Perceived Intensity of Extreme Events and Employees' Safety Performance: An Affective Events Perspective

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Perceived Intensity of Extreme Events and Employees' Safety Performance: An Affective Events Perspective

Occupational accidents, injuries, and illnesses remain critical challenges for organizations, particularly in extreme contexts where unusual or atypical events occur. While organizational responses to extreme events have been widely studied, there is less research on how individuals appraise and respond to such events. This leaves us with insufficient evidence on the micro-foundations of extreme events, including differences in how individuals perceive the intensity or severity of such events, as well as the implications for safety performance. Drawing on affective events theory, we conducted two quasi-experiments to understand how three distinct levels of exposure to extreme events affect safety performance. In Study 1, data from 292 Iranian male firefighters reveal a significant reduction in safety performance among employees experiencing high, rather than medium and low, exposure to extreme events. This reduction is mediated by heightened negative emotions and lower work engagement. Study 2 replicates these findings with data from 315 Iranian male seafarers and further examines the moderating role of self-emotion appraisal. We find that individuals with strong self-emotion appraisal experience reduced negative emotions confronted with high exposure to extreme events. We discuss the theoretical and practical implications of our findings.

Keywords: extreme contexts, safety performance, emotions, work engagement, emotional appraisal

Occupational accidents, injuries, and illnesses remain a major issue for organizations. According to the latest data from the United States Bureau of Labor Statistics (BLS, 2023a, 2023b), there were 5,486 fatal work injuries in 2022 and 2.8 million nonfatal workplace injuries and illnesses in the United States alone. The total cost of work injuries in 2021, including productivity losses, medical expenses, and administrative costs, reached $167.0 billion (National Safety Council, 2023). This issue is especially severe in extreme contexts, where challenging conditions and unpredictable events elevate the risks of occupational injuries (de Rond & Lok, 2016; Fisher & Hutchings, 2013; Hällgren et al., 2018). For instance, mortality from accidents in British merchant shipping from 2003 to 2012 was 21 times higher than in the general British workforce (Roberts et al., 2014), highlighting the heightened risks in such environments. Additionally, research on safety performance—a crucial element in accident prevention—indicates that it significantly reduces occupational risks and injuries (Christian et al., 2009; Clarke, 2006, 2010). Thus, we argue that understanding the factors that influence employee safety performance in extreme contexts is crucial for enhancing occupational health and safety (Neal & Griffin, 2006).

Extreme work contexts are work settings or situations in which "one or more extreme events are occurring or are likely to occur that may exceed the organization's capacity to prevent and result in an extensive and intolerable magnitude of physical, psychological, or material consequences to organization members" (Hannah et al., 2009, p. 898). Firefighters, for example, often face life-or-death situations that pose significant threats to their well-being. They encounter physical risks such as burns, smoke inhalation, and injuries from heavy lifting; emotional risks and trauma from witnessing fatalities and the pressure to save lives; and psychological risks such as post-traumatic stress disorder, anxiety, and depression (Aisbett et al., 2012; Haslam & Mallon, 2003). Similarly, seafarers encounter perils of the sea such as extreme weather conditions and piracy, which also threaten their well-being. These

dangers expose them to physical risks such as injury, death, and physical exhaustion; emotional risks such as heightened feelings of fear and helplessness; and psychological risks including stress, suicide, and alcohol or drug dependence (Çakır, 2019; McVeigh et al., 2019; Nayyeri et al., 2024). With the right tools and mindset, organizations can develop more adaptative strategies for managing extreme events and reducing safety-related costs (Bundy et al., 2017; Kelloway et al., 2006; Neal & Griffin, 2006; Williams et al., 2017).

While the research landscape on extreme work contexts is expanding (Bacharach & Bamberger, 2007; de Rond & Lok, 2016; Eberly et al., 2017; Madsen, 2013; Weber et al., 2023), the literature has primarily focused on organizational responses (Hällgren et al., 2018), often overlooking individuals' perceptions, interpretations, and subsequent emotional, attitudinal, and behavioral responses (Bakker & Demerouti, 2007). The organizational focus has undoubtedly enhanced our understanding of policy interventions to mitigate safety-related risks in extreme work environments (Bothner et al., 2007; Shepherd & Williams, 2014). However, it typically assumes that extreme events have a uniform impact on the occupational health and well-being of workers. Hannah et al. (2009) challenge this assumption, arguing that factors such as the timing, duration, and frequency of extreme events, along with the complexity of work environments, shape individuals' perceptions and subsequent reactions. For instance, an extreme event occurring too rapidly might constrain an individual's decision-making ability and response time, while frequent and prolonged exposure to such events might impair their preparedness and ability to adapt effectively. Given that extreme work settings (such as firefighting and shipping) involve varying degrees of these factors, studying employees appraisals of events intensity and its impact on behavior becomes crucial (Hällgren et al., 2018; Leuridan & Demil, 2022).

Hannah et al. (2009. p.898) defined an extreme event as "a discrete episode or occurrence that may result in an extensive and intolerable magnitude of physical,

psychological, or material consequences to—or in close physical or psycho-social proximity to—organization members." According to Hannah et al. (2009), the perceived intensity or severity of extreme events refers to the subjective evaluation of the magnitude and impact of a discrete occurrence that demands substantial mental and physical resources to manage effectively. This perception is shaped by factors including the frequency of encountering extreme events, the degree of challenge they present, and the level of preparedness required to address their complexities and consequences. Building on this idea, we argue that employees' responses to extreme events may vary depending on how intensely or severely they perceive those events.

Ford and Tetrick (2011) reported that employees facing severe and distressing challenges, as opposed to comparatively milder risks, experience varying impacts on their attitudes and safety behaviors. Specifically, as the intensity of occupational hazards increases, employees' engagement in safety participation tends to decrease. This finding aligns with the concept of the normalization of deviance in high-risk environments, a phenomenon where risky behaviors that deviate from established safety norms gradually become accepted over time (Sedlar et al., 2023; Vaughan, 1996). This process occurs when individuals repeatedly engage in such behaviors without experiencing immediate negative consequences. Over time, these deviations are increasingly perceived as normal, leading to a decline in adherence to the original safety protocols. The issue is further exacerbated in high-stakes work environments, where high exposure to extreme events reduces individuals' sensitivity to potential hazards, increases emotional exhaustion, and ultimately weakens their compliance with safety standards. These assertions align with Hällgren et al.'s (2018) call for a more person-centric approach that explores the micro-foundations of extreme work contexts, essential for understanding how individuals perceive and respond to safety-related challenges at work. Adopting a person-centric approach not only helps organizations meet compliance

requirements but also offers fresh insights into employee agency in shaping organizational strategies for managing extreme work environments (Bacharach & Bamberger, 2007; Bell et al., 2018; Somaraju et al., 2022).

We step into this debate by examining the micro-foundations of extreme events, focusing on differences in the perceived intensity or severity of such events (Eberly et al., 2017; George et al., 1993) and their impacts on safety performance. This involves recognizing the varying degrees of exposure to atypical work events, as well as workers' responses to them. For example, the challenges faced by a firefighter dealing with a typical residential fire are distinct from the intense pressure encountered while battling a large-scale forest fire. Similarly, the difficulties faced by seafarers in mildly turbulent weather are considerably less intense than the potentially fatal conditions of a severe storm. These variations in the perceived intensity of extreme events can elicit distinct emotional, attitudinal, and behavioral responses, affecting not only individuals' compliance with workplace safety protocols but also their participation in safety-related activities. Ignoring these important nuances risks oversimplifying the complex and multifaceted nature of occupational behaviors in extreme work environments. Consequently, to fully understand the micro-foundations of extreme events, we propose a comprehensive framework that differentiates individuals' appraisals of high, medium, and low extreme events and the associated behavioral responses in terms of safety compliance and safety participation.

Our model draws on Affective Events Theory (AET: Weiss & Cropanzano, 1996), which posits that external events can trigger emotional responses that subsequently influence individuals' attitudes and behaviors. Essentially, when an event is perceived as particularly intense, the resulting negative emotional response can impair positive attitudes and behaviors, leading to a significant decline in overall performance (Judge & Kammeyer-Mueller, 2012). Building on this, we contend that high exposure to extreme events, as opposed to medium or

low exposure, elicits negative emotions such as fear, distress, and anxiety. These emotions can adversely affect physical, cognitive, and emotional energy (viz. work engagement; Bakker et al., 2008; Kahn, 1990). Although the relationship between emotions and work engagement is complex (Green et al., 2017), research suggests that intense negative emotions can have a particularly adverse influence on work engagement (Bledow et al., 2011; Fredrickson et al., 2003; Koole & Jostmann, 2004), which fluctuates based on the intensity of such emotions (Hallberg & Schaufeli, 2006; Sonnentag, 2003). Moreover, intense emotions and low levels of engagement prompts individuals to be less cautious, vigilant, and risk-averse in workplace decision-making (Christian et al., 2011; Fenton-O'Creevy et al., 2011; George & Dane, 2016). This implies that, in high-stakes work environments, the potential for safety-related errors and accidents is likely to increase. Ultimately, we contend that the combination of negative emotions and poor work engagement reduces individuals' adherence to safety protocols and standards.

We further examine the role of self-emotion appraisal as a boundary condition for the negative indirect relationship between high exposure to extreme events and safety performance. Self-emotion appraisal is a key component of emotional intelligence, characterized by an individual's ability to cognitively assess and interpret their emotions in a given situation, thereby enhancing their adaptability in high-stress environments (Law et al., 2004). According to AET (Weiss & Cropanzano, 1996), individuals' reactions to events may vary based on personality traits, cognitive and emotional appraisals, and affective tendencies. Specifically, AET suggests that self-emotion appraisal can moderate the impact of exposure to extreme events on negative emotions by facilitating a more adaptive psychological response. Individuals with heightened emotional awareness have a better appreciation of their feelings or affective states, enabling them to develop more effective and appropriate responses in challenging or stressful situations (Joseph & Newman, 2010). This ability helps

mitigate their experience of negative emotions (Nizielski et al., 2013), thereby weakening the negative link between exposure to extreme events and safety performance. In this light, we argue that individuals with strong self-emotion appraisal are better equipped to maintain emotional stability and perform safely, even under high-stress conditions.

As shown in Figure 1, our research makes important contributions to the growing literature on extreme work contexts. Through the theoretical lens of AET, we address Hällgren et al.'s (2018) call for a more nuanced understanding of how exposure to extreme events impacts employee attitudes and behaviors in the workplace. We also respond to Christian et al.'s (2009) call to examine how psychological and situational factors influence each other or interact in shaping safety performance. Our findings show that the effects of extreme events on employee responses are not uniform across employees but vary according to intensity or severity. High exposure to extreme events, where the perceived intensity or severity of such events likely exceeds an individual's coping capacity, is linked to a significant decline in emotional well-being, work engagement, and safety performance. In contrast, medium and low levels of exposure result in less severe impacts. In this light, our research enriches AET by providing deeper insights into the micro-foundations of extreme work contexts, extending beyond its primary focus on organizational responses to examine psychological and behavioral outcomes. In addition, exploring the role of self-emotion appraisal as a boundary condition provides a nuanced perspective on how individuals' capacity to recognize their emotions can mitigate the risks associated with exposure to extreme events. These insights have practical implications for developing targeted organizational interventions that support workers in managing workplace uncertainty (Madsen, 2009; Madsen & Desai, 2010).

Insert Figure 1 about here

Extreme Events and Negative Emotions

A central theme in the growing body of research on extreme work contexts focuses on how organizations adapt and respond to uncertainty in unusual or atypical work environments. In their review, Hällgren et al. (2018) categorize these work environments into three distinct domains: risky contexts (characterized by near-constant exposure to potential extreme events), emergency contexts (characterized by actual extreme events related to the organization's core operations), and disrupted contexts (characterized by actual extreme events unrelated to the organization's core operations). Studies on risky contexts generally focus on the various strategies that organizations use to manage uncertainty, such as continuous risk assessment (Bothner et al., 2007) and creating policies to promote a psychologically safe environment (Edmondson, 2003). In emergency contexts, research emphasizes organizational strategies to establish a "culture of objectivity" aimed at improving managers' sensitivity to uncertainty (Feldman, 2004), developing actions to navigate the complex interplay between technological and human systems (Shattuck & Miller, 2006), and fostering a more effective safety culture in the workplace (Chikudate, 2009). In disrupted contexts, researchers typically consider the formation of temporary response groups, such as disaster response teams, as a strategy for managing uncertainty (Shepherd & Williams, 2014). These studies highlight the critical role of organizational structures and processes in fostering safe operations and preventing risks in extreme work environments.

In comparison, fewer studies have examined individuals' appraisals and responses to extreme work conditions (Hällgren et al., 2018). In one study, George et al. (1993) revealed that nurses who cared for AIDS patients reported negative emotions such as distress, scorn, hostility, fear, nervousness, and anxiousness compared to nurses without such experience. The Apollo 13 and Three Mile Island incidents are other examples of how individuals

reported negative emotions as a response to extreme events (Stein, 2004). In firefighting, Bacharach and Bamberger (2007) found a significant relationship between New York City firefighters' involvement in dealing with the fallout from the September 11 terrorist attack and post-event negative emotional states, such as anxiety and stress. Meanwhile, in the shipping context, Fan et al. (2018) found that seafarers participating in a bridge simulation of extreme events reported higher levels of negative emotions such as fear, anger, and sadness. These studies collectively suggest that exposure to extreme events can lead to emotional distress, which in turn might impair workplace performance and efficiency. The critical question, however, is whether there are varying levels of perceived exposure to these events and if so, how do they affect employees' emotional reactions, attitudes, and behaviors.

In the current study, we propose that high exposure to extreme events, as opposed to medium or low exposure, is particularly critical in eliciting negative emotions. We consider high exposure as a situation where the intensity or severity of extreme events exceed an individual's coping ability (Eberly et al., 2017). According to AET (Weiss & Cropanzano, 1996), individuals experiencing events that pose serious danger may undertake a cognitive assessment of the situation to determine the implications for their well-being and performance. This assessment involves two main stages: primary and secondary appraisals. In the primary appraisal stage, individuals quickly, and often subconsciously, assess the potential risks that the event poses to their personal goals and sense of mental stability. This initial reaction can trigger adverse psychological consequences, as individuals perceive threats to both their own safety and the well-being of those around them (Bacharach & Bamberger, 2007). For instance, in firefighting, extreme events, such as wildfires, structure fires, and incidents involving vehicles or hazardous materials have been associated with a heightened sense of vulnerability and perceived threats to individuals' mental stability (Bacharach & Bamberger, 2007; Tuckey & Hayward, 2011). Similarly, in shipping, extreme

events such as collision, operating in war zones, and exposure to dangerous chemicals (European Maritime Safety Agency, 2022) may adversely influence employees' physical and psychological experiences (Nayyeri et al., 2024).

After the primary appraisal, individuals move into the secondary appraisal stage, where they engage in a more in-depth evaluation of their ability to cope with potential outcomes of an extreme event. This phase involves a conscious, deliberate assessment of one's mental capacity and readiness to confront the event, along with a careful consideration of available resources to manage unexpected challenges (Lench et al., 2011). Additionally, this secondary appraisal includes a cognitive evaluation of the event's intensity or severity and the level of distress it causes. For instance, when an event is perceived as less severe, individuals may feel more capable of effectively utilizing their skills and support systems, leading to minimal or no negative emotional responses. In contrast, when an event is perceived as highly severe or life-threatening, it can elicit a sense of being overwhelmed, leading to more intense emotional responses (Eberly et al., 2017; Vogel & Bolino, 2020). These examples highlight the variability in individuals' emotional responses to extreme events, with higher exposure being associated with greater emotional distress. In this context, high exposure can be seen as a stressful experience that impairs an individual's perceived ability to manage or control the situation.

Drawing on AET, we argue that, compared to high exposure, medium and low exposure to extreme events place less strain on individuals' emotional responses. While still challenging, these lower levels of exposure may not necessarily result in the same level of emotional distress as high exposure (Eberly et al., 2017). Medium exposure to a distressing event can indeed raise serious cognitive and psychological concerns, yet individuals typically retain the ability to engage in problem-solving or seek support as needed (Lazarus, 1993; Tomprou et al., 2015). In such cases, those affected may still possess the mental capacity to

adapt, stay focused, and complete tasks effectively. Similarly, low exposure to a distressing event generally results in even less emotional disturbance, as these events are often perceived as less threatening or impactful (George et al., 1993; Lazarus, 1993). Individuals in this group can typically continue their daily routines with minimal disruption and without significant emotional or psychological burden. These examples underscore the varying psychological impacts of different levels of exposure to extreme events, each carrying its unique set of emotional responses. In the specific case of high exposure, we argue that the inability to cope effectively elicits more intense negative emotions. Based on the foregoing, we propose the following hypothesis:

> *Hypothesis 1:* High, compared to medium and low, exposure to extreme events is associated with stronger negative emotions.

Negative Emotions and Low Work Engagement

We propose that negative emotions stemming from high exposure to extreme events can lead to an adverse attitudinal response, manifesting as low work engagement. Work engagement is a vital job-related attitude characterized by vigor, dedication, and absorption (Demerouti et al., 2010). Vigor refers to high levels of energy and persistence at work, while dedication entails being motivated, inspired, and enthusiastic about one's work. Absorption captures the experience of deep concentration and the feeling that time flies when one is immersed in work activities. As positive attitudinal qualities (Bledow et al., 2011), these core aspects of work engagement are evident in employees who are energetic and emotionally able to accomplish work-related tasks (Demerouti et al., 2010; Rich et al., 2010; Schaufeli et al., 2008). Research consistently demonstrates a strong link between positive emotions such as feeling happy, optimistic, and relaxed on the job and the experience of work engagement (Christian et al., 2011; Ouweneel et al., 2012; Salanova et al., 2011). Positive emotions are thought to increase employees' likelihood of being highly invested in their work and better

prepared to manage adversity. In contrast, negative emotions can have a detrimental influence on employees' work engagement and impair one's ability to thrive at work (Bakker et al., 2008).

There are at least two reasons why negative emotions are expected to reduce work engagement in extreme work contexts. First, as outlined in AET's primary appraisal stage, negative emotions fundamentally alter an individual's motivational state, often leading individuals to reassess how they approach goals and challenges (Fredrickson et al., 2003; Koole & Jostmann, 2004). When individuals experience negative emotions such as fear or anxiety, their motivational energy may be depleted due to psychological mechanisms that limit cognitive and adaptive responses (Green et al., 2017). For instance, imagine attempting to focus on the complex task of fighting a wildfire while being preoccupied with anxiety about personal safety and the safety of others affected by the fire. Similarly, a seafarer concerned about hazardous weather conditions may expend significant mental energy interpreting every shift in sea currents as a potential threat, leaving less cognitive capacity for their actual work tasks. In this sense, negative emotions resulting from stressful events can disrupt an individual's ability to stay absorbed in tasks, maintain energy and vigor, and remain dedicated to their work (Bledow et al., 2011; Weiss & Cropanzano, 1996). These emotions constrain cognitive processes and disrupt the flow of activities, making it difficult to feel motivated in one's job (Bledow et al., 2011; Fredrickson et al., 2003; Koole & Jostmann, 2004).

Second, as part of the psychological response to a distressing event, AET suggests that negative emotions can initiate a pattern of physical, psychological, and social disengagement from work duties (Weiss & Cropanzano, 1996). This response implies that affected employees may feel disconnected not only from their roles and colleagues but also from a sense of purpose in completing tasks effectively. Green et al. (2017) describe this as a

behavioral pattern where negative emotions drive employees to withdraw both physically and psychologically from social interactions, resulting in isolation within their work environment. These individuals typically demonstrate reduced attention to detail and a general lack of enthusiasm in their tasks (Bledow et al., 2011; Koole & Jostmann, 2004). In high-stakes environments such as firefighting, for example, this disengagement raises serious concerns due to the critical need for trust, coordination, and adherence to safety protocols (Bacharach & Bamberger, 2007). At the same time, mood instability resulting from negative emotions can impair performance due to poor impulse control and feelings of social alienation. When left unaddressed, these adverse emotions and subsequent disengagement can impair judgment and lead to decision-making errors, ultimately compromising operational effectiveness. Along these lines, we hypothesize a direct inverse relationship between negative emotions and work engagement:

Hypothesis 2. Negative emotions are associated with low work engagement.

Indirect Effects on Safety Performance

Building on AET, our theoretical framework proposes that negative emotions and poor work engagement sequentially mediate the relationship between high exposure to extreme events and safety performance. We define safety performance as "actions or behaviors that individuals exhibit in almost all jobs to promote the health and safety of workers, clients, the public, and the environment" (Burke et al., 2002, p. 432). Following Griffin and Neal (2000), we conceptualize safety performance as having two key dimensions: safety compliance and safety participation. Safety compliance involves adhering to standard or basic safety protocols that are designed to protect individuals from harm in the workplace. This includes using personal protective equipment correctly, reporting hazards, complying with safety training requirements, and completing risky tasks with care. On the other hand, safety participation refers to employees' voluntary involvement in safety-related activities

that go above and beyond the basic requirements of compliance. This includes promoting safety improvement initiatives in the workplace, offering constructive feedback on safety procedures, and helping to promote a safety culture among peers. Despite slight conceptual differences, both dimensions of safety performance are critical for understanding how key safety requirements and standards are met in the workplace (Griffin & Neal, 2000).

In both firefighting and shipping contexts, safety compliance and participation are adapted to the unique, work-related risks that employees face. In firefighting, safety compliance entails strictly adhering to protocols for using personal protective equipment in high-risk tasks such as entering burning buildings and evaluating structural integrity, as well as optimizing the use of safety equipment, including rescue tools (Poplin et al., 2015). Safety participation focuses on protecting team members during high-risk operations, sharing hands-on knowledge from past experiences, mentoring new team members on safety procedures, and taking on additional safety responsibilities to strengthen team cohesion and preparedness (Smith et al., 2016). Conversely, safety compliance in shipping requires strict adherence to international maritime regulations, such as the International Safety Management (ISM) Code. This code mandates proper use of lifesaving and firefighting appliances, emergency procedures, and regular drills (Størkersen et al., 2017). Safety participation in shipping entails contributing to protocol development, providing feedback after drills, inspecting equipment regularly, conducting safety briefings, and assisting colleagues with proper gear usage in hazardous situations. Safety participation among seafarers can also involve proactively identifying hazards and promoting a strong safety culture on board (Chen et al., 2023). In these high-risk work environments, it is essential to take proactive steps in managing occupational safety, as any oversight can lead to severe consequences.

Drawing on AET, we argue that negative emotions and low work engagement resulting from high exposure to extreme work events can compromise safety performance.

This supports the idea that employees experiencing negative emotions and low work engagement are often psychologically depleted (Cole et al., 2012), which impairs their ability to invest the necessary time and effort for essential safety practices in the workplace. These employees tend to show lower commitment to their roles, leading to decreased effort in meeting quality standards for safety tasks (Christian et al., 2009; Rich et al., 2010). Thus, compared to their engaged counterparts, disengaged workers may overlook critical safety measures and protocols due to a reduced sense of emotional investment in their work (Nahrgang et al., 2011). Poor levels of engagement not only increase the risk of accidents and injuries, but also undermine employees' ability to accept personal responsibility for their unsafe actions. Such employees are often struggle to apply essential safety-related knowledge, skills, and motivation, making them more susceptible to risky and accident-prone behavior in the workplace (Christian et al., 2009; Nahrgang et al., 2011). Given prior research showing a direct link between work engagement and safety performance (Hu et al., 2018; Liu et al., 2019; Nahrgang et al., 2011; Yuan et al., 2015), it is reasonable to infer that low work engagement contributes to reduced safety performance.

Based on the foregoing, we argue that high exposure to extreme events elicits negative emotions (Hypothesis 1), which in turn reduces work engagement (Hypothesis 2), and ultimately impairs safety performance. Grounded in AET's core principles, this sequential indirect relationship suggests that challenging work events act as critical emotional triggers that shape employees' affective states and, in turn, significantly influence their attitudes and behaviors (Weiss & Cropanzano, 1996). When confronted with these events, individuals engage in cognitive appraisal to assess potential threats to their safety and well-being (Hällgren et al., 2018). In extreme work settings, such as firefighting and shipping, these events are often perceived as highly intense and life-threatening, requiring quick or prompt decision-making under pressure. We contend that these effects are more pronounced

in cases of high, rather than medium and low, exposure to extreme events, as they are perceived as more severe and detrimental to performance (Eberly et al., 2017). Building on this, our hypothesis proposes that negative emotions and diminished work engagement act as critical variables explaining the indirect relationship between extreme events and safety violations in the workplace. This process reflects a serial mediation, where high exposure to extreme events lowers safety performance through the influence of negative emotions and low work engagement.

> *Hypothesis 3:* High, compared to medium and low, exposure to extreme events is indirectly related to (a) safety compliance and (b) safety participation via negative emotions and poor work engagement.

The Moderating Role of Self-emotion Appraisal

AET recognizes the potential interplay between an individual's psychological characteristics and their reactions to challenging events, suggesting that these factors can reinforce each other (Weiss & Cropanzano, 1996). While high exposure to extreme events elicits negative emotions, individuals may react differently depending on their inner strengths and coping capacities. For instance, those with a greater capacity to withstand stress may perceive distressing situations as opportunities for growth and learning, leading to a more positive cognitive responses instead of negative ones (Crane & Searle, 2016; Williams et al., 2017). These individuals are more likely to persevere and engage in adaptive responses, enabling them to effectively manage negative emotions during difficult times. This perspective underscores the importance of one's psychological capital in maintaining a positive outlook and exploring opportunities for growth even in the face of adversity (Ogbonnaya et al., 2024). In the present research, we identify self-emotion appraisal (Law et al., 2004) as a key psychological ability and a critical component of emotional intelligence that mitigates the adverse effects of high exposure to extreme events. While such exposure

poses significant risks to emotions and behaviors, individuals capable of assessing their emotional responses are likely to experience less severe consequences.

Self-emotion appraisal refers to an individual's ability to recognize and understand their own deep emotions. This ability requires a higher level of awareness and sensitivity to one's emotional states, enabling individuals to be more in tune with their inner feelings (Law et al., 2004). According to Joseph and Newman (2010), the development of self-emotion appraisal hinges on two key abilities: perceiving and understanding emotions. Perceiving emotions involves recognizing one's own emotional states while also identifying emotional cues in others. Understanding emotions, on the other hand, is a more intricate ability that involves recognizing how emotions evolve over time, distinguishing between different emotions, and identifying the most appropriate emotion for each situation. Both aspects of self-emotion appraisal complement other facets of emotional intelligence, such as regulating emotions and using them to enhance performance (Joseph & Newman, 2010; Law et al., 2004). Individuals with strong self-emotion appraisal are therefore better equipped to persevere through setbacks and manage stressful situations. Previous research has linked this form of emotional intelligence to improved well-being (Bayighomog & Arasli, 2022; Carmeli et al., 2009) and better safety outcomes (Edmund et al., 2023). Building on this foundation, we propose two hypotheses that demonstrate the importance of self-emotion appraisal as a valuable personal resource that can mitigate the negative effects of high exposure to extreme events.

First, we argue that self-emotion appraisal moderates the direct influence of high exposure to extreme events on negative emotions, such that this relationship is weaker among individuals with higher (vs. lower) levels of this psychological ability. We connect this to AET's core principle that individuals' reactions to challenging events vary depending on their personality traits, cognitive and emotional appraisals, and affective tendencies (Weiss &

Cropanzano, 1996). AET specifically suggests that self-emotion appraisal can mitigate the adverse impact of extreme events on negative emotions, as it enhances individuals' ability to recognize and appreciate a range of emotional states. Those with heightened emotional awareness have a better understanding of their emotions and the circumstances that trigger them, allowing for a more accurate assessment of their inner feelings (Joseph & Newman, 2010). Furthermore, self-emotion appraisal supports emotional regulation by allowing individuals to distinguish between varying intensities of positive and negative emotions. This ability enables individuals to develop proactive and adaptive coping strategies in challenging situations, thereby reducing the intensity of negative emotions (Nizielski et al., 2013). Consequently, we propose that individuals with higher (vs. lower) self-emotion appraisal ability experience less pronounced negative emotions when exposed to extreme events.

> *Hypothesis 4:* Self-emotion appraisal moderates the direct relationship between high, compared to medium and low, exposure to extreme events and negative emotions, such that the direct relationship is weaker when the self-emotion appraisal is high (vs. low).

Second, we hypothesize that the negative indirect relationship between high exposure to extreme events and safety performance (via negative emotions and low work engagement) is weaker among individuals with stronger self-emotion appraisal abilities. This suggests a first-stage moderated mediation model, where the indirect influence of extreme event exposure on safety performance depends on a person's self-emotion appraisal capacity. Specifically, we argue that individuals experiencing high-stakes events at work are less likely to compromise safety performance if they can better perceive and understand their emotional states. These individuals are more aware of their emotional reactions to extreme events, enabling them to stay focused and committed to their tasks (Joseph & Newman, 2010). They are also more likely to take precautions against occupational hazards and proactively adjust

their workplace behaviors to maintain safety standards (Haver et al., 2021). For example, a firefighter with strong self-emotion appraisal abilities may recognize their rising anxiety during a dangerous rescue operation and deliberately slow down to double-check their safety equipment, rather than rushing in with impaired judgment. Such individuals can deploy effective responses to minimize impaired emotional judgment, which would otherwise increase safety-related risks and injuries. Taken together, we propose the following hypothesis:

> *Hypothesis 5:* Self-emotion appraisal moderates the indirect links between high, compared to medium and low, exposure to extreme events and (a) safety compliance and (b) safety participation via negative emotions and poor work engagement, such that the indirect relationship is weaker when self-emotion appraisal is high (vs. low).

Overview of Current Research

We conducted two field studies to test our hypotheses and validate our conceptual model across different extreme work contexts. Study 1 tested Hypotheses 1-3, while Study 2 extended the analysis to examine Hypotheses 1-5. This multi-study approach is essential for enhancing the generalizability and external validity of our findings (Hochwarter et al., 2011). For Study 1, we collected data from experienced firefighters exposed to various extreme events as part of their jobs, such as controlling wildfires during adverse weather, dealing with explosions in hazardous environments, rescuing people and animals, and handling various types of emergencies and accidents. Considering our goal of establishing differences in the perceived intensity or severity of extreme events, we adopted a quasi-experimental design in which respondents self-selected into three distinct groups (high, medium, and low) based on their real-life job experiences. This method exemplifies a non-equivalent groups design, wherein firefighters were allocated to exposure groups based on actual work-related encounters, as opposed to random assignment (Steiner et al., 2010). Compared to a

randomized experiment, our approach is especially useful for capturing participants' lived experiences on the job, allowing us to analyze naturally occurring differences in their exposure to extreme events.

Study 2 was designed to replicate and corroborate our findings through a follow-up quasi-experiment in a different organizational context involving experienced seafarers. These seafarers had encountered various challenging work events, including operating ships in conflict zones, exposure to dangerous chemicals, onboard injuries or illnesses at sea, extreme weather conditions, and piracy. The goal was to strengthen our research design by addressing inherent limitations, such as selection bias and limited internal validity, especially since the three exposure groups were defined based on pre-existing differences among respondents. We also expanded the study's scope by investigating how self-emotion appraisal moderated the indirect relationship between high exposure to extreme events and safety performance. Acknowledging that both the firefighting and shipping sectors are challenging work environments, we leveraged our professional networks in accessing potential respondents for our study. This enabled us to achieve a robust sample size that meets statistical power requirements, ensuring reliable analysis and strengthening the validity of our findings. Data from both studies are publicly available in the OSF repository and can be accessed at https://osf.io/2e3dc/. We obtained ethics approval prior to data collection and adhered to university standards (University of Bedfordshire), ensuring voluntary participation and exclusive use of data for research purposes.

Study 1

Sample and Procedure

Data were gathered from firefighters stationed at 19 different firefighting stations across Iran. The participants were drawn from various firefighting roles, including station managers, watch managers, deputy watch managers, and frontline firefighters. They were

contacted through the first author's professional network, as well as experts from the Iranian firefighting community. Given firefighters' unique work schedules (24-hour shifts followed by 48-hour breaks), we collected data during their 24-hour shifts to accommodate these logistical challenges. At the start of their 24-hour shift, we carried out all activities related to the quasi-experiment, such as assigning the respondents into three (high, medium, and low) exposure groups. We also measured participants' negative emotions regarding their chosen category of extreme events. Seven days later, upon their return for another 24-hour shift, we collected data on work engagement, followed by data on safety performance at the end of that shift. This systematic approach allowed us to not only accommodate the firefighters' distinct work schedules but also establish the necessary time lag between our mediator and outcome variables (Podsakoff et al., 2003). We used unique respondent identification codes to ensure that data were appropriately matched during each stage of the process.

Quasi-experimental Design

The quasi-experiment was systematically executed through a structured approach. First, we employed the Delphi method (Okoli & Pawlowski, 2004) to engage a panel of ten firefighting experts including five station managers, four watch managers, and one deputy watch manager. Their task was to rank the following nine extreme events from 1 (lowest) to 9 (highest) based on how the broader firefighting community would typically perceive the intensity or severity of each event: (1) animal rescue, (2) accident and obstacles on the road, (3) small-scale fires, (4) vehicle fires, (5) search and rescue operations in confined spaces, (6) vehicle extrication in hazardous conditions, (7) explosions in hazardous environments, (8) structural collapse during a fire, and (9) rapid wildfire spread in adverse weather conditions. This selection and ranking of these events were guided by Angle et al.'s (2020) comprehensive framework for evaluating the effectiveness of firefighting strategies.

Second, we analyzed the expert ratings to reach a consensus and categorize three events each as low, medium, or high. Thus, events rated 1-3, including animal rescue, small-scale fires, and accident and obstacles on the road, were classified as low, as they involve minimal immediate risk to life and are typically more routine. Events rated 4-6, including vehicle fires, vehicle extrication in hazardous conditions, and search and rescue operations in confined spaces, were classified as medium, reflecting their greater complexity and potential for significant harm. Lastly, events rated 7-9, including rapid wildfire spread in adverse weather conditions, structural collapse during a fire, and explosions in hazardous environments, were classified as high, representing more serious situations with severe risk and the potential for large-scale impact and casualties. To ensure reliability, Cohen's Weighted Kappa analysis (Cohen, 1968) was conducted, revealing consistent agreement between pairs of raters, with values ranging from .550 to 1.000. Most comparisons had narrow confidence intervals and statistically significant results ($p < .001$). Subsequently, we consulted the same panel of firefighting experts who initially assessed the intensity or severity of each event to confirm the accuracy of our classifications. Once these classifications (each containing three events) were presented, all experts agreed that the classifications aligned with their professional experience and judgment, resolving any prior disagreements. This additional review validated our approach, ensuring the credibility and relevance of our categorization in the context of real-world firefighting scenarios.

Third, we presented the three-tier category of extreme events—high, medium, and low—to our sample of 292 firefighters. Participants were asked to review the three categories of extreme events, with three individual events grouped into each category, presented without labels such as low, medium, or high. They then selected the category that best matched their experiences based on the following criteria: (i) events they encountered most frequently, (ii) events they found most challenging, and (iii) events requiring the highest levels of mental and

physical preparedness to manage effectively. The three criteria were assessed collectively by participants, who were asked to consider all these criteria when making their selections. This process encouraged participants to reflect on their personal encounters, considering both the perceived intensity of events in each category and the specific demands on their coping abilities. Based on their selections, we assigned participants into three exposure groups. Firefighters who chose the category of low intensity events were placed in the low exposure group (N = 92). Those who selected the category of medium intensity events were assigned to the medium exposure group (N = 112). Those who selected the category of high intensity events were assigned to the high exposure group (N = 88).

The sample exclusively consisted of male participants, reflecting the absence of female workers in the firefighting stations. Approximately 39% of the respondents were aged between 34 and 41 years, with an additional 26% aged 41 years and older. A significant proportion of respondents (74%) have been employed in their current roles for five years or more. Regarding marital status, nearly half of the participants (49%) were single, with the rest being married (44%) or divorced (7%). Educational attainment among the respondents was high: 78% held undergraduate degrees, 14% had postgraduate degrees, and 8% possessed upper diploma degrees.

Measures

The surveys were administered in Persian, which is the official language of communication among participants. All measures were translated from English to Persian by the third author and then back-translated independently by the first author to ensure consistency in the meaning of the items (Klotz et al., 2023). Both authors are bilingual researchers who have studied at Persian and English universities. To enhance the integrity of our data, we integrated reverse questions into the survey by phrasing certain items, such as those pertaining to work engagement, in the opposite direction compared to other similar

questions. This approach served as a control measure to mitigate response bias, allowing us to detect inconsistent responses from participants (Podsakoff et al., 2003).

Negative Emotions

Negative emotions were measured using the ten-item measure from the Positive and Negative Affect Schedule (PANAS, Watson et al., 1988). We measured participants' negative emotions (e.g., "distressed", "hostile") when exposed to their chosen category of extreme events (α=0.87). Items were rated on a 5-point Likert scale from 1 (not at all) to 5 (extremely).

Work Engagement

Work engagement was measured using the eight-item measure from the Oldenburg Burnout Inventory (OLBI, Demerouti et al., 2010). A sample item is "I feel more and more engaged in my work" (α=0.88). These items were rated on a 4-point Likert scale from 1 (strongly disagree) to 4 (strongly agree).

Safety Performance

Safety performance was measured using the four-item measure of safety compliance and the four-item measure of safety participation from Griffin and Neal (2000). A sample item for safety compliance is "I use the correct safety procedures for carrying out my job" (α=0.75), and a sample item for safety participation is "I often take part in development of the safety requirements for my job" (α=0.76). These items were rated on a 5-point Likert scale from 1 (totally disagree) to 5 (totally agree).

Control Variables

In testing our hypotheses, we included control variables selected in light of previous research on employee emotions, attitudes, and behaviors (e.g., Burke et al., 2002; Kunze & Menges, 2017; Ng & Feldman, 2008; Wood et al., 1989; Xanthopoulou et al., 2009). We controlled for respondents' age, including five age bands ranked from youngest to oldest: 18-

25, 26-33, 34-41,42-49,50-57. Research has consistently shown that age can significantly influence emotional responses (Silvers et al., 2012) and safety performance in the workplace (Ng & Feldman, 2008). Additionally, we controlled for factors such as years of work experience (from 1 = less than one year to 6 = up to 20 years and over), marital status (three categories: single, married, divorced), and educational attainment (three categories: undergraduate, postgraduate, and higher degrees), which could influence respondents' experiences with extreme events and their subsequent behaviors.

Data Analyses and Results

The correlations and descriptive statistics for Study 1 are shown in Table 1. We conducted a four-factor confirmatory factor analysis (CFA) involving negative emotions, work engagement, and two dimensions of safety performance. To ensure an adequate indicator-to-sample ratio (Little et al., 2013), we created three parcels for the ten negative emotions items and two parcels for the eight work engagement items. The results showed adequate model fit: x^2= 100.37, df= 59, p<0.001, Comparative Fit Index (CFI)= 0.97, Tucker-Lewis Index (TLI)= 0.97, Root Mean Square Error of Approximation (RMSEA) = 0.05, Standardized Root Mean Square Residual (SRMR)= 0.04. All unrestricted factor loadings were positive and consistent with our hypotheses. This model outperformed two alternative models: a three-factor model that combined items for negative emotions and work engagement (CFI = 0.78, TLI = 0.72, RMSEA = 0.14, SRMR = 0.13) and a one-factor model that included all items together (CFI = 0.50, TLI = 0.44, RMSEA = 0.17, SRMR = 0.14). In addition, the composite reliability (CR) and maximum reliability (MaxR H) for all scales were larger than the standard threshold of 0.7, thus confirming the internal consistency of our constructs. Average variance extracted (AVE) values in Table 1 further demonstrate the convergent validity of our constructs.

Insert Table 1 about here

To test Hypotheses 1–3, we performed path analysis in Mplus (version 8). We created two dummy variables each for the medium and low exposure groups, making the high exposure group our reference or baseline category. By setting the high-exposure group as the reference category, we could isolate and interpret the unique influence of moderate-to-lower exposure levels relative to high exposure. In other words, all regression coefficients are interpreted relative to high exposure group. This approach represents a multi-group analytical strategy (Byrne, 2011) that allows for comparison of group-specific effects and their statistical significance relative to the high exposure group. The indirect effects were estimated using the product-of-coefficients (*ab*) approach (MacKinnon et al., 2007), which is the default method in Mplus. The approach involves estimating the regression paths between the independent variable and mediator (*a*), as well as between the mediator and dependent variable (*b*).

Table 2 demonstrates that, compared to high exposure, medium (*β=-0.39, p= 0.00*) and low (*β=-0.51, p= 0.00*) exposures to extreme events were significantly and negatively associated with negative emotions. These results support Hypothesis 1, suggesting that individuals with high exposure to extreme events are more likely to report stronger negative emotions than those with moderate or low exposure, likely due to the added strain on their coping mechanisms. In addition, Hypothesis 2 was supported as negative emotions had an inverse relationship with work engagement (*β=-0.120, p= 0.00*). In other words, as individuals experience greater negative emotions, their level of engagement with work-related activities tends to decrease.

Table 2 further shows that, compared to high exposure, the indirect path from medium exposure to safety compliance (*β=0.02, p= 0.02, 95% Confidence interval= [0.004, 0.038]*) and safety participation (*β=0.02, p= 0.02, 95% Confidence interval= [0.003, 0.035]*), were

serially mediated by negative emotions and low work engagement. Similarly, compared to high exposure, we observed positive and significant indirect paths involving low exposure to extreme events for both safety compliance (*β=0.03, p= 0.01, 95% Confidence interval= [0.006, 0.049]*) and safety participation (*β=0.03, p= 0.01, 95% Confidence interval= [0.005, 0.045]*) through the mediating effects of negative emotions and low work engagement. These findings indicate that poor safety outcomes tend to be more pronounced in cases of high, as opposed to medium or low, exposure to extreme events. Specifically, the increase in negative emotions and the reduction in work engagement under high exposure significantly contribute to the deterioration of workplace safety (support for Hypothesis 3).

Insert Table 2 about here

Study 2

Sample and Procedure

We collected data from seafarers employed by various shipping companies in Iran. The sample included individuals working as deck officers (e.g., captains, chief officers, second officers, and third officers) and engine officers (e.g., chief engineers, second engineers, third engineers, and fourth engineers). These individuals typically work on ships for three to four months before taking a two to three-month break. As in Study 1, participants were recruited through the first author's professional network, with shipping officers assisting in data collection from their colleagues. These officers also served as contact points and intermediaries to coordinate the logistics of distributing surveys to their colleagues. Given the participants' distinct work patterns on ships (4-hour shifts followed by 8-hour breaks) and logistical constraints, we collected data during their two 4-hour shifts. At the start of their 4-hour shift, we performed activities related to the quasi-experiment (e.g., grouping respondents) and gathered data on negative emotions regarding their chosen category of

extreme events and self-emotion appraisal. Three days later, upon their return for another 4-hour shift, we collected data on work engagement, followed by data on safety performance at the end of that shift. We used unique respondent identification codes to match data accurately at each process stage while strictly adhering to research ethics protocols.

Quasi-experimental Design

The quasi-experiment was conducted using a similar systematic approach as Study 1. First, using a Delphi method, we engaged a panel of ten shipping officers including four captains, three chief officers, one chief engineer, and two second engineers. They were asked to rank the following nine extreme events from 1 (lowest) to 9 (highest) based on how the broader shipping community generally perceives their intensity and severity of each event: (1) exposure to extreme weather at sea, (2) arrest by third parties, (3) loss of maneuverability in a congested area, (4) trade in a war zone, (5) poisoning by toxic gas/exposure to dangerous chemicals, (6) piracy, (7) crew injuries or illness due to working on ships, (8) electricity, fire, explosion, and (9) ship collision and grounding. The selection and ranking of these events were guided by previous research investigating various factors that contribute to distressing working conditions in the shipping sector (e.g., Li et al., 2014).

Second, we analyzed the expert ratings to reach a consensus and categorize three events each as low, medium, or high. Thus, events rated 1-3, including exposure to extreme weather at sea, arrest by third parties, and loss of maneuverability in a congested area, were classified as low, as they involve minimal immediate risk to life and are typically more routine. Events rated 4-6, including trade in a war zone, piracy, and poisoning by toxic gas/exposure to dangerous chemicals, were classified as medium, reflecting their greater complexity and potential for significant harm. Lastly, events rated 7-9, including crew injuries or illness due to working on ships, ship collision and grounding, and electricity, fire, explosion, were classified as high, representing more serious situations with severe risk and

the potential for large-scale impact and casualties. The results of Cohen's Weighted Kappa analysis revealed consistent agreement between pairs of raters, with values ranging from .625 to .925. The majority of comparisons were statistically significant ($p < .001$), demonstrating strong consistency among raters. Subsequently, we consulted the same panel of ten shipping officers who initially assessed the intensity or severity of each event to confirm the accuracy of our classifications. Once these classifications (each containing three events) were presented, all experts agreed that the classifications aligned with their professional experience and judgment, resolving any prior disagreements.

Our sample of 315 seafarers was then asked to review our three-tier classification of extreme events—categorized as high, medium, and low—and self-select into one of these categories. As in Study 1, seafarers were asked to review the three categories of extreme events, with three individual events grouped into each category, presented without labels such as low, medium, or high. They then selected the category that best matched their experiences based on the following criteria: (i) events they encountered most frequently, (ii) events they found most challenging, and (iii) events requiring the highest levels of mental and physical preparedness to manage effectively. The three criteria were assessed collectively by participants, who were asked to consider all these criteria when making their selections. They were encouraged to reflect on their personal encounters, considering both the intensity of events within each category and the specific demands on their coping abilities. Based on their selections, we assigned participants to exposure groups. Seafarers who chose low intensity events were placed in the low exposure group ($N = 90$). Those who selected medium intensity events were assigned to the medium exposure group ($N = 108$). Those who selected a high intensity event were assigned to the high exposure group ($N = 117$).

The sample only included male participants, highlighting the lack of female workers in the shipping sector. Approximately 85% of the respondents were between the ages of 18

and 41, with an additional 5% aged 50 and above. Most of the respondents (83%) have been in their current positions for five years or more, implying a high level of experience in the shipping sector. Around 32% of the respondents were single, with the rest being married (61%) or divorced (7%). Approximately 80% had undergraduate degrees, with the remainder holding postgraduate degrees.

Measures

Compared to Study 1, the surveys for this study were conducted in English, which was the official language of communication among seafarers in Iran. We reversed some survey questions to reduce response bias, identify inconsistent responses, and improve the overall quality of the data (Podsakoff et al., 2003). *Negative emotions* (α=0.92), *work engagement* (α=0.80), *safety compliance* (α=0.73), and *safety participation* (α=0.79) were measured using the same constructs as Study 1.

Self-emotion Appraisal

Self-emotion appraisal was measured using the four-item measure from Law et al. (2004). A sample item for self-emotion appraisal is "I have good understanding of my own emotions" (α=0.97). These items were rated on a 5-point Likert scale from 1 (strongly disagree) to 5 (strongly agree).

Control variables

Our analysis included the same set of four control variables used in Study 1.

Data Analyses and Results

Table 3 presents the correlations and descriptive statistics for Study 2. We conducted a five-factor CFA involving measures for negative emotions (three parcels), work engagement (two parcels), two dimensions of safety performance, and self-emotion appraisal showed adequate goodness-of-fit: x^2= 328.56, df= 109, p<0.001, CFI= 0.95, TLI= 0.94, RMSEA = 0.08, SRMR= 0.06. All unrestricted factor loadings for this analysis were positive and

consistent with our hypotheses. This model outperformed two alternative models: a four-factor model that combined items for negative emotions and work engagement (CFI = 0.88, TLI = 0.86, RMSEA = 0.12, SRMR = 0.10) and a one-factor model that included all items together (CFI= 0.21, TLI= 0.10, RMSEA= 0.31, SRMR= 0.21). As shown in Table 3, the CR, MaxR H, and AVE values demonstrate the internal consistency of our constructs.

Hypotheses 1-3 were tested using path analysis in Mplus. Consistent with Study 1, we created dummy variables to represent the medium- and low-exposure groups, with the high-exposure group serving as the baseline. The indirect effects were estimated using the product-of-coefficients (*ab*) approach (MacKinnon et al., 2007). Table 4 shows that, compared to high exposure, medium (*β=-0.22, p= 0.00*) and low (*β=-0.36, p= 0.00*) exposures to extreme events were negatively associated with negative emotions. This suggests that when individuals face extreme events with high exposure, their coping abilities may be overwhelmed, leading to a rise in negative emotions (support for Hypothesis 1). Additionally, we found an inverse relationship between negative emotions and work engagement (*β=-0.17, p= 0.01*), supporting Hypothesis 2. This finding suggests that when individuals experience more negative emotions due to challenging situations at work, they are likely to be less engaged in their tasks.

Our test for Hypothesis 3 shows that, compared to high exposure, the indirect paths from medium exposure to safety compliance (*β=0.01, p= 0.04, 95% Confidence interval= [0.001, 0.024]*) and safety participation (*β=0.01, p= 0.04, 95% Confidence interval= [0.000, 0.020]*) were serially mediated by negative emotions and decreased work engagement. Similarly, compared to high exposure, the indirect paths from low exposure to safety compliance (*β=0.02, p= 0.02, 95% Confidence interval= [0.003, 0.038]*) and safety participation (*β=0.02, p= 0.03, 95% Confidence interval= [0.002, 0.031]*) were positive and serially mediated by negative emotions and decreased work engagement. Thus, we could

argue that poor workplace safety performance is more likely when individuals face high exposure to extreme events, rather than moderate or low exposure. In these situations, negative emotions and low work engagement play a significant role in explaining this indirect relationship (support for Hypothesis 3).

Insert Table 3 about here

Our tests for Hypotheses 4 and 5 examine the moderating influence of self-emotion appraisal. We estimated a path analysis model involving the interaction terms between self-emotion appraisal (as the moderator) and each dummy variable representing the medium and low exposure groups, with the high exposure group serving as the baseline. This was a first-stage moderated mediation model (Edwards & Lambert, 2007), in which estimates of the indirect paths from the dummy variables to both dimensions of safety performance (via negative emotions and low work engagement) were conditional on self-emotion appraisal.

Table 4 shows that, compared to high exposure, the interaction between medium exposure and self-emotion appraisal had a positive influence on negative emotions (*β= 0.14, p= 0.07, 95% Confidence interval= [-0.008, 0.287]*). Although this result was not statistically significant at the 0.05 level, the positive beta coefficient implies that self-emotion appraisal had a less mitigating impact on negative emotions at medium exposure levels than at high exposure (see Appendix 1 for the corresponding simple slopes plot). Therefore, within the limits of our analysis, we argue that individuals with medium exposure to extreme events may not need to rely on their coping resources as often or intensely as those experiencing high exposure. Furthermore, compared to high exposure, the interaction between low exposure and self-emotion appraisal had a positive and significant influence on negative emotions (*β= 0.20, p= 0.01, 95% confidence interval= [0.052, 0.339]*). The simple slopes plot for this result (Figure 2) suggests that self-emotion appraisal has a stronger mitigating

impact on negative emotions in the high exposure group than the low exposure group. Thus, our analysis supports Hypothesis 4.

Insert Figure 2 about here

The lower portion of Table 4 shows the results of our moderated mediation analysis for Hypothesis 5. Compared to high exposure, the interaction between medium exposure and self-emotion appraisal had a negative and non-significant influence on the indirect paths (via negative emotions and low work engagement) to safety compliance (*-0.00, p= 0.15, 95% confidence interval= [-0.009, 0.001]*) and safety participation (*-0.00, p= 0.15, 95% confidence interval= [-0.009, 0.001]*). Although the coefficients were negative, aligning with Hypothesis 5, the non-significant statistical effects suggest that self-emotion appraisal was not a particularly strong moderator at medium levels of exposure to extreme events. Similarly, compared to high exposure, the interaction between low exposure and self-emotion appraisal had a negative but non-significant influence on the indirect paths (via negative emotions and poor work engagement) to safety compliance (*-0.01, p= 0.08, 95% confidence interval= [-0.012, 0.001]*) and safety participation (*-0.01, p= 0.08, 95% confidence interval= [-0.011, 0.001]*). Overall, we found no evidence supporting Hypothesis 5.

Insert Table 4 about here

Discussion

Workplace accidents, injuries, and illnesses pose significant safety challenges for organizations, particularly in extreme environments (de Rond & Lok, 2016; Fisher & Hutchings, 2013; Hällgren et al., 2018). Given that safety performance is a crucial indicator of organizational effectiveness (Christian et al., 2009; Clarke, 2006, 2010), it is essential to understand the factors influencing occupational health and well-being (Neal & Griffin, 2006).

Using the theoretical lens of AET, our research explored the micro-foundations of extreme work events, proposing that the psychological and safety-related outcomes of these events vary based on individual perceptions of their severity and intensity. Our findings show that high exposure to extreme events, compared to moderate or low exposure, significantly impairs compliance with workplace safety protocols and participation in safety activities. This effect operates through indirect pathways, with negative emotions and reduced work engagement serving as serial mediators. Our results were consistent across two field studies involving firefighters who regularly experience high-stress emergency situations, and seafarers who frequently encounter life-threatening conditions at sea. In addition, our analysis highlighted the important role of self-emotion appraisal as a boundary condition for the relationship between high exposure to extreme events and negative emotions. Specifically, individuals with higher self-emotion appraisal abilities could better mitigate the adverse emotional impacts of high exposure to extreme events than those with lower abilities.

Theoretical Implications

Our research makes four important theoretical contributions to the nascent literature on extreme work contexts. First, by offering a fresh perspective on the micro-foundations of extreme events, we deepen understanding of how individuals' perceptions of such events influence their emotional, attitudinal, and safety-related behaviors. In so doing, we introduce a unique person-centric approach to the study of extreme work contexts, highlighting the significance of how individuals perceive and respond to distressing events in an atypical work context. Traditional models in extreme contexts literature have often paid more attention to macro-level experiences, including the various adaptation strategies that organizations undertake in response to emergency situations at work (Bothner et al., 2007; Feldman, 2004; Shepherd & Williams, 2014). These studies have primarily focused on structural and operational crisis-management tactics, often overlooking the individual-level

processes that occur before, during, and after such events. Responding to Hällgren et al.'s (2018) call for a more person-centric perspective, our person-centric approach shows that individuals' well-being may be compromised when the levels of exposure are perceived to be particularly high. This, in turn, can adversely affect both their sense of enthusiasm and engagement at work, potentially undermining workplace safety compliance and participation.

Second, as part of our micro-foundational reasoning, we expand prior research (Eberly et al., 2017; Gray et al., 2023) by exploring how distinct levels of exposure to extreme events can influence different responses at work. It is commonly assumed that extreme events impact all employees uniformly—an assumption that typically shapes organizational strategies for designing interventions (see Bothner et al., 2007; Edmondson, 2003). However, based on AET, we show that the perceived intensity or severity of exposure to extreme events matters when attempting to comprehend how individuals respond in challenging work events. Specifically, low-to-medium exposure may not necessarily elicit intense negative emotions or pose significant risks to occupational safety performance. Individuals in this category may retain the psychological capacity to manage the potential impact of extreme events without adverse effects on their emotions, attitudes, and behaviors. In other words, their level of exposure remains manageable and does not impair their coping abilities. On the other hand, high exposure to extreme events has the potential to overwhelm an individual's coping abilities, leading to significant psychological distress and impaired safety performance. These varying levels of exposure highlight an important avenue for future research on extreme work contexts, emphasizing the need for tailored support and intervention strategies that address individuals' unique experiences and adaptive capabilities.

Third, to further understand how individuals react in extreme work environments, we explored the crucial role of self-emotion appraisal in mitigating the adverse effects of high exposure to extreme events. As a core component of emotional intelligence, self-emotion

appraisal enables individuals to develop adaptive coping strategies and persevere during difficult times (Law et al., 2004), which is essential for managing negative emotions. This perspective is reinforced by previous research linking different aspects of emotional intelligence to positive workplace outcomes, including safety behaviors (Bayighomog & Arasli, 2022; Carmeli et al., 2009; Edmund et al., 2023). Our research extends these findings by highlighting the role of a person's self-emotion appraisal ability as a protective buffer that enhances emotional stability in challenging environments. Recognizing the importance of self-emotion appraisal enables individuals to effectively assess their emotional states and navigate challenging situations at work. Specifically, we show that the link between high exposure to extreme events and negative emotions is weaker when individuals possess higher (vs. lower) self-emotion appraisal abilities. This suggests that being acutely aware of one's emotional states at any given time may significantly enhance a person's capacity to navigate and respond to distressing situations effectively.

Finally, our research advances AET by simultaneously investigating two important aspects of safety performance, offering a more comprehensive picture of safety behaviors in the workplace. Though conceptually distinct, safety participation and compliance are considered essential to organizational effectiveness, especially given the evolving nature of workplace accidents and hazardous conditions (Burke et al., 2011; Nahrgang et al., 2011; Neal & Griffin, 2006). As a result, organizations are placing greater emphasis on incorporating these two dimensions of safety into intervention strategies, enabling a more nuanced analysis of how safety practices affect outcomes in high-stakes work environments. Research in AET has not, however, kept up with this understanding, often overlooking the interdependence of compliance and participation as critical factors in achieving optimal safety outcomes. We broaden the application of AET by exploring the impact of extreme events within a more comprehensive safety performance framework. Our findings reveal that

negative emotions arising from high exposure to extreme events not only reduce work engagement but also diminish safety compliance and participation. This research also responds to Christian et al.'s (2009) call to explore interaction between various situational and personal factors influencing safety performance. Our research can support organizations in developing more effective interventions to enhance overall safety performance.

Practical Implications

Our findings have practical implications for improving employees' emotional, attitudinal and safety-related behaviors in extreme work contexts. To mitigate employees' negative emotions stemming from exposure to extreme events, organizations should prioritize workplace support systems, such as counseling and psychological services (Ashkanasy & Daus, 2002), as well as resilience-building programs (Robertson et al., 2015). Additionally, regular debriefing sessions following extreme events offer employees a safe space to openly discuss their experiences and emotions, which is crucial for emotional recovery and resilience (Tuckey & Scott, 2014). To enhance work engagement, particularly when negative emotions are present, organizations should implement strategies that promote a supportive work environment. One effective approach is increasing job resources, such as autonomy, and social support which have been shown to boost engagement by satisfying employees' psychological needs (Bakker & Demerouti, 2008). In addition, cultivating a culture of recognition and providing regular feedback can further enhance employees' sense of achievement and purpose, which are key drivers of engagement (Salanova & Schaufeli, 2008).

Our analysis also emphasizes the importance of self-emotion appraisals as a buffer against negative emotional responses to high exposure to extreme events. Emotional intelligence training programs that combine didactic and skills-based learning (Kotsou et al., 2011; Nelis et al., 2011), along with techniques that foster self-awareness (Mattingly &

Kraiger, 2019) and encourage self-reflection (Wing et al., 2006), can help employees recognize and understand their emotional states and their impact on safety behaviors. Additionally, integrating feedback mechanisms through performance reviews and coaching sessions provides employees with opportunities to reflect on their emotional responses in various work situations, thereby reinforcing their self-emotion appraisals (Brackett et al., 2011). These practices not only build emotional resilience but also promote a work environment that values employee mental health and well-being. Furthermore, establishing a culture of psychological safety, where employees can express and reflect on their emotions without fear of negative consequences, is essential for promoting accurate self-emotion appraisals (Frazier et al., 2017).

Given the indirect impact of high exposure to extreme events on safety performance, we recommend safety-related interventions at both the organizational and leadership levels. At the organizational level, high-performance work systems—including employment security, selective hiring, team-based work, status distinctions, information sharing, contingent compensation, and job quality—are positively related to occupational safety (Nielsen et al., 2017). Furthermore, interactive safety training methods, such as behavioral modeling (e.g., role-playing), simulations, and hands-on training, significantly improve employees' capacity to handle extreme events. Burke et al. (2011) demonstrated that these safety training methods can lead to substantial improvements in safety knowledge and performance, especially in hazardous contexts. Leadership also plays a critical role, with safety-specific transformational leadership emerging as a promising approach (Barling et al., 2002). Such leaders exhibit individualized consideration, communicate a clear vision of workplace safety, inspire employees to exceed safety standards, and encourage them to innovate and improve safety practices. This leadership approach enhances the safety climate and safety consciousness, which in turn, predict positive safety outcomes and reduce injuries

(Kelloway et al., 2006). Finally, organizations should cultivate an open and supportive workplace culture where employees can voice safety concerns without fear of retribution. This approach encourages compliance with safety guidelines and facilitates early detection of stressors and hazards, ultimately enhancing safety outcomes (Probst et al., 2020).

Strengths, Limitations, and Future Research Directions

Our study has several strengths that are worth highlighting. Our hypotheses were supported by a well-established theoretical framework and tested across two field studies within work environments where employees are regularly exposed to extreme events of varying intensity or severity. Data from the firefighting setting, for example, enabled us to examine how individuals reacted to physical danger and trauma associated with rescue operations, road accidents, and other hazardous conditions, whereas data from seafarers were critical for investigating responses to isolation and confinement during extended periods at sea. This multi-study design increased the external validity and generalizability of our results (Hochwarter et al., 2011), ensuring a more nuanced understanding of the research questions.

Although our findings are encouraging, the quasi-experimental design has limitations. Specifically, there was a potential for selection bias due to the non-random assignment of participants to groups (Campbell & Stanley, 2015) and the subjective ranking of extreme events by the expert panel members (Okoli & Pawlowski, 2004). Additionally, the reliance on expert judgment may have introduced subtle inconsistencies in the classification of events, which could impact the uniformity of our findings. Recognizing these biases, we took precautions to ensure that our observations accurately reflect the real-world experiences of participants in their natural work environments. We also adopted a systematic approach, involving multiple rounds of consultation with experts who were carefully selected based on their diverse backgrounds and expertise in the field. This strategy allowed us to mitigate issues of personal biases, ensuring a more balanced perspective on our research questions.

Nevertheless, future research should consider employing alternative methods and more controlled approaches to complement our findings and provide deeper insights into the micro-foundations of extreme events.

In addition, as with many empirical studies, a limitation of this study is the reliance on self-report measures, which introduces potential common method bias (e.g., common rater effects). Additionally, we did not use longitudinal data with repeated measurements over time, which means autocorrelation in constructs was not accounted for, making causal inferences challenging (Ogbonnaya et al., 2023). Although these limitations are significant, they were partially addressed by spacing out intervals between data collection points and employing robust statistical analyses (Podsakoff et al., 2003). Nevertheless, future research could address these issues more effectively by using causal models that capture temporal patterns and the interdependence of variables, providing a stronger foundation for causal conclusions. Furthermore, we included reverse-coded items in our surveys, particularly for work engagement, to address potential response biases. While reversed items can sometimes load on separate factors (Kam, 2023), they are especially useful in specific contexts, such as non-English-speaking samples where cultural and linguistic factors may heighten the risk of response bias. This consideration was crucial for our sample of firefighters and seafarers in Iran, where cultural norms may introduce bias into survey results (Weijters & Baumgartner, 2012).

Furthermore, when selecting categories of extreme events, participants evaluated the events' intensity based on three criteria: frequency, challenge, and preparedness demands. While these criteria collectively represent the intensity of extreme events (Hannah et al., 2009), participants may have given varying weight to each criterion (e.g., prioritizing frequency over the level of challenge). Future research could address this limitation by isolating and independently assessing the impact of each criterion to better understand their

individual contributions to perceived event extremity. In addition, while we applied AET to underscore the role of negative emotions and low work engagement as mechanisms explaining the adverse outcomes of extreme events, it may be valuable to consider additional mediating mechanisms. These could help illustrate how individuals develop personal resources to mitigate the psychological impact of such events. Future research could expand these frameworks by incorporating elements of job design when investigating the negative consequences of extreme events.

Moreover, beyond self-emotion appraisal, dispositional traits such as conscientiousness, neuroticism, extraversion, locus of control, and risk-taking propensity (Christian et al., 2009), may serve as buffers against the negative effects of high exposure to extreme events on safety performance. For instance, Yuan et al. (2020) found that trait self-control mitigates the impact of abusive supervision on emotional exhaustion, while attentional bias toward safety moderates the link between emotional exhaustion and safety compliance. Exploring these traits alongside other dimensions of emotional intelligence, such as others-emotion appraisal and emotion regulation, can deepen our understanding of how individual factors influence safety performance. In addition to person-related factors, situation-related factors such as safety climate, leadership, and organizational support (Christian et al., 2009), may also assist in mitigating the negative effects of high exposure to extreme events on safety performance. For example, Probst (2004) demonstrated that a positive safety climate can reduce the negative effects of job insecurity on safety outcomes, such as safety knowledge, compliance, accidents, and injuries. Griffin and Hu (2013) showed that leaders who encourage safety-related learning can strengthen the link between safety monitoring and safety participation. Lyubykh et al. (2022) found that organizational support moderates the link between teams' shared transformational leadership and team leaders' safety participation. We recommend that future research develop more comprehensive

models that assess the interactive effects of individual and organizational factors on safety performance in extreme contexts.

Conclusion

In this research, we leveraged AET to shed new light on the micro-foundations of extreme events, focusing on how individuals perceive their intensity and the associated emotional, attitudinal, and behavioral responses. Our analysis of two field studies revealed compelling evidence that high exposure to extreme events reduces safety performance indirectly by eliciting negative emotions and decreasing employee work engagement. These findings underscore the importance of understanding employees' emotional and attitudinal responses to extreme events, particularly in work contexts where safety outcomes are at risk. We also established the importance of self-emotion appraisal as a moderating factor that weakens the adverse impact of extreme events on employee emotions. We hope that these findings inspire further research on individuals' ability to manage their emotions and thrive in challenging work environments.

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Table 1

Correlations and Descriptive Statistics in Study 1—Firefighting

Variables	Mean	SD	1	2	3	4	CR	MaxR(H)	AVE
1. Negative emotions	3.46	0.74	**.65**				0.88	0.90	0.43
2. Safety compliance	2.15	0.60	-.13	**.67**			0.71	0.71	0.45
3. Safety participation	4.22	0.49	-.11	.57	**.80**		0.77	0.80	0.46
4. Work engagement	4.10	0.54	-.18	.41	.42	**.76**	0.88	0.89	0.48
Age	2.93	0.92	.23**	-.02	.14*	.13*			
Education level	2.06	0.46	-.11	.08	.16**	.15**			
Tenure	3.33	1.09	.12*	.21**	.01	.25**			
Marital status	1.58	0.61	.12*	-.02	.02	.16**			

Note: SD: standard deviation; CR: composite reliability; MaxR(H): maximum reliability; AVE: Average variance extracted. Bolded values on the diagonal are the square root of correspondent AVE which should be larger than absolute value of correlation with another factors. Age: 1: 18-25; 2: 26-33; 3: 34-41; 4: 42-49; 5: 50-57. Education level: 1: Undergraduate degree; 2: Postgraduate degree; Tenure: 1: Less than 1 year; 2: 1-5 years; 3: 5-10 years; 4: 10-15 years: 4: 15-20 years; 5: More than 20 years; Marital status: 1: Single; 2: Married; 3: Divorced. -: correlation for age is not computed as all respondents were male. *: $p<0.05$; **: $p<0.01$; ***: $p<0.001$.

Table 2

Results from Path Analysis in Study 1—Firefighting

	Negative emotions			Work engagement			Safety compliance			Safety participation		
	B (*SE*)	*p*	95% CI	B (*SE*)	*p*	95% CI	B (*SE*)	*p*	95% CI	B (*SE*)	*p*	95% CI
Control variables												
Age	0.16 (0.09)	.06	[-0.00, 0.32]	-0.07 (0.09)	.43	[-0.25, 0.11]	-0.08 (0.09)	.38	[-0.26, 0.09]	-0.16 (0.09)	.07	[-0.33, 0.01]
Educational attainment	-0.14 (0.05)	.01	[-0.24, -0.03]	0.01 (0.06)	.86	[-0.10, 0.12]	0.01 (0.06)	.83	[-0.103, 0.12]	-0.00 (0.06)	.94	[-0.11, 0.10]
Tenure	-0.12 (0.10)	.24	[-0.32, 0.08]	0.10 (0.11)	.39	[-0.12, 0.32]	-0.00 (0.11)	.99	[-0.221, 0.21]	0.19 (0.11)	.08	[-0.02, 0.40]
Marital status	-0.13 (0.09)	.14	[-0.31, 0.04]	-0.23 (0.10)	.02	[-0.42, -0.03]	-0.02 (0.10)	.84	[-0.215, 0.17]	-0.17 (0.10)	.07	[-0.35, 0.01]
Study variables												
Negative emotions	--	--	--	-0.20 (0.06)	.00	[-0.31, -0.07]	-0.13 (0.06)	.04	[-0.25, -0.00]	-0.15 (0.06)	.01	[-0.27, -0.03]
Work engagement	--	--	--	--	--	--	0.28 (0.06)	.00	[0.16, 0.38]	0.25 (0.05)	.00	[0.14, 0.35]
Direct effects with high exposure as baseline or reference category												
Medium exposure	-0.39 (0.06)	.00	[-0.50, -0.27]	0.11 (0.07)	.11	[-0.02, 0.24]	0.01 (0.07)	.87	[-0.12, 0.14]	-0.02 (0.07)	.77	[-0.15, 0.11]
Low exposure	-0.51 (0.06)	.00	[-0.61, -0.39]	-0.11 (0.07)	.16	[-0.25, 0.04]	-0.24 (0.07)	.00	[-0.38, -0.10]	-0.25 (0.07)	.00	[-0.38, -0.11]
R^2		.28			.13			.17			.23	
R^2 *change*		.03			.07			.01			.05	
Indirect effects with high exposure as baseline reference category												
Medium exposure → Negative emotions → Work engagement → Safety compliance										0.02 (0.01)	.02	[0.00, 0.03]
Medium exposure → Negative emotions → Work engagement → Safety participation										0.02 (0.01)	.02	[0.00, 0.03]
Low exposure → Negative emotions → Work engagement → Safety compliance										0.03 (0.01)	.01	[0.00, 0.04]
Low exposure → Negative emotions → Work engagement → Safety participation										0.03 (0.01)	.01	[0.00, 0.04]

Sample size (N) = 292 firefighters

R^2 change is based on comparing our main model with an alternative model without control variables.

Table 3

Correlations and Descriptive Statistics in Study 2—Shipping

Variables	Mean	SD	1	2	3	4	5	CR	MaxR(H)	AVE
1. Work Engagement	2.45	0.66	**.64**					0.83	0.88	0.41
2. Safety compliance	4.25	0.44	.52	**.67**				0.71	0.71	0.45
3. Safety participation	4.12	0.52	.41	.50	**.71**			0.80	0.83	0.51
4. Negative emotions	3.45	0.89	-.20	-.19	-.13	**.76**		0.92	0.94	0.55
5. Self-emotion appraisal	2.93	1.33	.07	.09	-.03	-.20	**.78**	0.97	0.99	0.89
Age	2.81	0.83	.03	.01	.17**	.24**	-.06			
Education level	1.20	0.40	.22**	.11*	.06	-.47**	.14**			
Tenure	3.57	1.10	.18**	.04	.21**	.10	-.04			
Marital status	1.74	0.57	.06	.02	.21**	.12*	-.05			

Note: SD: standard deviation; CR: composite reliability; MaxR(H): maximum reliability; AVE: Average variance extracted. Bolded values on the diagonal are the square root of correspondent AVE which should be larger than absolute value of correlation with another factors. Age: 1: 18-25; 2: 26-33; 3: 34-41; 4: 42-49; 5: 50-57. Education level: 1: Undergraduate degree; 2: Postgraduate degree; Tenure: 1: Less than 1 year; 2: 1-5 years; 3: 5-10 years; 4: 10-15 years: 4: 15-20 years; 5: More than 20 years; Marital status: 1: Single; 2: Married; 3: Divorced. -: correlation for age is not computed as all respondents were male. *: $p<0.05$; **: $p<0.01$; ***: $p<0.001$.

Table 4

Results from Path Analysis in Study 2—Shipping

	Negative emotions			Work engagement			Safety compliance			Safety participation		
	B (*SE*)	*p*	95% CI	B (*SE*)	*p*	95% CI	B (*SE*)	*p*	95% CI	B (*SE*)	*p*	95% CI
Control variables												
Age	0.30 (0.11)	.01	[0.08, 0.51]	-0.56 (0.13)	.00	[-0.80, -0.31]	0.16 (0.13)	.24	[-0.10, 0.41]	0.09 (0.13)	.49	[-0.16, 0.33]
Educational attainment	-0.47 (0.05)	.00	[-0.55, -0.37]	0.01 (0.07)	.93	[-0.12, 0.13]	-0.03 (0.07)	.60	[-0.16, 0.09]	-0.14 (0.06)	.03	[-0.26, -0.01]
Tenure	-0.13 (0.11)	.23	[-0.35, 0.08]	0.69 (0.13)	.00	[0.44, 0.94]	-0.19 (0.14)	.16	[-0.45, 0.07]	0.01 (0.13)	.93	[-0.24, 0.26]
Marital status	-0.02 (0.05)	.76	[-0.11, 0.08]	0.01 (0.06)	.91	[-0.11, 0.12]	0.02 (0.06)	.75	[-0.09, 0.13]	0.14 (0.06)	.03	[0.02, 0.24]
Study variables												
Negative emotions	--	--	--	-0.17 (0.07)	.01	[-0.29, -0.04]	-0.19 (0.07)	.00	[-0.32, -0.06]	-0.27 (0.06)	.00	[-0.39, -0.14]
Work engagement	--	--	--	--	--	--	0.33 (0.05)	.00	[0.22, 0.43]	0.27 (0.05)	.00	[0.16, 0.36]
Direct effects with high exposure as baseline or reference category												
Medium exposure	-0.22 (0.05)	.00	[-0.32, -0.12]	0.08 (0.06)	.20	[-0.04, 0.19]	-0.13 (0.06)	.04	[-0.24, -0.00]	-0.16 (0.06)	.01	[-0.27, -0.04]
Low exposure	-0.36 (0.05)	.00	[-0.45, -0.26]	-0.04 (0.07)	.59	[-0.16, 0.09]	-0.28 (0.06)	.00	[-0.40, -0.15]	-0.35 (0.06)	.00	[-0.46, -0.23]
R^2		.40			.17			.18			.23	
R^2 *change*		.26			.10			.01			.05	
Indirect effects with high exposure as baseline or reference category												
Medium exposure → Negative emotions → Work engagement → Safety compliance										0.01 (0.01)	.04	[0.00, 0.02]
Medium exposure → Negative emotions → Work engagement → Safety participation										0.01 (0.01)	.04	[0.00, 0.02]
Low exposure → Negative emotions → Work engagement → Safety compliance										0.02 (0.01)	.02	[0.00, 0.03]
Low exposure → Negative emotions → Work engagement → Safety participation										0.02 (0.01)	.03	[0.00, 0.03]
Moderated effects with high exposure as baseline or reference category												
Medium exposure*Self-emotion appraisal → Negative emotions										0.14 (0.08)	.07	[-0.00, 0.28]
Low exposure*Self-emotion appraisal → Negative emotions										0.20 (0.07)	.01	[0.05, 0.33]
Medium exposure*Self-emotion appraisal → Negative emotions→ Work engagement → Safety compliance										-0.00 (0.00)	.15	[-0.00, 0.00]
Medium exposure*Self-emotion appraisal → Negative emotions→ Work engagement → Safety participation										-0.00 (0.00)	.15	[-0.00, 0.00]
Low exposure*Self-emotion appraisal → Negative emotions→ Work engagement → Safety compliance										-0.01 (0.00)	.08	[-0.01, 0.00]
Low exposure*Self-emotion appraisal → Negative emotions→ Work engagement → Safety participation										-0.01 (0.00)	.08	[-0.01, 0.00]

Sample size (N) = 315 seafarers

R^2 change is based on comparing our main model with an alternative model without control variables.

Figure 1
Conceptual Model

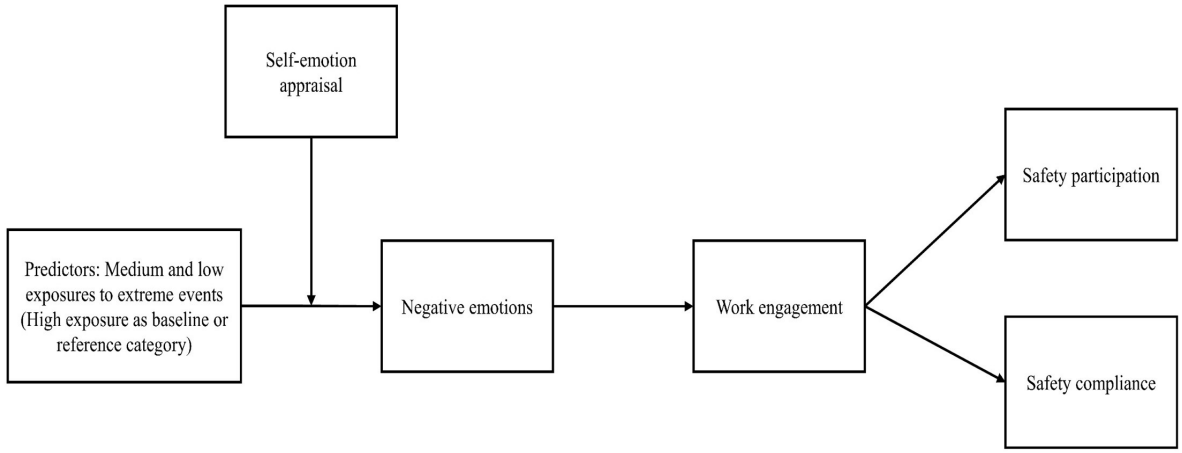

Figure 2

Moderated Effect of Low Exposure on Negative Emotions with High Exposure as Baseline