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.

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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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 α = .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.
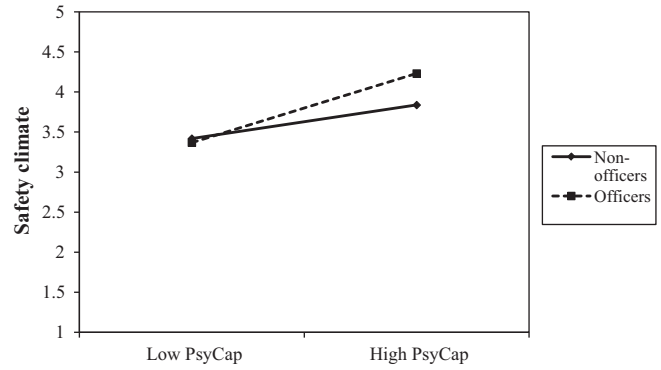

Fig. 1. The interaction between PsyCap and work role with regard to safety climate.
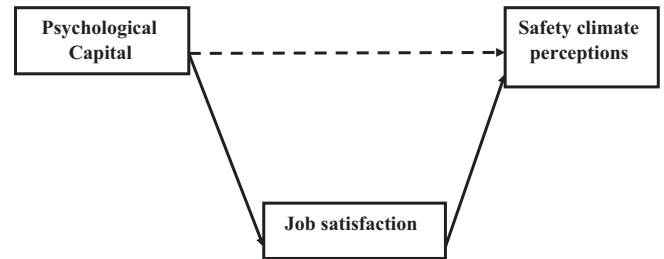

Fig. 2. Conceptual model of the investigated relationship between psychological capital, job satisfaction, and safety perceptions.

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 PsyCap 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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