited to participate in the survey, the sampling is based on a probability mechanism. Respondents with more than 25% missing data on the study variables were excluded from the sample. Remaining missing data were replaced by the use of the Hot Deck imputation procedure [19]. Hot Deck imputation is a method for handling missing data in which each missing value is replaced with an observed response from a respondent with similar characteristic on

pre-determined anchor variables. Age, years of experience at sea, and nationality (dichotomised into Western vs. Eastern country origin) was used as anchor variables in the Hot Deck imputation. The final sample comprised 397 respondents.

SAMPLE

Because there were very few women (< 1.0%) working on board the vessels, gender was not recorded in order to protect the anonymity of these women. The nationalities of the participants were Norwegian (34.9%), other European countries (24.1%), Filipino (36.7%), and other Asian and Australasian countries (4.3%). The age distribution of the seafarers was: under 25 years: 12.2%, 25–29 years: 17.3%, 30–39 years: 32.9%, 40–54 years: 28.1%, over 54 years: 9.5%. In this sample 45.2% worked in deck detail, 26% in machine detail, 17.6% worked in gallery detail and 10.7% were captains (0.5% did not report job title). The mean time the maritime workers had been working for the company was 3.73 years (range: 0–29 years). Their experience as seafarers ranged from 0–55 years, the mean was 14.78 years (SD = 10.95). Altogether 23.3% mainly worked night shifts, 44.1% mainly day shifts, and 32.5% worked another/not specified shift type.

INSTRUMENTS

Sleepiness. Sleepiness was measured with one of the subscales of the Swedish Occupational Fatigue Inventory (SOFI) [20–22]. The dimension describes feelings of sleepiness, and consists of four verbal expressions that describe how workers feel at the end of their work shift: *falling asleep, drowsy, yawning,* and *sleepy*. The participants were asked to answer how tired they usually feel after finishing their watch, and responses were recorded on a seven-point scale with anchors 1 = Not at all and 7 = To a very high degree. Cronbach's alpha for the scale was satisfactory (0.87). A confirmatory factor analysis (CFA) provided acceptable fit for the latent indicator (CMIN = 12.91; df = 1; CFI = 0.99; TLI = 0.91). All factor loadings for the scale exceeded 0.66.

Worries about accidents. Worries about prospective accidents were measured with a questionnaire based on the hazard categories used in official reports from the Norwegian Maritime Directorate [23]. The participants were asked to assess the probability for seven common accidents to happen to them during the next year: "Struck by objects", "Trapped, crushed or squeezed", "Cuts or contact with sharp or pointed elements", "Contact with hazardous substances", "Man over board", "Slips, trips, falls", and "Electrical hazard, fire, explosion". Answers were provided on a seven-point scale ranging from 1 = Very unlikely, through 4 = Neither nor, to 7 = Very likely. Cronbach's alpha for the scale was 0.90. A CFA provided acceptable fit for the latent indicator (CMIN = 77.81; df = 7; CFI = 0.95; TLI = 0.89).

Table 1. Testing the moderator effect of psychological capital on the relationship between worries about accidents (predictor) and sleepiness (outcome) using hierarchical multiple regression (n = 397)

Step and variable	B	SE B	β	R^2	ΔR^2
Step 1				0.167***	
Experience as seafarer [years]	–0.02	0.01	–0.12*		
Poor psychological safety climate	0.29	0.11	0.14**		
Worries about accidents	0.35	0.06	0.31***		
Psychological capital (PsyCap)	–0.10	0.12	–0.04		
Step 2				0.187***	0.02**
Experience as seafarer (years)	–0.02	0.01	–0.13**		
Poor psychological safety climate	0.27	0.11	0.13*		
Worries about accidents	0.34	0.06	0.30***		
PsyCap	–0.14	0.12	–0.06		
Worries X PsyCap	0.29	0.10	0.14**		

Level for significance: *p < 0.05; **p < 0.01; ***p < 0.001

PsyCap. PsyCap was measured with the 12-item Psychological Capital Questionnaire (PCQ-12) [11, 24]. The questionnaire consists of 12 statements about how the respondent is feeling right now about his/her job situation. The PCQ-12 items were extracted from the 24 item version of the PCQ, with 3 items for efficacy, 4 items for hope, 3 items for resiliency, and 2 items for optimism [12]. This shorter version of the PCQ was used to reduce the response burden of the participants. Answers were provided on a 6-point scale ranging from 1 = Strongly disagree, to 6 = Strongly agree. A confirmatory factor analyses of a four-dimension latent model had good fit to data (CMIN = 143.34; df = 48; CFI = 0.96; TLI = 0.94). Factor loadings for all observed indicators exceeded 0.60. All four first order factors provided strong loadings when specified on a second higher order factor representing the overall PsyCap construct (CMIN = 149.68; df = 50; CFI = 0.96; TLI = 0.94). Cronbach's alpha for this composite scale was 0.90.

Psychological safety climate. Psychological safety climate was included as a covariate in analyses and was measured with 16 items from the Safety Climate Questionnaire [25]. The psychological safety climate items cover a range of interaction modes between supervisors and group members that assess the management's priority of safety versus competing goals such as production speed or schedules [25]. The respondents are presented with different statements and rate their level of agreement on a 5-point scale ranging from 1 = Completely disagree, to 5 = Completely agree. Examples of these statements are: "My direct supervisor discusses how to improve safety with us", and "My direct supervisor is strict about working safely when we are tired or stressed". The scale was recoded so that a high score indicates a poor psychological safety climate. The internal consistency for the scale (Cronbach's alpha = 0.95) was excellent. A CFA indicated that the latent variable had good psychometric properties (CMIN = 482.07; df = 103; CFI = 0.92; TLI = 0.91). Factor loadings for all observed indicators were above 0.53.

STATISTICAL ANALYSIS

Statistical analyses were conducted with IBM SPSS 22.0 and SPSS AMOS 23.0. The level of significance was set to p < 0.05. For all measurement inventories, summary scales were calculated on the basis of a mean score of their respective items. Psychometric properties of the measurement models for the scales were determined by means of confirmatory factor analyses in SPSS AMOS. A comparative fit index (CFI) and Tucker-Lewis Index (TLI) with values in the area of 0.90 to 0.95 were employed as indicators of good model fit [26]. To explore the hypotheses about main and moderating effects, we conducted a hierarchical regression analysis, to test for linear associations between worries about accidents and sleepiness, as well as the interactive effects of worries and PsyCap, with regard to sleepiness (Table 1). The recommendations provided by Baron and Kenny [27] were followed, and, in accordance with Aiken and West [28], the predictor variables were centred prior to the two-way interaction analysis. The SPSS macro "Interaction and simple slopes test with two continuous variables" by Jason T. Newsom (http://web .pdx.edu/~newsomj/) was used to generate the regression estimates, plots, and simple slopes analyses.

RESULTS

Descriptives, reliability coefficients, and intercorrelations for all study variables are presented in Table 2. VIF-indexes

Table 2. Means, standard deviations, inter-correlations (Pearson's r) and Cronbach's alphas for study variables (n = 397)

| Variables | Descriptives | | | | | | | | Intercorrelations | | | | |
	No. of items	Response scale	Skewness	Kurtosis	VIF	Tolerance	M	SD	1	2	3	4	5
1 Experience as seafarer [years]	1	0+	0.90	0.26	0.99	1.00	14.78	10.95	–				
2 Worries about accidents	7	1–7	0.85	0.11	0.94	1.09	2.32	1.19	–0.06	0.90			
3 Psychological capital	12	1–6	–1.64	7.27	0.87	1.15	5.06	0.59	0.03	–0.17	0.90		
4 Poor psychological safety climate	16	1–5	0.93	1.95	0.84	1.19	1.95	0.66	–0.01	0.24	–0.36	0.95	
5 Sleepiness	4	1–7	0.87	0.09	–	–	2.48	1.34	–0.14	0.35	–0.14	0.23	0.87

All correlations above 0.10 are significant at p < 0.001. Note: Cronbach's alphas are presented in boldface along the diagonal

(range: 0.84–0.99) and tolerance values (range: 1.00–1.19) provided no indication of multicollinearity between the variables. Mean sleepiness score was 2.48 (SD = 1.34). This is perfectly in line with findings from previous studies that have used the same measurement inventory and response categories [29, 30]. The average score on poor psychological safety climate is also in line with previous research [31]. A mean value of 5.06 indicated that the level of PsyCap was high in the sample, while a standard deviation of 0.59 showed that the variation in PsyCap was low. A series of t-tests showed no differences between respondents from Eastern and Western countries with regard to worries about accidents (t = 1.81; df = 376; p > –0.05), PsyCap (t = –1.65; df = 376; p > –0.05), poor psychological safety climate (t = 1.46; df = 376; p > –0.05), or sleepiness (t = 1.75; df = 376; p > –0.05).

The intercorrelations showed that worries about accidents (r = 35; p < 0.001) and inferior psychological safety climate (r = 0.23; p < 0.001) was positively correlated, whereas PsyCap was negatively correlated (r = –0.14; p < 0.001), with sleepiness. Worries about accidents was positively correlated with perceptions of the psychological safety climate as poor (r = 0.24; p < 0.001) and negatively correlated with PsyCap (r = –0.17; p < 0.001). A negative correlation was established between PsyCap and perceptions of the psychological safety climate as poor (r = –0.36; p < 0.001).

MAIN AND INTERACTION EFFECTS

Findings from the multiple regression analyses of linear associations and interaction effects are presented in Table 1. All analyses were adjusted for years of experience as seafarer and poor psychological safety climate. For the linear association, the predictor and control variables explained 16.7% of the variance in sleepiness ($R^2 = 0.167$; p < 0.001). Worries about accidents ($\beta = 0.31$; p < 0.001), experience as seafarer ($\beta = –0.12$; p < 0.05), and poor psychological safety climate ($\beta = 0.14$; p < 0.01), but not PsyCap ($\beta = –0.10$; p > 0.05) yielded significant contributions to explaining the variance (F = 18.70; df = 4; p < 0.001).

The finding of a negative relationship between worries about accidents and sleepiness supported the first study hypothesis. When adding the interaction term to the regression analysis, the amount of explained variance increased significantly by two percentage points ($R^2 = 0.187$; p < 0.01). As displayed in Table 1, the interaction made a significant contribution to the explained variance ($\beta = 0.14$; $\Delta R^2 = 0.02$; p < 0.01), and the interaction model was significant (F = 17.11; df = 5; p < 0.001).

Thus, the findings show that PsyCap interacts with worries about accidents in explaining sleepiness. The associations between the other predictor variables and
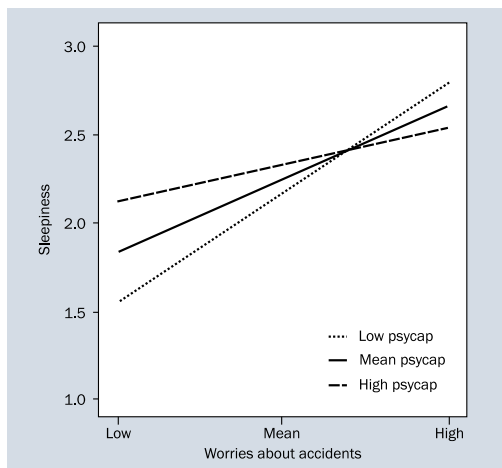
Figure 1. The interaction between worries about accidents and psychological capital (PsyCap) with regard to sleepiness. Low: –1 SD below mean, Mean: at mean, High: +1 SD above mean

sleepiness did not change after adding the interaction term. To examine the form of the interaction, a graphical display was created. Scores were plotted at the mean, low (1 SD below the mean) and high (1 SD above the mean) values on the predictor variables. As shown in Figure 1, the results indicate a stronger relationship between worries about accidents and sleepiness for the mean and high PsyCap groups than for the low PsyCap group. Follow-up analyses of simple slopes revealed that higher levels of worries about accidents were related to significantly elevated sleepiness among seafarers with a mean (β = 0.30; p < 0.01) and high PsyCap (β = 0.46; p < 0.001), but not for seafarers with a low PsyCap (β = 0.15; p > 0.05). Consequently, in direct contrast to our second hypothesis about a protective effect of PsyCap, the results indicate a reverse buffer association where PsyCap only seems to have a protective effect on the relationship between worries about accidents and sleepiness when levels of worries are low. When workers become more worried about accidents, there is a stronger increase in sleepiness among seafarers with high PsyCap compared to seafarers with low PsyCap.

The tests of interaction effects were replicated in a series of additional analyses where each of the four components of PsyCap was specified as a moderator. The finding showed that worries about accidents interacted significantly with self-efficacy (β = 0.27; ΔR^2 = 0.03; p < 0.01) and hope (β = 0.29; ΔR^2 = 0.03; p < 0.01), but not resiliency (β = 0.12; ΔR^2 = 0.01; p > 0.05) or optimism (β = 0.11; ΔR^2 = 0.01; p > 0.05). The form of the significant interactions replicated the main findings of a reverse buffering effect.

DISCUSSION

The aims of this study were to examine the relationship between worries about prospective accidents and sleepiness among seafarers, and to examine PsyCap as a protective factor in this relationship. The present study adds additional empirical support to the assumption that worries about accidents constitutes a significant work-related stressor in that levels of worries were associated with increased sleepiness. However, the findings did not support the theoretical assumption of PsyCap as a protective resource. Contrary to our expectations, we found a reverse buffering effect where PsyCap only moderated the association between worries about accidents and sleepiness when levels of worries were low. When levels of worries were high, sleepiness was most prominent among workers with high PsyCap. All findings were controlled for experience as a seafarer and perceptions of psychological safety climate. With regard to those aspects of PsyCap that had the most important moderating effects, additional analyses showed that the interaction effect was only significant for self-efficacy and hope.

Although this latter finding may be counterintuitive to the common assumption that a robust personality should be protective with regard to the outcomes of work-related exposures, it may actually be that this awareness about risk may be highly beneficial in a maritime setting. That is, as PsyCap seems to enhance levels of sleepiness among high PsyCap workers in cases where they are very concerned about accidents, an interpretation is that workers with high PsyCap are especially sensitive to safety critical stimuli. When faced with substandard safety measures and safety critical operations high PsyCap workers may find themselves in a situation where they will be inclined to work to their limits in order to compensate for shortcomings in fellow crewmembers or equipment. Hence, the findings indicate that workers with high PsyCap do not necessarily see the world through rose-tinted glasses, but stay sensitive and vigilant to work-related risk factors. In short, these results show that workers with high levels of PsyCap will be attentive (as reflected through worrying) when the threat level is serious, but they will not be worrisome when exposed to the normal range of everyday strain and hassles associated with their work situation.

The above interpretation of our findings suggests that PsyCap is an individual asset that should be valued and even trained in the maritime industry. PsyCap has been highlighted as a malleable personality characteristic that is open to development and change [32], and organizations may therefore benefit from interventions that increase PsyCap among employees. As Schaubroeck and colleagues [18] have suggested, strategies can be developed to better shape the PsyCap dispositions among employees to facil-

itate their coping with stress exposures. In maritime organizations timely and specific feedback on job performance may increase efficacy and self-confidence, while future goals and safety targets may increase hope and the ability to focus on safety at work. Furthermore, encouragement to keep up the performance despite setbacks may build resiliency and a realistic optimism about future accomplishments. After experiencing a risky situation on board a realistic optimist will analyse the situation and try to understand if the causes were personal or situational, permanent or temporary, and then make accurate causal attributions that fits this situation [12].

Despite the many favourable aspects of PsyCap in high risk situations, our findings also indicate that there may be thresholds with regard to how beneficial PsyCap will be in hazardous situations. That is, as extensive worrying over time seems to increase sleepiness, and there may be situations where heightened and prolonged sleepiness becomes unhealthy for the worker. It is therefore important to emphasize that the personal resources of PsyCap in themselves may not protect workers from sleep problems if there is substantial shortcomings in safety on board. In these cases, other organisational factors such as leadership practices in communicating risk and prioritizing safety are also important along with proper maintenance and training in emergency procedures and adherence to safety routines.

METHODOLOGICAL IMPLICATIONS

A notable strength of this study is that it is based on a relatively large and randomly drawn sample, applying internationally recognized instruments with satisfactory psychometric properties, which strengthen the validity of the findings. Nonetheless, some caution is needed when interpreting the results from the study. Firstly, the data is based on self-reports, with common-method variance as a possible problem [33]. Secondly, the data was cross-sectional, which implies that one cannot draw conclusions about causal relationships. That is, while this study focuses on the potential impact of worries on sleep, one cannot rule out the fact that there also is a reciprocal relationship between safety-related worries and sleep problems where poor sleep leads to more worries [34]. Longitudinal studies should be conducted to attain more knowledge about the causality of the relationships between worries about accidents, sleepiness, and PsyCap. Response bias could also be an issue because of factors like cross-cultural differences. The sample is from one company, but the seafarers are from many different national cultures, which may influence their individual interpretation of the questions.

It should be noted that PsyCap may be influenced by specific coping styles such as problem focused or appraisal coping, or other personality characteristics, such as neu-

roticism, agreeableness, extraversion, conscientiousness, and openness. Hence, a limitation of the current study is that we did not examine and adjust for other personality characteristics and coping strategies. Furthermore, as the study was limited to worries about accidents we have not been able to adjust for the impact of other important work characteristics, such as job demands, leadership, and role expectations, that may influence sleepiness [6].

CONCLUSIONS AND PRACTICAL IMPLICATIONS

Extending previous research on PsyCap in safety critical organizations [17, 35, 36], our findings show that PsyCap serves as a buffer against worries about accidents in situations where levels of perceived risks are low, but not in cases where levels of perceived risks is high. On the one hand, this suggests that upcoming research could look into other factors that may act as stress buffers in high risk situations. One such factor could be safety specific leadership, as it is important to have a good operational leader in a high risk situation [37]. On the other hand, the fact that workers with PsyCap seem to react to worries about risks and accidents is a beneficial trait as this indicates that they are sensitive and vigilant with regard to risky situations at work. Hence, selecting, recruiting and training employees with high levels of PsyCap, and especially self-efficacy and hope, may be favourable with regard to preventing accidents in the maritime industry.

It should be noted that our study represents a single contribution to the knowledge about PsyCap in the maritime industry; hence, the findings should be replicated in upcoming research. Future studies could examine worries about accidents, PsyCap and sleepiness in other maritime settings as well as in other safety critical organizations such as healthcare, the police, or the emergency services.

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	Øverland, Simon Nygaard, PhD	Mental health and impairment in disability benefits. Studies applying linkages between health surveys and administrative registries.
	Eichele, Tom, PhD	Electrophysiological and Hemodynamic Correlates of Expectancy in Target Processing
	Børhaug, Kjetil, Dr.philos.	Oppseding til demokrati. Ein studie av politisk oppseding i norsk skule.
	Eikeland, Thorleif, Dr.philos.	Om å vokse opp på barnehjem og på sykehus. En undersøkelse av barnehjemsbarns opplevelser på barnehjem sammenholdt med sanatoriebarns beskrivelse av langvarige sykehusopphold – og et forsøk på forklaring.
	Wadel, Carl Cato, Dr.philos.	Medarbeidersamhandling og medarbeiderledelse i en lagbasert organisasjon
	Vinje, Hege Forbech, PhD	Thriving despite adversity: Job engagement and self-care among community nurses
	Noort, Maurits van den, PhD	Working memory capacity and foreign language acquisition
2008 V	Breivik, Kyrre, Dr.psychol.	The Adjustment of Children and Adolescents in Different Post-Divorce Family Structures. A Norwegian Study of Risks and Mechanisms.
	Johnsen, Grethe E., PhD	Memory impairment in patients with posttraumatic stress disorder
	Sætrevik, Bjørn, PhD	Cognitive Control in Auditory Processing
	Carvalhosa, Susana Fonseca, PhD	Prevention of bullying in schools: an ecological model
2008 H	Brønnick, Kolbjørn Selvåg	Attentional dysfunction in dementia associated with Parkinson's disease.
	Posserud, Maj-Britt Rocio	Epidemiology of autism spectrum disorders
	Haug, Ellen	Multilevel correlates of physical activity in the school setting
	Skjerve, Arvid	Assessing mild dementia – a study of brief cognitive tests.

	Kjønniksen, Lise	The association between adolescent experiences in physical activity and leisure time physical activity in adulthood: a ten year longitudinal study
	Gundersen, Hilde	The effects of alcohol and expectancy on brain function
	Omvik, Siri	Insomnia – a night and day problem
2009 V	Molde, Helge	Pathological gambling: prevalence, mechanisms and treatment outcome.
	Foss, Else	Den omsorgsfulle væremåte. En studie av voksnes væremåte i forhold til barn i barnehagen.
	Westrheim, Kariane	Education in a Political Context: A study of Konwledge Processes and Learning Sites in the PKK.
	Wehling, Eike	Cognitive and olfactory changes in aging
	Wangberg, Silje C.	Internet based interventions to support health behaviours: The role of self-efficacy.
	Nielsen, Morten B.	Methodological issues in research on workplace bullying. Operationalisations, measurements and samples.
	Sandu, Anca Larisa	MRI measures of brain volume and cortical complexity in clinical groups and during development.
	Guribye, Eugene	Refugees and mental health interventions
	Sørensen, Lin	Emotional problems in inattentive children – effects on cognitive control functions.
	Tjomsland, Hege E.	Health promotion with teachers. Evaluation of the Norwegian Network of Health Promoting Schools: Quantitative and qualitative analyses of predisposing, reinforcing and enabling conditions related to teacher participation and program sustainability.
	Helleve, Ingrid	Productive interactions in ICT supported communities of learners
2009 H	Skorpen, Aina Øye, Christine	Dagliglivet i en psykiatrisk institusjon: En analyse av miljøterapeutiske praksiser
	Andreassen, Cecilie Schou	WORKAHOLISM – Antecedents and Outcomes
	Stang, Ingun	Being in the same boat: An empowerment intervention in breast cancer self-help groups
	Sequeira, Sarah Dorothee Dos Santos	The effects of background noise on asymmetrical speech perception
	Kleiven, Jo, dr.philos.	The Lillehammer scales: Measuring common motives for vacation and leisure behavior
	Jónsdóttir, Guðrún	Dubito ergo sum? Ni jenter møter naturfaglig kunnskap.
	Hove, Oddbjørn	Mental health disorders in adults with intellectual disabilities - Methods of assessment and prevalence of mental health disorders and problem behaviour
	Wageningen, Heidi Karin van	The role of glutamate on brain function

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		Bjørkvik, Jofrid	God nok? Selvaktelse og interpersonlig fungering hos pasienter innen psykisk helsevern: Forholdet til diagnoser, symptomer og behandlingsutbytte
		Andersson, Martin	A study of attention control in children and elderly using a forced-attention dichotic listening paradigm
		Almås, Aslaug Grov	Teachers in the Digital Network Society: Visions and Realities. A study of teachers' experiences with the use of ICT in teaching and learning.
		Ulvik, Marit	Lærerutdanning som danning? Tre stemmer i diskusjonen
2010 V		Skår, Randi	Læringsprosesser i sykepleieres profesjonsutøvelse. En studie av sykepleieres læringserfaringer.
		Roald, Knut	Kvalitetsvurdering som organisasjonslæring mellom skole og skoleeigar
		Lunde, Linn-Heidi	Chronic pain in older adults. Consequences, assessment and treatment.
		Danielsen, Anne Grete	Perceived psychosocial support, students' self-reported academic initiative and perceived life satisfaction
		Hysing, Mari	Mental health in children with chronic illness
		Olsen, Olav Kjellevold	Are good leaders moral leaders? The relationship between effective military operational leadership and morals
		Riese, Hanne	Friendship and learning. Entrepreneurship education through mini-enterprises.
		Holthe, Asle	Evaluating the implementation of the Norwegian guidelines for healthy school meals: A case study involving three secondary schools
	H	Hauge, Lars Johan	Environmental antecedents of workplace bullying: A multi-design approach
		Bjørkelo, Brita	Whistleblowing at work: Antecedents and consequences
		Reme, Silje Endresen	Common Complaints – Common Cure? Psychiatric comorbidity and predictors of treatment outcome in low back pain and irritable bowel syndrome
		Helland, Wenche Andersen	Communication difficulties in children identified with psychiatric problems
		Beneventi, Harald	Neuronal correlates of working memory in dyslexia
		Thygesen, Elin	Subjective health and coping in care-dependent old persons living at home
		Aanes, Mette Marthinussen	Poor social relationships as a threat to belongingness needs. Interpersonal stress and subjective health complaints: Mediating and moderating factors.
		Anker, Morten Gustav	Client directed outcome informed couple therapy

	Bull, Torill	Combining employment and child care: The subjective well-being of single women in Scandinavia and in Southern Europe
	Viig, Nina Grieg	Tilrettelegging for læreres deltakelse i helsefremmende arbeid. En kvalitativ og kvantitativ analyse av sammenhengen mellom organisatoriske forhold og læreres deltakelse i utvikling og implementering av Europeisk Nettverk av Helsefremmende Skoler i Norge
	Wolff, Katharina	To know or not to know? Attitudes towards receiving genetic information among patients and the general public.
	Ogden, Terje, dr.philos.	Familiebasert behandling av alvorlige atferdsproblemer blant barn og ungdom. Evaluering og implementering av evidensbaserte behandlingsprogrammer i Norge.
	Solberg, Mona Elin	Self-reported bullying and victimisation at school: Prevalence, overlap and psychosocial adjustment.
2011 V	Bye, Hege Høivik	Self-presentation in job interviews. Individual and cultural differences in applicant self-presentation during job interviews and hiring managers' evaluation
	Notelaers, Guy	Workplace bullying. A risk control perspective.
	Moltu, Christian	Being a therapist in difficult therapeutic impasses. A hermeneutic phenomenological analysis of skilled psychotherapists' experiences, needs, and strategies in difficult therapies ending well.
	Myrseth, Helga	Pathological Gambling - Treatment and Personality Factors
	Schanche, Elisabeth	From self-criticism to self-compassion. An empirical investigation of hypothesized change prosesses in the Affect Phobia Treatment Model of short-term dynamic psychotherapy for patients with Cluster C personality disorders.
	Våpenstad, Eystein Victor, dr.philos.	Det tempererte nærvær. En teoretisk undersøkelse av psykoterapautens subjektivitet i psykoanalyse og psykoanalytisk psykoterapi.
	Haukebø, Kristin	Cognitive, behavioral and neural correlates of dental and intra-oral injection phobia. Results from one treatment and one fMRI study of randomized, controlled design.
	Harris, Anette	Adaptation and health in extreme and isolated environments. From 78°N to 75°S.
	Bjørknes, Ragnhild	Parent Management Training-Oregon Model: intervention effects on maternal practice and child behavior in ethnic minority families
	Mamen, Asgeir	Aspects of using physical training in patients with substance dependence and additional mental distress
	Espevik, Roar	Expert teams: Do shared mental models of team members make a difference
	Haara, Frode Olav	Unveiling teachers' reasons for choosing practical activities in mathematics teaching

2011 H	Hauge, Hans Abraham	How can employee empowerment be made conducive to both employee health and organisation performance? An empirical investigation of a tailor-made approach to organisation learning in a municipal public service organisation.
	Melkevik, Ole Rogstad	Screen-based sedentary behaviours: pastimes for the poor, inactive and overweight? A cross-national survey of children and adolescents in 39 countries.
	Vøllestad, Jon	Mindfulness-based treatment for anxiety disorders. A quantitative review of the evidence, results from a randomized controlled trial, and a qualitative exploration of patient experiences.
	Tolo, Astrid	Hvordan blir lærerkompetanse konstruert? En kvalitativ studie av PPU-studenters kunnskapsutvikling.
	Saus, Evelyn-Rose	Training effectiveness: Situation awareness training in simulators
	Nordgreen, Tine	Internet-based self-help for social anxiety disorder and panic disorder. Factors associated with effect and use of self-help.
	Munkvold, Linda Helen	Oppositional Defiant Disorder: Informant discrepancies, gender differences, co-occuring mental health problems and neurocognitive function.
	Christiansen, Øivin	Når barn plasseres utenfor hjemmet: beslutninger, forløp og relasjoner. Under barnevernets (ved)tak.
	Brunborg, Geir Scott	Conditionability and Reinforcement Sensitivity in Gambling Behaviour
	Hystad, Sigurd William	Measuring Psychological Resiliency: Validation of an Adapted Norwegian Hardiness Scale
2012 V	Roness, Dag	Hvorfor bli lærer? Motivasjon for utdanning og utøving.
	Fjermestad, Krister Westlye	The therapeutic alliance in cognitive behavioural therapy for youth anxiety disorders
	Jenssen, Eirik Sørnes	Tilpasset opplæring i norsk skole: politikeres, skolelederes og læreres handlingsvalg
	Saksvik-Lehouillier, Ingvild	Shift work tolerance and adaptation to shift work among offshore workers and nurses
	Johansen, Venke Frederike	Når det intime blir offentlig. Om kvinners åpenhet om brystkreft og om markedsføring av brystkreftsaken.
	Herheim, Rune	Pupils collaborating in pairs at a computer in mathematics learning: investigating verbal communication patterns and qualities
	Vie, Tina Løkke	Cognitive appraisal, emotions and subjective health complaints among victims of workplace bullying: A stress-theoretical approach
	Jones, Lise Øen	Effects of reading skills, spelling skills and accompanying efficacy beliefs on participation in education. A study in Norwegian prisons.

2012 H	Danielsen, Yngvild Sørebø	Childhood obesity – characteristics and treatment. Psychological perspectives.
	Horverak, Jøri Gytre	Sense or sensibility in hiring processes. Interviewee and interviewer characteristics as antecedents of immigrant applicants' employment probabilities. An experimental approach.
	Jøsendal, Ola	Development and evaluation of BE smokeFREE, a school-based smoking prevention program
	Osnes, Berge	Temporal and Posterior Frontal Involvement in Auditory Speech Perception
	Drageset, Sigrunn	Psychological distress, coping and social support in the diagnostic and preoperative phase of breast cancer
	Aasland, Merethe Schanke	Destructive leadership: Conceptualization, measurement, prevalence and outcomes
	Bakibinga, Pauline	The experience of job engagement and self-care among Ugandan nurses and midwives
	Skogen, Jens Christoffer	Foetal and early origins of old age health. Linkage between birth records and the old age cohort of the Hordaland Health Study (HUSK)
	Leversen, Ingrid	Adolescents' leisure activity participation and their life satisfaction: The role of demographic characteristics and psychological processes
	Hanss, Daniel	Explaining sustainable consumption: Findings from cross-sectional and intervention approaches
	Rød, Per Arne	Barn i klem mellom foreldrekonflikter og samfunnsmessig beskyttelse
2013 V	Mentzoni, Rune Aune	Structural Characteristics in Gambling
	Knudsen, Ann Kristin	Long-term sickness absence and disability pension award as consequences of common mental disorders. Epidemiological studies using a population-based health survey and official ill health benefit registries.
	Strand, Mari	Emotional information processing in recurrent MDD
	Veseth, Marius	Recovery in bipolar disorder. A reflexive-collaborative exploration of the lived experiences of healing and growth when battling a severe mental illness
	Mæland, Silje	Sick leave for patients with severe subjective health complaints. Challenges in general practice.
	Mjaaland, Thera	At the frontiers of change? Women and girls' pursuit of education in north-western Tigray, Ethiopia
	Odéen, Magnus	Coping at work. The role of knowledge and coping expectancies in health and sick leave.
	Hynninen, Kia Minna Johanna	Anxiety, depression and sleep disturbance in chronic obstructive pulmonary disease (COPD). Associations, prevalence and effect of psychological treatment.

	Flo, Elisabeth	Sleep and health in shift working nurses
	Aasen, Elin Margrethe	From paternalism to patient participation? The older patients undergoing hemodialysis, their next of kin and the nurses: a discursive perspective on perception of patient participation in dialysis units
	Ekornås, Belinda	Emotional and Behavioural Problems in Children: Self-perception, peer relationships, and motor abilities
	Corbin, J. Hope	North-South Partnerships for Health: Key Factors for Partnership Success from the Perspective of the KIWAKKUKI
	Birkeland, Marianne Skogbrott	Development of global self-esteem: The transition from adolescence to adulthood
2013 H	Gianella-Malca, Camila	Challenges in Implementing the Colombian Constitutional Court's Health-Care System Ruling of 2008
	Hovland, Anders	Panic disorder – Treatment outcomes and psychophysiological concomitants
	Mortensen, Øystein	The transition to parenthood – Couple relationships put to the test
	Årdal, Guro	Major Depressive Disorder – a Ten Year Follow-up Study. Inhibition, Information Processing and Health Related Quality of Life
	Johansen, Rino Bandlitz	The impact of military identity on performance in the Norwegian armed forces
	Bøe, Tormod	Socioeconomic Status and Mental Health in Children and Adolescents
2014 V	Nordmo, Ivar	Gjennom nåløyet – studenters læringserfaringer i psykologutdanningen
	Dovran, Anders	Childhood Trauma and Mental Health Problems in Adult Life
	Hegelstad, Wenche ten Velden	Early Detection and Intervention in Psychosis: A Long-Term Perspective
	Urheim, Ragnar	Forståelse av pasientaggresjon og forklaringer på nedgang i voldsrate ved Regional sikkerhetsavdeling, Sandviken sykehus
	Kinn, Liv Grethe	Round-Trips to Work. Qualitative studies of how persons with severe mental illness experience work integration.
	Rød, Anne Marie Kinn	Consequences of social defeat stress for behaviour and sleep. Short-term and long-term assessments in rats.
	Nygård, Merethe	Schizophrenia – Cognitive Function, Brain Abnormalities, and Cannabis Use
	Tjora, Tore	Smoking from adolescence through adulthood: the role of family, friends, depression and socioeconomic status. Predictors of smoking from age 13 to 30 in the "The Norwegian Longitudinal Health Behaviour Study" (NLHB)
	Vangsnes, Vigdis	The Dramaturgy and Didactics of Computer Gaming. A Study of a Medium in the Educational Context of Kindergartens.

	Nordahl, Kristin Berg	Early Father-Child Interaction in a Father-Friendly Context: Gender Differences, Child Outcomes, and Protective Factors related to Fathers' Parenting Behaviors with One-year-olds
2014 H	Sandvik, Asle Makoto	Psychopathy – the heterogenety of the construct
	Skotheim, Siv	Maternal emotional distress and early mother-infant interaction: Psychological, social and nutritional contributions
	Halleland, Helene Barone	Executive Functioning in adult Attention Deficit Hyperactivity Disorder (ADHD). From basic mechanisms to functional outcome.
	Halvorsen, Kirsti Vindal	Partnerskap i lærerutdanning, sett fra et økologisk perspektiv
	Solbue, Vibeke	Dialogen som visker ut kategorier. En studie av hvilke erfaringer innvandrerungdommer og norskfødte med innvandrerforeldre har med videregående skole. Hva forteller ungdommenes erfaringer om videregående skoles håndtering av etniske ulikheter?
	Kvalevaag, Anne Lise	Fathers' mental health and child development. The predictive value of fathers' psychological distress during pregnancy for the social, emotional and behavioural development of their children
	Sandal, Ann Karin	Ungdom og utdanningsval. Om elevar sine opplevingar av val og overgangsprosessar.
	Haug, Thomas	Predictors and moderators of treatment outcome from high- and low-intensity cognitive behavioral therapy for anxiety disorders. Association between patient and process factors, and the outcome from guided self-help, stepped care, and face-to-face cognitive behavioral therapy.
	Sjølie, Hege	Experiences of Members of a Crisis Resolution Home Treatment Team. Personal history, professional role and emotional support in a CRHT team.
	Falkenberg, Liv Eggset	Neuronal underpinnings of healthy and dysfunctional cognitive control
	Mrdalj, Jelena	The early life condition. Importance for sleep, circadian rhythmicity, behaviour and response to later life challenges
	Hesjedal, Elisabeth	Tverrprofesjonelt samarbeid mellom skule og barnevern: Kva kan støtte utsette barn og unge?
2015 V	Hauken, May Aasebø	*«The cancer treatment was only half the work!»* A Mixed-Method Study of Rehabilitation among Young Adult Cancer Survivors
	Ryland, Hilde Katrin	Social functioning and mental health in children: the influence of chronic illness and intellectual function
	Rønsen, Anne Kristin	Vurdering som profesjonskompetanse. Refleksjonsbasert utvikling av læreres kompetanse i formativ vurdering

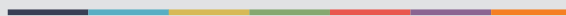|		
	Hoff, Helge Andreas	Thinking about Symptoms of Psychopathy in Norway: Content Validation of the Comprehensive Assessment of Psychopathic Personality (CAPP) Model in a Norwegian Setting
	Schmid, Marit Therese	Executive Functioning in recurrent- and first episode Major Depressive Disorder. Longitudinal studies
	Sand, Liv	Body Image Distortion and Eating Disturbances in Children and Adolescents
	Matanda, Dennis Juma	Child physical growth and care practices in Kenya: Evidence from Demographic and Health Surveys
	Amugsi, Dickson Abanimi	Child care practices, resources for care, and nutritional outcomes in Ghana: Findings from Demographic and Health Surveys
	Jakobsen, Hilde	The good beating: Social norms supporting men's partner violence in Tanzania
	Sagoe, Dominic	Nonmedical anabolic-androgenic steroid use: Prevalence, attitudes, and social perception
	Eide, Helene Marie Kjærgård	Narrating the relationship between leadership and learning outcomes. A study of public narratives in the Norwegian educational sector.
2015 H	Wubs, Annegreet Gera	Intimate partner violence among adolescents in South Africa and Tanzania
	Hjelmervik, Helene Susanne	Sex and sex-hormonal effects on brain organization of fronto-parietal networks
	Dahl, Berit Misund	The meaning of professional identity in public health nursing
	Røykenes, Kari	Testangst hos sykepleierstudenter: «Alternativ behandling»
	Bless, Josef Johann	The smartphone as a research tool in psychology. Assessment of language lateralization and training of auditory attention.
	Løvvik, Camilla Margrethe Sigvaldsen	Common mental disorders and work participation – the role of return-to-work expectations
	Lehmann, Stine	Mental Disorders in Foster Children: A Study of Prevalence, Comorbidity, and Risk Factors
	Knapstad, Marit	Psychological factors in long-term sickness absence: the role of shame and social support. Epidemiological studies based on the Health Assets Project.
2016 V	Kvestad, Ingrid	Biological risks and neurodevelopment in young North Indian children
	Sælør, Knut Tore	Hinderløyper, halmstrå og hengende snører. En kvalitativ studie av håp innenfor psykisk helse- og rusfeltet.
	Mellingen, Sonja	Alkoholbruk, partilfredshet og samlivsstatus. Før, inn i, og etter svangerskapet – korrelater eller konsekvenser?
	Thun, Eirunn	Shift work: negative consequences and protective factors

	Hilt, Line Torbjørnsen	The borderlands of educational inclusion. Analyses of inclusion and exclusion processes for minority language students
	Havnen, Audun	Treatment of obsessive-compulsive disorder and the importance of assessing clinical effectiveness
	Slåtten, Hilde	Gay-related name-calling among young adolescents. Exploring the importance of the context.
	Ree, Eline	Staying at work. The role of expectancies and beliefs in health and workplace interventions.
	Morken, Frøydis	Reading and writing processing in dyslexia
2016 H	Løvoll, Helga Synnevåg	Inside the outdoor experience. On the distinction between pleasant and interesting feelings and their implication in the motivational process.
	Hjeltnes, Aslak	Facing social fears: An investigation of mindfulness-based stress reduction for young adults with social anxiety disorder
	Øyeflaten, Irene Larsen	Long-term sick leave and work rehabilitation. Prognostic factors for return to work.
	Henriksen, Roger Ekeberg	Social relationships, stress and infection risk in mother and child
	Johnsen, Iren	«Only a friend» - The bereavement process of young adults who have lost a friend to a traumatic death. A mixed methods study.
	Helle, Siri	Cannabis use in non-affective psychoses: Relationship to age at onset, cognitive functioning and social cognition
	Glambek, Mats	Workplace bullying and expulsion in working life. A representative study addressing prospective associations and explanatory conditions.
	Oanes, Camilla Jensen	Tilbakemelding i terapi. På hvilke måter opplever terapeuter at tilbakemeldingsprosedyrer kan virke inn på terapeutiske praksiser?
	Reknes, Iselin	Exposure to workplace bullying among nurses: Health outcomes and individual coping
	Chimhutu, Victor	Results-Based Financing (RBF) in the health sector of a low-income country. From agenda setting to implementation: The case of Tanzania
	Ness, Ingunn Johanne	The Room of Opportunity. Understanding how knowledge and ideas are constructed in multidisciplinary groups working with developing innovative ideas.
	Hollekim, Ragnhild	Contemporary discourses on children and parenting in Norway. An empirical study based on two cases.
	Doran, Rouven	Eco-friendly travelling: The relevance of perceived norms and social comparison
2017 V	Katisi, Masego	The power of context in health partnerships: Exploring synergy and antagony between external and internal ideologies in implementing Safe Male Circumcision (SMC) for HIV prevention in Botswana

	Jamaludin, Nor Lelawati Binti	The "why" and "how" of International Students' Ambassadorship Roles in International Education
	Berthelsen, Mona	Effects of shift work and psychological and social work factors on mental distress. Studies of onshore/offshore workers and nurses in Norway.
	Krane, Vibeke	Lærer-elev-relasjoner, elevers psykiske helse og frafall i videregående skole – en eksplorerende studie om samarbeid og den store betydningen av de små ting
	Søvik, Margaret Ljosnes	Evaluating the implementation of the Empowering Coaching™ program in Norway
	Tonheim, Milfrid	A troublesome transition: Social reintegration of girl soldiers returning 'home'
	Senneseth, Mette	Improving social network support for partners facing spousal cancer while caring for minors. A randomized controlled trial.
	Urke, Helga Bjørnøy	Child health and child care of very young children in Bolivia, Colombia and Peru.
	Bakhturidze, George	Public Participation in Tobacco Control Policy-making in Georgia
	Fismen, Anne-Siri	Adolescent eating habits. Trends and socio-economic status.
2017 H	Hagatun, Susanne	Internet-based cognitive-behavioural therapy for insomnia. A randomised controlled trial in Norway.
	Eichele, Heike	Electrophysiological Correlates of Performance Monitoring in Children with Tourette Syndrome. A developmental perspective.
	Risan, Ulf Patrick	Accommodating trauma in police interviews. An exploration of rapport in investigative interviews of traumatized victims.
	Sandhåland, Hilde	Safety on board offshore vessels: A study of shipboard factors and situation awareness
	Blågestad, Tone Fidje	Less pain – better sleep and mood? Interrelatedness of pain, sleep and mood in total hip arthroplasty patients
	Kronstad, Morten	Frå skulebenk til deadlines. Korleis nettjournalistar og journaliststudentar lærer, og korleis dei utviklar journalistfagleg kunnskap
	Vedaa, Øystein	Shift work: The importance of sufficient time for rest between shifts.
	Steine, Iris Mulders	Predictors of symptoms outcomes among adult survivors of sexual abuse: The role of abuse characteristics, cumulative childhood maltreatment, genetic variants, and perceived social support.
	Høgheim, Sigve	Making math interesting: An experimental study of interventions to encourage interest in mathematics

2018 V	Brevik, Erlend Joramo	Adult Attention Deficit Hyperactivity Disorder. Beyond the Core Symptoms of the Diagnostic and Statistical Manual of Mental Disorders.
	Erevik, Eilin Kristine	User-generated alcohol-related content on social media: Determinants and relation to offline alcohol use
	Hagen, Egon	Cognitive and psychological functioning in patients with substance use disorder; from initial assessment to one-year recovery
	Adólfsdóttir, Steinunn	Subcomponents of executive functions: Effects of age and brain maturations
	Brattabø, Ingrid Vaksdal	Detection of child maltreatment, the role of dental health personnel – A national cross-sectional study among public dental health personnel in Norway
	Fylkesnes, Marte Knag	Frykt, forhandlinger og deltakelse. Ungdommer og foreldre med etnisk minoritetsbakgrunn i møte med den norske barnevernstjenesten.
	Stiegler, Jan Reidar	Processing emotions in emotion-focused therapy. Exploring the impact of the two-chair dialogue intervention.
	Egelandsdal, Kjetil	Clickers and Formative Feedback at University Lectures. Exploring students and teachers' reception and use of feedback from clicker interventions.
	Torjussen, Lars Petter Storm	Foreningen av visdom og veltalenhet – utkast til en universitetsdidaktikk gjennom en kritikk og videreføring av Skjervheims pedagogiske filosofi på bakgrunn av Arendt og Foucault. *Eller hvorfor menneskelivet er mer som å spille fløyte enn å bygge et hus.*
	Selvik, Sabreen	A childhood at refuges. Children with multiple relocations at refuges for abused women.
2018 H	Leino, Tony Mathias	Structural game characteristics, game features, financial outcomes and gambling behaviour
	Raknes, Solfrid	Anxious Adolescents: Prevalence, Correlates, and Preventive Cogntive Behavioural Interventions
	Morken, Katharina Teresa Enehaug	Mentalization-based treatment of female patients with severe personality disorder and substance use disorder
	Braatveit, Kirsten Johanne	Intellectual disability among in-patients with substance use disorders

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