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Linking emotional intelligence to safety performance: The roles of situational awareness and safety training

Zhongmin Wang [a,*], Zhou Jiang [b], Anna Blackman [a]

[a] College of Business, Law and Governance, James Cook University, Australia
[b] College of Business, Government and Law, Flinders University, Australia

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ABSTRACT

Introduction: Safety outcomes in the workplace require individual employees to perform (behave) safely in everyday duties. While the literature suggests that emotional management capabilities or traits can be positively related to individual performance in certain conditions, it is not clear how they can influence safety-related performance in high-risk work contexts. Drawing upon trait activation theory, this paper aims to examine when emotional intelligence (EI) benefits employees' safety performance. We propose that when employees receive inadequate safety training, EI is more likely to trigger their situational awareness and consequently promote their safety performance. *Method:* We collected time-lagged data from 133 full-time airplane pilots working in commercial aviation industry. Hierarchical moderated regression analysis was conducted to test the moderating effect of safety training inadequacy on the EI–situational awareness relationship. The moderated mediation model, which involves conditional indirect effects of EI on safety performance via situational awareness across different levels of safety training inadequacy, was tested using the PROCESS-based bootstrap confidence interval. *Results:* Safety training inadequacy negatively moderated the relationship between EI and situational awareness, such that EI was significantly related to situational awareness only when safety training inadequacy was more salient. The more inadequate safety training was, the greater the indirect effect of EI on safety performance via situational awareness was. *Conclusions:* Inadequate safety training, as a negative situational cue, can activate individuals' EI to drive their safety-related cognitions (e.g., situational awareness) and behaviors. Effective safety training may be able to complement employees' low EI in shaping their situational awareness and safety behaviors. *Practical Applications*: Aviation managers should monitor the adequacy and effectiveness of safety training; this could make pilots' situational awareness and safety performance depend less on personal attributes (e.g., EI), which organizations are less able to control. When training capacity is temporarily limited, priority might be given to those with low EI.

Emotional Intelligence (EI) has attracted substantial scholarly attention due to its significant implications on workplace outcomes, including safety-related results (Karimi, Leggat, Bartram, & Rada, 2020; O'Boyle, Humphrey, Pollack, Hawver, & Story, 2011; Sunindijo & Zou, 2013). A large number of empirical studies have demonstrated that EI has a positive impact on individuals' work performance (Karimi et al., 2020; Law, Wong, & Song, 2004). For example, some researchers found that EI-specific attributes, including one's understanding of his/her own and others' emotions, and regulation and utilization of emotions, collectively enhance task and contextual performance (Bozionelos & Singh, 2017; O'Boyle et al., 2011). However, other studies have found that EI has only a marginal or non-significant effect on employee performance (Tu, Guo, Hatcher, & Kaufman, 2018). The inconsistent results suggest that the relationship between EI and work-related performance might be subject to certain conditions. For example, while the effect of EI on important work outcomes such as performance has been emphasized, both theoretically and empirically, some EI researchers argue that the study of EI is better situated in a specific context, particularly where emotions are likely to cause undesirable feelings or psychological states (Miao, Humphrey, & Qian, 2017).

In line with this contention, scholars (e.g., Sunindijo & Zou, 2013) have attempted to investigate the influence of EI in typical safety–critical work contexts (e.g., the construction setting), showing that EI facilitates workers in implementing safety management

* Corresponding author.
E-mail addresses: aaron.zhongmingwang@gmail.com, zhongmin.wang@my.jcu.edu.au (Z. Wang).

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tasks. Safety–critical situations are prone to raising emotional reactions (Leung, Chan, & Yuen, 2010); thus, the traits or abilities that enable better control over and regulation of undesirable emotional experiences should help individuals keep safe (Wang, Zou, & Li, 2016). Despite being theoretically meaningful, as we will discuss shortly, empirical research regarding the relationship between EI and safety performance is underdeveloped in multiple ways. To advance our knowledge in this regard, the current paper tests a situation-incurred, conditionally-mediated process underlying the EI–safety performance linkage.

While prior research has assisted with our understanding or forecast of the role of EI in predicting various types of work performance (e.g., safety performance), some areas warrant further investigation. For example, increasing numbers of voices in the literature argue that the influence of EI on performance is more indirect than direct (Ingram, Peake, Stewart, & Watson, 2019; Rode et al., 2007). Within these voices, researchers have argued for the potentiality that the insignificant EI–performance relationship observed in past research (e.g., Tu et al., 2018) could have been due to the ambiguity of EI's ability in explaining more proximate enablers of work performance. This indicates the need to place a focus on the core, proximate indicators of individual performance to explore their variations that are attributed to EI or similar emotional traits or abilities. In the safety-related domain, Endsley (1988) claims that situational awareness is the most important and proximal indicator of individuals' safety performance, especially in industries such as aviation, gas and mining, and construction. This claim is supported by the perspective that situational awareness denotes safety-oriented cognitions or abilities (Endsley, 2000). Based on Endsley, situational awareness is characterized by being aware of what is happening around the workplace, and this involves the capability of appraising critical environmental cues, processing vital safety information, forecasting near-future occurrences, and finding solutions to manage emerging risks. That is, safety performance is largely embedded in individuals' situational awareness (Caponecchia, Zheng, & Regan, 2018; Endsley & Robertson, 2000). As such, we first focus on situational awareness, which is argued to be a direct manifestation of safety performance, and its relationship with EI.

As stated above, prior research suggests inconsistent findings regarding the EI–performance relationship, indicating the roles of boundary conditions. While situational awareness is not a type of performance itself, it denotes a critical, immediate indicator of safety performance (Sneddon, Mearns, & Flin, 2013); thus, we expect that the relationship between EI and situational awareness may also be subject to certain boundary conditions. In this paper, we consider training-related conditions that may intervene with EI to affect employees' psychological and behavioral reactions. This consideration is based on the view that external cues are important to drive how people use personal resources to guide their understanding of relevant contexts (Tett & Burnett, 2003), and that this importance becomes more salient when external situations become more challenging (Farh, Seo, & Tesluk, 2012). Specifically, for this study, EI is a personal resource that people might rely on more under more challenging circumstances to shape their understanding of the associated environment (e.g., situational awareness) and thus to direct subsequent behaviors (e.g., safety behaviors). The literature has highlighted safety training inadequacy as a significant concern in safety–critical industries and organizations (Chan, Wong, Hon, Javed, & Lyu, 2017), as evidenced in research suggesting that ineffective or insufficient safety training represents significant challenges that produce heightened anxiety and stress (Huber, Hill, & Merritt, 2015). Therefore, we examine safety training inadequacy as a moderator (i.e., boundary condition) for the effect of EI.

Integrating these ideas, this paper develops and tests a model (Fig. 1), which proposes that safety training inadequacy will interact with EI to influence situational awareness, which in turn influences safety performance. We draw on trait activation theory (TAT) (Tett & Burnett, 2003) to conceptualize the moderating effect of training inadequacy on the EI–situational awareness relationship. According to TAT, trait-relevant external cues (e.g., task, social, and organizational demands or stressors) are likely to strengthen or weaken the relationship between traits and individuals' cognitive and behavioral outcomes, for traits can be activated by these cues to guide individuals' thoughts and actions. TAT and related research highlights that these traits are broadly defined as personal attributes that may not change rapidly in time (Farh et al., 2012). In the present study, EI is such an attribute; it denotes an individual's "emotions-related behavioral dispositions and self-perceived abilities" (Sanchez-Ruiz, Mavroveli, & Poullis, 2013, p. 658). Following Farh et al.'s (2012) application of TAT in EI research, as we will theorize later, this paper argues that EI will be activated by challenging external cues (e.g., safety training inadequacy) to affect situational awareness. Since situational awareness is an immediate enabler of safety performance (Endsley, 2000), we also expect that when activated by training inadequacy, the role of EI will extend to impact safety performance through situational awareness.

This paper contributes to the literature in different ways. First, it sheds light on an indirect approach to exploring the EI–performance link, for which prior research has generated inconclusive results. Specifically, by extending this link to the safety context, we emphasize the importance of focusing on a core, proximal indicator of safety performance (i.e., situational awareness) to appreciate the role played by EI. Second and relatedly, our research advances the EI–performance literature by identifying safety training inadequacy as a boundary condition that triggers emotional competence to function in building employees' situational awareness. Extending TAT (Tett & Burnett, 2003) into the safety performance setting to explain the effect of EI, we verify that EI, a self-perceived ability operationalized through a trait approach (i.e., self-rated EI; Wong & Law, 2002), when activated by the inadequacy of training (an opposing work demand), contributes to shaping situational awareness. Third, it enriches the EI and work performance theories by verifying the moderating mediation model of EI–safety performance involving situational awareness

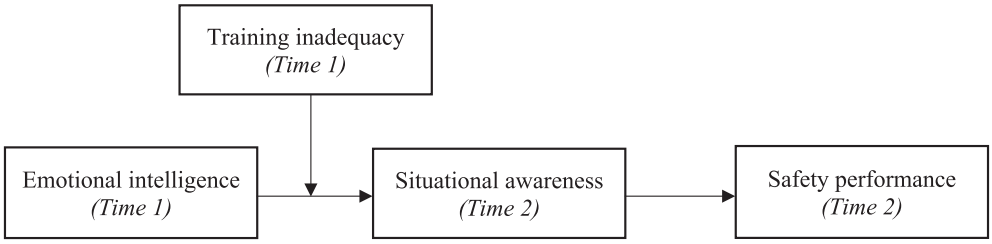

Fig. 1. Research model.

as a mediator and safety training inadequacy as a boundary condition, thereby providing a new explanation of when and how EI might matter in employee performance.

1. Literature review and hypothesis development

According to Mayer and Geher (1996), EI refers to individuals' ability to regulate and use emotional competence to guide thinking and improve performance. In the daily workplace, which Khalili (2012) calls an emotion-eliciting environment, there would be a variety of emotional distractions from intrapersonal factors (e.g., personal health and family issues), interpersonal factors (e.g., the relationship with colleagues and supervisors), and other factors (e.g., stressful company or environment). These distractions can perturb people's moods and cause unpleasant feelings, and the planned work scheme may thus be interrupted when individuals are less able to control these emotional experiences (Cardenas, Major, & Bernas, 2004). It is important to cast aside the distractions and focus on the most urgent/important tasks to avoid unnecessary consumption of mental energy if one is to be effective at work.

The literature suggests the relevance of EI-related attributes in one's awareness of or attention to one's affiliated situation. For example, Brackett, Rivers, and Salovey (2011) have summarized that employees with high emotional regulation skills tend to be more vigilant to emerging information from colleagues and the work environment, be more proficient in distinguishing various types of information, and shift attention from less significant tasks to focus on the more critical. In the course of performing work, situational awareness plays a crucial role during the decision-making process (Endsley & Robertson, 2000). According to Endsley (1988, p. 97), situational awareness refers to "the perception of elements of the environment, the comprehension of their meaning, and the projection of their future status." The process of accomplishing a specific task involves effective information analysis, planning, decision-making and action. As Durso, Hackworth, Truitt, Crutchfield, and Nikolic (1999) emphasized, situational awareness establishes the foundation of decision-making that requires significant attention to contextual cues.

Research indicates that it is important to maintain a comfortable stable mood in the workplace without the interference of negative emotions (Muchinsky, 2000). This requires a person to possess effective emotional management abilities or traits (e.g., EI). Emotions bias people's thinking and behaviors (Miner & Glomb, 2010). For instance, individuals are likely to overestimate their capabilities and neglect the distal details when in a good mood. In contrast, people tend to underestimate their abilities and lack confidence when in a bad mood. Either way, intense emotions could alter people's way of thinking, interfere with their attention, and lead them to make decisions that violate their original purpose (Beal, Weiss, Barros, & MacDermid, 2005). These arguments assert that EI may be positively related to situational awareness because EI involves one using emotions to reason about situational information and to help undertake rational behaviors. However, as discussed earlier, in safety contexts, this potential relationship between EI and situational awareness might be subject to the level of safety training inadequacy. Below, we theorize how safety training inadequacy might alter the strength of this relationship.

2. The moderating role of safety training inadequacy

This paper draws upon the trait-activation perspective to discuss the role of training inadequacy. Previous research has proved that many personal traits are stable dispositions that can predict job performance (Barrick, Mount, & Judge, 2001; Mount, Barrick, & Stewart, 1998) and verified that whether and to what extent they can influence one's behaviors and performance is subject to situational cues (Kell, Rittmayer, Crook, & Motowidlo, 2010). Based on a personality–job fit perspective combined with a traits–situation interaction perspective, Tett and Burnett (2003) introduced TAT to explain how traits or stable individual attributes can drive one's psychological and behavioral reactions by considering contextual interferences.

TAT presents a person–situation interactionist perspective suggesting that trait-relevant situations (or situational cues) can activate an individual's way of expressing their traits, therefore influencing job performance (Tett & Burnett, 2003). In the workplace, employees prefer to seek jobs that can easily express their instinctive traits or use their attributes to pursue satisfaction and achieve success (Farh et al., 2012). For example, an introverted person will not look for a sales or customer service job because he/she knows the challenges will put him/her in an unfavorable situation. In contrast, an extraverted person may easily use their strengths to gain satisfaction in the above jobs (Barrick, Stewart, & Piotrowski, 2002). This is consistent with Johns' (2006) perspective that work contexts can be situational opportunities or constraints to enlarge or suppress the influence of traits on work performance, depending on whether the situation or associated cues are relevant/important to the traits.

In the present study, EI is a trait-like attribute that reflects one's self-perceived capability (Wong & Law, 2002). Applying TAT to this case, certain situational or context cues might activate EI to manifest its function on employee outcomes. TAT states that traits are activated by task, social, or organizational cues to affect performance (Tett & Burnett, 2003), partly because activated traits or relatively-stable attributes (e.g., trait-like abilities) elicit cognitions or psychological states before changing behaviors or performance (Blickle, Schütte, & Genau, 2018). Situational awareness, as noted earlier, reflects such psychological cognitions relevant to one's environment, and it is a precursor of job performance (e.g., safety performance) (Irwin, Caruso, & Tone, 2019). In line with TAT, we propose that the EI and situational awareness relationship will be stronger when safety training inadequacy becomes more salient.

Training equips individuals with essential skills and relevant capabilities to perform their tasks and duties in an effective manner (Bartel, 1995). In a safety–critical work context, inadequate safety training may result in consequences harmful to the individual (e.g., stress, errors, and mistakes) and the organization (e.g., turnover, low productivity, and jeopardized safety patterns) (Dysvik & Kuvaas, 2008; Elnaga & Imran, 2013; Zhao, Hwang, & Gao, 2016). Importantly, when employees are aware that the company offers insufficient training, which hinders them from gaining relevant resources that are needed to navigate or explore the safety–critical environment (Givehchi, Hemmativaghef, & Hoveidi, 2017), they tend to seek from inside (i.e., within the individual) and use related personal abilities/resources to deal with the situation (Rhee, Hur, & Kim, 2017).

A lack of safety training may represent risky situational constraints (Zhao, Wu, & Wang, 2018), which to some extent signal the cue that employees may not immediately gain resources from the organization before the situation is improved. Research indicates that inadequate training impairs employees' confidence, raises concerns, and incurs negative emotions (e.g., fear, depression, and anxiety, Huber et al., 2015). These negative psychological and emotional experiences would need individuals to access and utilize effective emotional management abilities or attributes to maintain their cognitive, attitudinal, or behavioral engagement at work (Rothbard & Wilk, 2011).

This line of reasoning suggests that when safety training is not adequate, it sends out the contextual cue that the lack of knowl-

edge/information to evaluate or forecast the safety–critical situation will lead to emotionally challenging circumstances. In this case, EI, which can assist to manage these challenging circumstances, is likely to be activated to help deal with associated unpleasant emotions (e.g., frustration, fear, confusion, or anxiety) so as to maintain situational awareness, which is a key to ensuring safety (Endsley, 2000). Therefore, when there is a lack of training, EI will play a stronger role in promoting and maintaining situational awareness. Conversely, when training is abundant, the role of EI might be less prominent. Thus, we propose:

Hypothesis 1: Safety training inadequacy will strengthen the relationship between EI and situational awareness.

3. The moderated mediation effect on safety performance

In addition to the above direct implications for situational awareness, we also propose that EI and safety training adequacy have downstream implications for safety performance. In fact, as mentioned earlier, past research has verified that situational awareness is an important antecedent of safety performance (Endsley, 1999; Fernandes & Braarud, 2015). In the case of the complex work environment, a lack of situational awareness can cause severe consequences that incur risks and unsafe behaviors (Nazir, Colombo, & Manca, 2012). Some researchers hold that situational awareness reflects cognitive motivations for information processing (van Winsen, Henriqson, Schuler, & Dekker, 2015), which is needed to direct safety actions. Based on the workplace safety research literature, these motivational characteristics associated with situational awareness can directly enable employees to perform tasks safely (Christian, Bradley, Wallace, & Burke, 2009). Integrating these arguments with the aforementioned discussions of the interactive effect of EI and safety training inadequacy on situational awareness, we propose that safety training adequacy will moderate the mediated effect of situational awareness on the relationship between EI and safety performance. Specifically, under high levels of safety training inadequacy, individuals will rely more on EI to maintain situational awareness, and in turn achieve better safety performance. In contrast, when safety training is abundant (i.e., low levels of training inadequacy), individuals become more confident in using gained safety-related knowledge and skills through training to conduct their tasks; thus, their EI tends to have less of an impact on situational awareness and in turn on safety performance. Therefore, we posit the following moderated mediation effects:

Hypothesis 2: Safety training inadequacy moderates the mediated relationship between EI and safety performance through situational awareness, such that the mediated relationship will be stronger when safety training is more inadequate.

4. Methods

4.1. Sample and procedure

We collected a convenience sample of full-time pilots working in the commercial aviation industry in China. With the assistance of a fleet manager, paper and online questionnaires were administered among frontline pilots in four airlines in mainland China. To reduce common method bias that is associated with self-reported data (Podsakoff, MacKenzie, & Podsakoff, 2012), participants were asked to complete a two-wave survey at two separate time points. In the first questionnaire (Time 1), pilots provided demographic information and answered questions regarding EI and safety training inadequacy. Approximately one month later (Time 2), they were asked to respond to the second questionnaire, which included questions regarding situational awareness and safety performance.

In Time 1, a total of 211 participants (response rate = 79.3%) returned useable responses. Out of these participants, 161 returned valid questionnaires (response rate = 76.3%) in Time 2. For each individual, his or her two questionnaires were matched using a self-created, unique code that mixed numbers and letters. Finally, questionnaires were successfully matched for 133 pilots. In this sample, 97.7% of the respondents were male. The average age was 28.66 years (SD = 4.11), and all of them had completed tertiary education. The average job tenure was 38.86 months (SD = 41.27).

4.2. Measures

Measurement items were originally written in English and then translated into Chinese following a back-translation procedure (Brislin, 1980). Participants rated all these items using a Likert-type scale (1 = strongly disagree; 5 = strongly agree).

EI. The 16-item scale developed by Wong and Law (2002) measured emotional intelligence. These items collectively capture individuals' abilities in understanding their own and others' feelings, regulating emotions, and using emotions for motivation purposes. Example items are "I am sensitive to the feelings and emotions of others" and "I am able to control my temper and handle difficulties rationally." The Cronbach's α for emotional intelligence was 0.89.

Safety training inadequacy. Four items developed by Evans, Glendon, and Creed (2007) were employed to measure the inadequacy of safety training in the organization. An example item is "Company training provided adequate skills and experience to carry out normal operations safely" (reverse coded). The Cronbach's α for safety training inadequacy was 0.85.

Situational awareness. The 13-item scale created by Sætrevik (2013) was adopted to measure pilots' situational awareness. Example items are "I plan ahead in order to handle various and adverse incident that may arise" and "I usually know what's going to happen next with regard to safety." The Cronbach's α for situational awareness was 0.62.

Safety performance. The seven-item instrument developed by Griffin and Neal (2000) was employed to measure pilots' safety performance. This instrument captures individuals' compliance and participation in safety procedures and behaviors in the workplace setting. Example items are "I carry out work in a safe manner" and "I help my co-workers when they are working under risky or hazardous conditions." The Cronbach's α for safety performance was 0.93.

Control variables. As prior research indicated that age, gender, and job tenure could potentially impact employees' safety performance (DeJoy, Schaffer, Wilson, Vandenberg, & Butts, 2004; Siu, Phillips, & Leung, 2003), as in other studies (e.g., Griffin & Hu, 2013), these variables were controlled in the data analyses. Because safety performance was self-reported, the supplementary analyses controlled for social desirability, which, as some researchers have argued, could potentially lead participants to offer slightly, if not to a large extent, more favorable performance ratings (e.g., Xie, Roy, & Chen, 2006). If the results remain similar regardless of controlling for social desirability, or the expected relationship becomes more prominent, or the social desirability is not significantly related to performance/behaviors, it is less likely that the results are distorted by self-rated measures of performance or behaviors (e.g., Cheng, Yen, & Chen, 2012; Crant, 1995). Social desirability was measured by five items developed by Hays, Hayashi, and Stewart (1989). An example item is "I am always courteous even to people

who are disagreeable." The Cronbach's α for social desirability was 0.63.

4.3. Data analysis

Missing values were dealt with by multiple imputation (Bernaards & Sijtsma, 2000). Specifically, if a participant had missing data on several, but not all, items on the scale for a variable, we followed Wanberg, Zhu, and Van Hooft (2010) in applying the full information maximum likelihood (FIML) to replace these missing values. Those participants that had all items missing on a scale were excluded from subsequent analyses, for there was no information/data on this scale that could be used for imputation (Bernaards & Sijtsma, 2000). Three cases had missing values for age and/or job tenure and were excluded from the main analyses. This process resulted in a sample of 130 for confirmatory factor analysis (CFA), and the listwise deletion resulted in a sample of 126 for correlational and regression analyses.

Before the hypotheses were tested, CFA was conducted to examine the discriminant validity of the four focal study variables (i.e., EI, safety training inadequacy, situational awareness, and safety performance) measured by multiple items. Considering the relatively small sample size and the large number of measurement items, we followed the recommendation of Little, Cunningham, Shahar, and Widaman (2002) in creating item parcels to reduce the inflation errors. EI and situational awareness were each represented by four parcels and safety performance by two parcels. The moderation hypothesis (Hypothesis 1) was examined using hierarchical regression analysis. The moderated mediation hypothesis (Hypothesis 2) was tested using the PROCESS code for SPSS (Hayes, 2013).

5. Results

5.1. Confirmatory factor analysis (CFA)

To check if the key variables featured in the research model (Fig. 1) could be distinguished from one another, we conducted CFA to test the measurement model. The hypothesized baseline model was a four-factor model, in which EI, safety training inadequacy, situational awareness, and safety performance were loaded on four separate factors. We compared this model with six three-factor models, three two-factor models, and a one-factor model. The results of CFA are shown in Table 1.

Following prior researchers (e.g., Franco-Santos, Nalick, Rivera-Torres, & Gomez-Mejia, 2017; Millner et al., 2020), we used three commonly used fit indexes to assess model fit: the root mean square error of approximation (RMSEA), the standardized root means square residual (SRMR), and comparative fit index (CFI). If a model's fit indexes meet the cut-off criteria (RMSEA <0.08, SRMR <0.08, and CFI >0.90), this model is regarded to fit the data well (Hu & Bentler, 1999). As shown in Table 1, the four-factor measurement model met all these criteria, while the other models did not. In addition, the chi-square difference ($\Delta\chi^2$) test further supported that the four-factor measurement model achieved a fit better than those of all other alternative models. This result suggested that EI, safety training inadequacy, situational awareness, and safety performance were empirically distinct constructs in the current research, sufficiently justifying the treatment of them as separate variables in the following analyses.

5.2. Descriptive statistics

The means, standard deviations, and correlations of the demographic controls and the four main variables are shown in Table 2. EI was significantly related to safety performance but not situational awareness. Consistent with several scholars' (Farh et al., 2012) view that the influence of EI on employee states or outcomes to some extent depends on boundary conditions, this result offered initial insights on the necessity of testing moderators of EI regarding its relationship with situational awareness. Detailed results regarding the moderation follow.

5.3. Results of hypothesis testing

Hypothesis 1, the moderation hypothesis, predicted that safety training inadequacy would strengthen the relationship between EI and situational awareness. It required a test of the interaction effect of EI and safety training inadequacy on situational awareness. We followed the well-established and most widely used procedure for moderation testing (Hayes, Montoya, & Rockwood, 2017), hierarchical regression analysis, in examining this hypothesis. The results are reported in Table 3.

As can be seen from Table 3, we followed our predecessors (e.g., Oliver, Hausdorf, Lievens, & Conlon, 2016) in performing a three-step hierarchical regression. In Step 1, control variables including gender, age, and job tenure were entered. In Step 2, the main effect step, the independent (i.e., EI) and moderating (i.e., safety training inadequacy) variables were entered. In Step 3 was entered the interaction term, which was equal to the product of IE and safety training inadequacy. In accordance with the advice of Aiken, West, and Reno (1991), both EI and safety training inadequacy

Table 1
CFA results.

Models	χ^2	*df*	$\Delta\chi^2$	Δdf	χ^2/df	SRMR	RMSEA	CFI
4-factor model	**99.32***	**71**	**—**	**—**	**1.40**	**0.07**	**0.06**	**0.96**
3-factor model A	173.91***	74	74.60***	3	2.35	0.10	0.10	0.84
3-factor model B	169.83***	74	70.51***	3	2.29	0.10	0.10	0.85
3-factor model C	197.74***	74	98.42***	3	2.67	0.11	0.11	0.81
3-factor model D	258.40***	74	159.09***	3	3.49	0.11	0.14	0.71
3-factor model E	243.46***	74	144.14***	3	3.29	0.10	0.13	0.73
3-factor model F	181.26***	74	81.94***	3	2.45	0.11	0.11	0.83
2-factor model A	267.06***	76	167.74***	5	3.51	0.13	0.14	0.70
2-factor model B	329.79***	76	230.47***	5	4.34	0.13	0.16	0.60
2-factor model C	322.66***	76	223.35***	5	4.25	0.13	0.16	0.61
1-factor model	423.29***	77	323.97***	6	5.50	0.16	0.19	0.46

Note. $N = 130$. Three cases were excluded because of missing values. 4-factor model: each variable was treated as a single factor; 3-factor model A: EI and situational awareness were combined; 3-factor model B: situational awareness and safety performance were combined; 3-factor model C: EI and training inadequacy were combined; 3-factor model D: Training inadequacy and safety performance were combined; 3-factor model E: EI and safety performance were combined; 3-factor model F: training inadequacy and situational awareness were combined; 2-factor model A: EI and training inadequacy were combined; situational awareness and safety performance were combined; 2-factor model B: EI and situational awareness were combined; training inadequacy and safety performance were combined; 2-factor model C: EI and safety performance were combined; situational awareness and training inadequacy were combined; 1-factor: all variables were combined.

Table 2
Means, standard deviations, and correlations.

Variables	Mean	SD	1	2	3	4	5	6
1. Gender	0.98	0.15						
2. Age	28.75	4.12	0.00					
3. Job tenure (months)	39.31	41.90	0.00	0.66**				
4. Emotional intelligence	3.89	0.50	−0.02	−0.17	−0.17			
5. Training inadequacy	1.65	0.66	−0.04	0.17	0.12	−0.29**		
6. Situational awareness	3.61	0.37	0.010	0.16	0.12	0.13	−0.09	
7. Safety performance	4.32	0.72	0.03	−0.06	−0.03	0.26**	−0.26**	0.21*

Note. $N = 126$. Listwise deletion was applied. Gender was dummy coded (male = 1 and female = 0).
* $p < .05$.
** $p < .01$.

Table 3
Results of moderated regression analyses (Hypothesis 1).

	Situational awareness		
	Step 1	Step 2	Step 3
Gender	0.10	0.09	0.10
Age	0.14	0.17	0.20
Job tenure (months)	0.02	0.04	0.04
Emotional intelligence (EI)		0.14	0.17+
Training inadequacy		−0.08	−0.09
EI × training inadequacy			0.21*
R^2	0.03	0.07	0.11*
ΔR^2		0.03 [a]	0.04*,[b]

Note. $N = 126$. Listwise deletion was applied. Standardized estimates are reported.
+ $p < 0.10$
* $p < 0.05$.

were mean-centered before the interaction term was calculated to reduce multicollinearity. According to Baron and Kenny (1986), testing a moderating effect does not require the main effects of the independent and moderating variables to be statistically significant. When the interaction term is significant in predicting the dependent variable (i.e., situational awareness for this particular moderation analysis), it reveals the existence of a moderation.

As Table 3 presents, the interaction between EI and safety training inadequacy was significant in predicting situational awareness ($\beta = 0.21$, $p < .05$), providing initial support for the moderating role of safety training inadequacy. To verify if the moderation was in the expected direction, we followed Dawson (2014) in creating a graphic presentation of the interaction effect. Specifically, we plotted the simple slope of the effect of EI on situational awareness one standard deviation above and below the mean of safety training inadequacy (see Fig. 2). Results of simple slope analysis showed that EI had a significant, positive effect on situational awareness only when safety training inadequacy was high (simple slope = 0.28, $t = 2.76$, $p < .01$), and there was not a significant effect when safety training inadequacy was low (simple slope = −0.02, $t = -0.255$, $p > .10$). Therefore, the relationship between EI and situational awareness was stronger when there was a higher level of safety training inadequacy, supporting Hypothesis 1.

Hypothesis 2 predicted that training inadequacy would suppress the indirect relationship between EI and safety performance through situational awareness. This hypothesis represented a first-stage moderated mediation. According to Hayes (2013), the test of a first-stage moderated mediation requires (1) testing the moderation of the first stage of the mediation and (2) testing the conditional indirect effects. Specifically, for the current research, Hypothesis 1 has supported that safety training inadequacy moderated the first stage of the mediation (i.e., the link between EI and situational awareness). The conditional indirect effects were examined with Hayes' (2013) PROCESS code for SPSS with 5000 bootstrap samples. Following Belogolovsky, Bamberger, and Bacharach (2012), we used a 90% bias-corrected confidence interval to test the significance of conditional indirect effects in our main analyses. A confidence interval not including zero indicates that an indirect effect is statistically significant (Hayes, 2013).

Table 4 presents the conditional indirect effects across low and high levels of training inadequacy. Results showed that the conditional indirect effect of EI on safety performance through situational awareness was significant under high-level training inadequacy ($B = 0.10$, Boot $SE = 0.06$, 90%$CI = [0.02, 0.21]$) but non-significant under low-level training inadequacy ($B = -0.01$, Boot $SE = 0.04$, 90%$CI = [-0.09, 0.06]$). The index of moderated mediation was significant (index = 0.08, Boot $SE = 0.06$, 90%$CI = [0.01, 0.21]$), suggesting that these two conditional indirect effects were significantly different from each other. These results demonstrated that only under high levels of safety training inadequacy could situational awareness mediate the relationship between EI and safety performance. Therefore, the mediated relationship was stronger when safety training inadequacy was high rather than low, and Hypothesis 2 was supported.

5.4. Supplementary analysis

As noted earlier, since some researchers argue that self-rated performance may be inflated by the respondents because of the socially desirable orientation (Schriesheim, 1980), we conducted additional analyses to test the proposed hypotheses by controlling for social desirability. Specifically, in these supplementary analyses, social desirability was added to the group of control variables in the hierarchical regression analysis for the moderation (for Hypothesis 1) and to the group of covariates controlled for both situational awareness and safety performance in the PROCESS analysis (for Hypothesis 2).

Results showed that the hypotheses remained supported. Similar to the main analyses reported above, the interaction term of EI and safety training inadequacy in predicting situational awareness was positive and significant ($\beta = 0.21$, $p < .05$). PROCESS results, with social desirability controlled for and based on 5000 bootstrap samples, demonstrated that the conditional indirect effect of EI on safety performance through situational awareness was stronger when safety training inadequacy was high ($B = 0.10$, Boot $SE = 0.06$, 95%$CI = [0.01, 0.27]$) rather than low ($B = -0.02$, Boot $SE = 0.04$, 95%$CI = [-0.12, 0.06]$). The index of moderated mediation was significant (Index = 0.09, Boot $SE = 0.07$, 95%$CI = [0.001, 0.26]$). Altogether, these results further consolidated the support of the proposed hypotheses.

6. Discussion

Researchers have begun investigating the role of EI in safety contexts (Sunindijo & Zou, 2013). However, our knowledge of how and when EI matters in promoting employees' safety performance is still limited. Inconsistent findings in the literature regard-

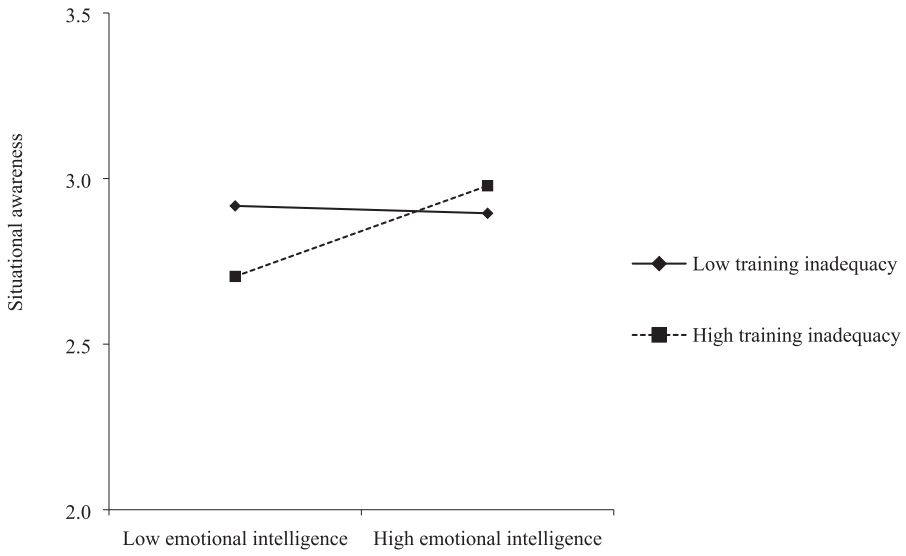

Fig. 2. The moderating effect of training inadequacy on the relationship between emotional intelligence and situational awareness.

Table 4
Conditional indirect effects of emotional intelligence on safety performance via situational awareness (Hypothesis 2).

	B	Boot SE	Boot LLCI	Boot ULCI
Conditional Indirect Effects				
Low-level training inadequacy	−0.01	0.04	−0.09	0.06
High-level training inadequacy	0.10	0.06	0.02	0.21
Index of Moderated Mediation	0.08	0.06	0.01	0.21

Note. LLCI = lower limit confidence interval (CI). ULCI = upper limit CI. 90%CI based on 5000 bootstrap samples. Low-level and high-level training inadequacy equals one standard deviation below and above the mean of training inadequacy.

ing the EI–performance linkage have led researchers to see the value of focusing on the indirect effect of EI on performance and the associated boundary conditions (i.e., moderators) to explore how EI influences performance (Rode et al., 2007). To this end, we investigated the relationship between EI and safety performance through the mechanism of situational awareness, a proximal enabler of safety performance, and the moderating role of safety training inadequacy, which is an important but underestimated boundary condition in the effects of EI. Our findings suggested that safety training inadequacy strengthened the link between EI and situational awareness, meaning that for those individuals receiving inadequate safety training, EI was more likely to contribute positively to their situational awareness, as compared to those receiving adequate training. In addition, we found that the moderating effect of safety training inadequacy could extend to moderate the indirect effect of EI on safety performance through situational awareness. In the following sections, we discuss the theoretical and practical implications of these findings, as well as the limitations of this study and suggestions for future research.

6.1. Theoretical implications

Drawing on the trait-activation perspective (Tett & Burnett, 2003), we proposed and found that EI would interact with safety training inadequacy to affect situational awareness, and in turn influence safety performance. Our study has important theoretical implications. First, we empirically contribute to the theoretical indication that the EI–performance relationship is more indirect through extending the focus to a proximal antecedent of safety performance (i.e., situational awareness) and probing the boundary condition underlying its relationship with EI. According to our results, the influence of EI on situational awareness is conditional on safety training inadequacy. Specifically, this influence tends to be consolidated when training is more inadequate. Therefore, training inadequacy, as a contextual factor, can trigger the role of EI in promoting situational awareness. This finding is consistent with TAT (Tett & Burnett, 2003), which emphasizes that personal attributes of a relatively stable nature can be activated by certain contexts to exert influences on one's cognitions, psychological states, and behaviors (Farh et al., 2012; Judge & Zapata, 2015). In our case, when safety training is less adequate, EI is activated to play a role. For example, when a company cannot provide sufficient safety training, from which employees may benefit little, if any, to improve their situational awareness at work where safety needs particular attention. In this case, as per our findings, employees with high-level EI may be better able to conquer the challenges associated with lack of training to maintain a certain level of situational awareness needed in safety contexts.

This observation regarding employees whose EI is activated is also in accordance with previous studies that show that, when facing a disadvantaged or challenging situation, individuals with higher levels of EI are more likely to take proactive actions than to be passive (Kim, Cable, Kim, & Wang, 2009). For example, high-EI individuals usually actively seek advice from experienced colleagues or supervisors, or they search for useful material online to increase their safety knowledge and boost safety-related situational awareness. In the workplace, individuals with high levels of EI will be more vigilant, such as becoming more cautious about the emerging information, paying attention to the details, and discreetly forecasting the changes (Brackett et al., 2011). These ten-

dencies characterize one's mindfulness or heedfulness toward his or her associated environments, and thus they are an explicit symbolization of situational awareness (Brackett et al., 2011). In contrast, instead of being active in looking for solutions to tackle the challenges (e.g., inadequate training), low-level EI employees may respond passively and negatively by complaining, losing confidence, and misinterpreting contextual information, which can lead to or be the embodiments of poor situational awareness (Jordan et al., 2002).

Second, we extended the moderation model to test a moderated mediation that represents a more complex process explaining the EI–safety performance relationship. Specifically, we have verified the downstream implications of situational awareness, the level of which varies with the interaction of EI and safety training inadequacy, on safety performance. By doing so, we broaden the impact of EI on performance through an expanded application to safety performance at work, an underexplored area in both EI and safety domains, as well as supplement the emerging but limited studies (e.g., Sunindijo & Zou, 2013) on the EI–safety performance linkage, which have neglected the boundary conditions of how EI matters in boosting safety behaviors. The findings of the present study indicate that only when safety training is inadequate can situational awareness serve as a mediation mechanism to transmit the effect of EI to safety performance. When employees receive adequate training, the mediating effect of situational awareness disappears.

These findings provide evidence for Rode et al.'s (2007) contention that EI's influence on employees' attitudes and behaviors may not be overt or direct and that it depends on work contexts and conditions. In this research, safety training inadequacy, serving as an adverse condition, boosts a greater effect of EI to facilitate the development of situational awareness, which enables superior performance in a safety–critical environment. What is implied is that while negative conditions may strike individuals' mindsets and mental/cognitive models and lead to lower performance, personal attributes like EI are likely to help alleviate this strike and thus maintain the situational awareness-based process underlying the EI–safety performance relationship. This implication accords with the TAT theory, which indicates that organization-level constraints can activate less-changeable personal traits or abilities to initiate a process that improves performance (Tett & Burnett, 2003). In the present study, we have highlighted that when employees are aware that the company offers insufficient training that is needed for safety effectiveness, they tend to turn to the self and utilize related abilities or traits to guide their cognitions so as to achieve the desired safety performance. From a broader perspective, this is supportive of the view that the conflict between the demands of performing well and the lack of training make it important for individuals to rely on personal resources (e.g., EI) to master the situation and achieve better performance (Brackett, Rivers, Shiffman, Lerner, & Salovey, 2006; Rhee et al., 2017).

6.2. Practical implications

Our study has important implications for managerial practice. For example, our findings provide organizations and managers, particularly those in safety–critical industries, with the knowledge that employees' EI does matter in persuading them to comply with safety procedures and participate in building a safe workplace climate. However, to what extent managers can expect to rely on or improve employees' EI to ensure desirable safety performance depends on specific situations, some of which are under the organization's or the manager's control. Our results indicate that whether employees receive enough safety-related training can help guide managers' emphasis on employees' EI.

From the safety management perspective, it is ideal that organizations can provide comprehensive, quality safety training to employees. However, it is often the case that the organization lacks resources or has unintentionally neglected certain aspects, damaging the quality of training development or delivery (Analoui, 2000); alternatively, due to individual differences, the content may not be well received and/or digested by trainees even when quality development/delivery is assured from the organization side (Brown, 2001). Our results suggest that if the organization does not provide, or employees do not perceive, enough safety training, those with higher levels of EI may be better able to keep on track with safety performance, for their EI is more likely to help them maintain situational awareness, which is key to ensuring safe behaviors. Therefore, when managers are aware of problems with safety training, they might pay more attention to employees who are less emotionally intelligent, especially when these training problems may not be fixed in a rapid and/or effective manner. In this case, work unit managers may consider implementing strategies to improve employees' EI through, for example, coaching, mentoring, and peer support (Mattingly & Kraiger, 2019). It might also be useful if employees' EI is first assessed by professional experts (e.g., researchers and/or management consults) using one or more appropriate methods (e.g., surveys, test banks, and interviews). The information generated from such assessments could help managers make effective decisions regarding who should be prioritized (i.e., those with lower levels of EI) when EI-enhancing strategies are to be implemented.

When training ineffectiveness is an existing shortcoming, our findings also have implications on the recruitment and selection process. As mentioned earlier, we found that inadequate training makes the role of EI more salient in improving situational awareness and thus safety performance. Based on this finding, managers, aware of the organization's weakness in training, may consider incorporating EI assessments in the recruitment and selection of new staff for safety–critical positions. For example, it could be practical that an appropriate threshold is predetermined for the results of an EI assessment to exclude applicants with low levels of EI.

7. Limitations and future research

This study has a few limitations that future research could address. First, we focused specifically on the training (in)adequacy when exploring the boundary conditions of the effects of EI on situational awareness, and subsequently on safety performance. However, training (in)adequacy may only be considered a subcomponent of training (in)effectiveness, which may also contain elements such as uselessness/usefulness of training (Bell, Tannenbaum, Ford, NOE, & Kraiger, 2017). As such, it is uncertain whether the overall quality of safety training could moderate the influence of EI. Future research should consider the role of overall safety training effectiveness, which can more comprehensively capture the training-related situation, when testing the relationship between EI, situational awareness, and safety performance.

Second, related to the boundary condition, we exclusively concentrated on the interaction effect of the training-related context and EI, having neglected other possible contextual features. Indeed, the literature suggests that contextual variables at the job and organization levels might also serve as triggers to promote the functions of EI in employee outcomes. For example, a lack of job autonomy may require employees to handle barriers to satisfying important, basic psychological needs (e.g., need for autonomy) and thus may activate their EI to regulate negative feelings caused by relevant barriers (Kim et al., 2009). At the organization level, the clarity of safety policy may intervene in the effects of EI. When safety policy is more ambiguous, EI should be more likely to be activated because employees with higher levels of EI may be moti-

vated to proactively seek meaning out of the ambiguous situation and cognitively pursue safety control (Huang, Chen, Krauss, & Rogers, 2004). Future research may consider additional moderators, both task- and organization-focused, to identify the conditions that promote or hinder EI from influencing safety-related outcomes.

Third, we did not control for some variables that may have confounded our proposed relationships. For example, existing research suggests that safety-specific orientations such as safety motivation (i.e., one's willingness to commit to safety behaviors; Neal & Griffin, 2006) and risk-taking orientation (Westaby & Lowe, 2005) affect safety performance. It has also been reported that characteristics such as trait mindfulness can influence situational awareness (Zhang, Ding, Li, & Wu, 2013). Future research should consider controlling for some of these confounders to explore whether EI or similar constructs can incrementally explain the variation of situational awareness and safety performance. To do this, it might be worth exploring available longitudinal panel data, which may have provided opportunities to explore and rule out potential confounders (Cheng, Guo, Hayward, Smyth, & Wang, 2020).

Fourth, we focused on situational awareness as a single conditional, mediation mechanism of the EI–safety performance linkage. Although this focus has verified the view that the link between EI and safety performance tends to be indirect, situational awareness might not be the only path through which EI can influence performance. The literature suggests that EI may promote positive and alleviate negative psychological states that are related to employees' wellbeing and thereby affect their performance (Mattingly & Kraiger, 2019; Sánchez-Álvarez, Extremera, & Fernández-Berrocal, 2016). It might be worthwhile for future research to examine wellbeing-related constructs such as burnout, engagement, and thriving at work as mediation mechanisms, as well as explore the associated boundary conditions.

Fifth, although our participants were commercial pilots from four different airlines in mainland China, the relatively small sample size may still have limited the generalizability of our findings considering that there are approximately 60,000 pilots in Chinese commercial aviation industry ("Statistics Bulletin on Civil," 2020). Future research may gather a larger sample from more airlines to further validate our findings. To generalize our findings to the broader population, future researchers may consider retesting our model in other safety–critical fields (e.g., mining, oil exploration, and manufacturing) with a greater sample size.

Finally, our sample was gender biased. Female pilots accounted for only 2.30% of our respondents, and thus our results might be more applicable for male pilots and not be generalized to females specifically. However, the gender bias was within the expectation, for female commercial pilots only account for 1.28% of the total pilot population in China (Brenda, 2018). Given that our sample size was relatively small and had a greater proportion of females than the national average, we conclude that the sample is representative in terms of gender. Considering that this female population is very small, future research may consider qualitative approaches to investigating the phenomena related to EI and safety if the experience of Chinese female commercial pilots is to be explored.

8. Conclusion

Drawing on data collected from pilots in commercial airlines, this study examined the influence of EI on safety performance through the mediating mechanism of situational awareness, with a focus on safety training inadequacy as a boundary condition. Our empirical findings suggest that EI is critical for employees to maintain a reasonable level of situational awareness that is needed to perform safety tasks, and this role of EI is more prominent when there is a lack of safety training. Our study contributes to the workplace safety literature by introducing trait activation theory to advance our understanding of how EI can be triggered in adverse work contexts (e.g., lack of safety training) to enhance situational awareness and safety performance. From a practitioner perspective, our findings suggest that, in addition to ensuring the effectiveness of safety training, companies may include EI tests when recruiting suitable employees for safety–critical positions, for high-EI individuals are more capable to conquer adverse situations.

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Zhongmin Wang is a PhD candidate in College of Business, Law & Governance at James Cook University, Australia. His current research is focused on safety performance and behaviors in the aviation context. His research interests also include emotional intelligence, training, career development, and work and non-work wellbeing. His work has been published in *Journal of Organizational Behavior*, *Journal of Vocational Behavior*, *Personality and Individual Differences*, among others.

Zhou Jiang is an Associate Professor in College of Business, Government and Law, Flinders University, Australia. He received his PhD in management from Macquarie University, Sydney, Australia. His research interests include knowledge management, emotions at work, career development, organizational behavior, workplace safety, and work and subjective wellbeing. He currently serves as an Associate Editor for *Applied Psychology: An International Review*, and seats on editorial boards of many leading journals, such as *Journal of Organizational Behavior*, *Journal of Vocational Behavior*, and *Human Resource Management Journal*, and *Australian Journal of Management* where he also publishes often.

Anna Blackman is an Associate Professor College of Business, Law & Governance at James Cook University, Australia. She obtained her PhD in management from James Cook University. Her areas of expertise include business coaching, human resource management, career development, rural and regional leadership, and workplace safety. She has published extensively in these areas many peer-reviewed journal articles, book chapters, and case studies in areas such as business coaching, workplace learning, employee training. Her recent work has appeared in *International Journal of Training and Development* and *Human Resource Development Review*.