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# Role overload and safety incidents: An examination of the individual- and team-level buffering effects of psychological safety

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ABSTRACT

A supportive work environment benefits employees and their organizations, and is particularly important for safety outcomes. In this paper we respond to calls in the literature to examine the moderating effects of individual- and team-level psychological safety on the relationship between role overload and safety incidents. Drawing on conservation of resources theory, we proposed that role overload would be positively related to safety incidents. Second, we proposed a multi-level interaction model where individual- and team-level psychological safety attenuate the positive relationship between role overload and safety incidents. Using data obtained from 841 employees nested in 100 teams, our multi-level analyses revealed that role overload positively relates to safety incidents and that psychological safety is a team-, rather than an individual-, level moderating resource that confers protection for employees by buffering the effects of role overload on safety incidents. We also found a main effect for individual-level psychological safety, with higher levels of psychological safety associated with fewer incidents. Based on our findings, employees should individually and collectively invest resources to create a climate of psychological safety to protect themselves and their colleagues from the negative safety implications of role overload. Leaders are advised to focus on interventions to enhance team-level psychological safety including supportive environments to encourage team cohesion, initiative taking, accountability, and via their leadership development.

## 1. Introduction

Employees are increasingly required to work more intensively and experience greater pressure to perform, which can result in role overload (Alfes et al., 2018; Eissa & Lester, 2017). Role overload is a form of work-related stress which can be categorized as qualitative or quantitative. Qualitative role overload occurs when an individual lacks the skills required to perform tasks required in their job. Quantitative role overload occurs when an individual perceives that the volume and pace of work they are required to perform is excessive. As our focus here is on healthcare workers, we examine quantitative role overload (hereafter referred to as role overload), as work stress for these employees is typically related to intensification and time pressures, rather than it arising from not having the capabilities to fulfil their role. A number of studies have found that role overload is positively related to adverse physical and psychological outcomes (Ahmad & Saud, 2016; Alzghoul et al., 2023; Bowling et al., 2015; Fan et al., 2019; Wong & Chan, 2020), risky behavior (Gracia & Martínez-Córcoles, 2018), as well as work-related injury and illness (Barling et al., 2002; Medeni, et al., 2024; Morrow & Crum, 2004; Parizadeh & Arshadi, 2021).

Researchers have called for more work on the boundary conditions of how role overload impacts on negative behavioral outcomes such as safety incidents (Montani & Dagenais-Desmarais, 2017; Tucker et al., 2018). This is because while the association between role overload and outcomes such as safety incidents have been found to be significant across studies, typically their effect sizes are modest, suggesting that there may be potential moderators of this relationship (Soderlund, 2023). Importantly, leading scholars examining role overload and negative outcomes such as safety incidents (Alfes et al., 2018) have proposed that work environment factors such as team climate may play a pivotal role in intensifying or weaking these relationships. In light of these factors, we propose psychological safety as a team climate that moderates (i.e., weakens) the positive association between role overload and safety incidents. It is also the case that psychological safety is increasingly recognised as an important, but understudied, environmental moderator in the literature (Edmonson & Lei, 2014; Newman

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et al., 2017). As a consequence, in this study we examine the buffering effects of psychological safety on the relationship between role overload and an important outcome of interest to employees and organizations, namely safety incidents. A wide range of behavioral outcomes of psychological safety have been studied, including innovation and creativity (Carmeli et al., 2010), organizational commitment (Chen et al., 2014), knowledge sharing (Xu & Yang, 2010) and service recovery performance to retain customers (Guchait et al., 2014). Recently, research interest has turned to examining psychological safety in terms reducing negative outcomes for employees in terms of their well-being, particularly in the education sector, with studies indicating that psychological safety decreases burnout (a typical consequence of role overload) amongst educators (Fleming et al., 2024; Kassandrinou et al., 2023).

In terms of the healthcare context, there have been recent calls for research examining the potential of psychological safety to protect healthcare workers from work-related stress (Mrayyan, 2024). Indeed, two recent studies involving nurses and hospital workers found that working in teams characterised by high levels of psychological safety was associated with lower levels of burnout (Lee et al., 2024; Li et al., 2022). While some studies have examined psychological safety in terms of reporting safety incident involving patients (i.e., medical treatment errors) (Derickson et al., 2015; Leroy et al., 2012), surprisingly few studies have examined this construct in relation to employee safety outcomes. One notable exception is the recent study by Dodoo et al. (2021) which found that psychological safety had a positive impact on the enactment of safety citizenship behaviors and that psychological safety mediated the relationship between hardy traits and safety citizenship behaviors. Similarly, a recent qualitative study conducted in a healthcare setting (Vogt et al., 2024) found that interviewees who did not feel they were psychologically safe also felt that their physical safety was at risk.

To our knowledge, no prior studies have examined the buffering effect of psychological safety on the relationship between role overload and safety incidents experienced by workers. This is surprising, as we believe that psychological safety has the potential to fill the knowledge gap in terms of being a supportive environment protecting workers from safety incidents arising from role overload. We base this on the fact that working in a team characterized by psychological safety, members feel supported and can request help when under pressure and by the same token they look out for each other in terms of potential risks and provide assistance that may avoid a safety incident occurring. In addition, in psychologically safe teams, members feel at ease about admitting errors they have made which, if undetected, may lead to accidents and they feel confident to "call out" colleagues who might not be behaving safely. In light of these arguments and given the substantial human and financial costs associated with safety incidents, there is a pressing need for investigation of the role of psychological safety in terms of reducing and preventing safety incidents arising from role overload.

Following the theoretical framing by Edmondson (1999), we conceptualize psychological safety as a supportive resource that is likely to protect employees from the effects of role overload on safety incidents. Psychological safety has been defined as a work environment where perceptions of the consequences of taking interpersonal risk are minimized (Frazier et al. 2017). Psychological safety enables team members to communicate openly via sharing information, seeking and providing honest feedback, and voicing ideas. Psychological safety enables members to collaborate to solve problems by developing new work approaches (Newman et al., 2017).

Some scholars have focused on individual perceptions of psychological safety, while others have construed psychological safety as a team-level climate, where there is shared belief amongst individuals that their workgroup is safe for interpersonal risk taking (Edmondson & Bransby, 2023; Edmondson & Lei, 2014). Studies examining individual perceptions of psychological safety typically apply the cognitive schemas approach (James & James, 1989), which holds that individuals principally respond to cognitive representation of environments and not to the environments per se. According to the cognitive schemas approach, people vary in terms of their personal biases, values, beliefs, and attitudes. As a consequence, each employee develops their own perception of the psychological safety of the same environment (Schepers et al., 2008).

Alternatively, proponents of the shared perceptions approach view psychological safety as a phenomenon shared by members within a team, as a property of that team. Researchers utilizing this approach typically apply a referent shift consensus model (Chan, 1998) where they gather perceptions of individual team members and, if there is sufficient within-team agreement, the data are then aggregated into team-level averages (Roussin et al., 2016). In the current study, we draw upon both the cognitive schemas and shared perception approaches and conservation of resources theory (COR: Hobfoll, 1989; 2001; 2014) by testing psychological safety as a resource in a multi-level model, incorporating individual-level and a team-level representation of this construct.

In practice, however, it is the case that many researchers have ignored the "levels" issue outlined above and have assumed that the effects of psychological safety are the same at the individual- and group-level. However, Frazier et al. (2017) highlighted the danger of this assumption in their review of psychological safety stating: "Though researchers generally treat psychological safety as homologous across different levels of analysis, this assumption has remained largely untested" (p. 115). Our study directly addresses Frazier et al's (2017) call for researchers to test the "homology hypothesis" as we compare the effect of psychological safety at the individual and group levels. In addition, we argue that identifying the level at which psychological safety is most potent in terms of mitigating the effects of role overload on safety incidents is of critical importance as this knowledge can be used to develop targeted interventions in the workplace.

Specifically, we use COR theory (Hobfoll, 2014) to explain the resource stressor effect of role overload on safety incidents and to position psychological safety as an individual- and team-level resource that moderates the relationship between role overload and safety incidents. In light of the potential theoretical and practical importance of psychological safety, the primary aim of the current research was to examine the individual- and team-level buffering effect of psychological safety on the individual-level relationship between role overload and safety incidents.

Maintaining a healthy and safe work environment is a major concern for employees and managers (Grote & Guest, 2017; Ye et al., 2020) and a primary strategy for doing so is by reducing safety incidents. Safety incidents include work-related illness or injury reported to management, unreported work-related illness or injury as well as near misses, which are incidents that did not result in illness or injury, but had the potential to do so. The costs of work-related injuries and illnesses to individuals, organizations, and the community are considerable. In the US, serious work-related injuries and illness cost employers more than US$1 billion per week in 2015 (Lee, 2017), while in the UK businesses paid UK£14.1 billion in costs associated with workplace injuries and accidents between 2015 and 2016 (Health and Safety Executive, 2016). Given these inordinately high human and financial costs, it is critical to understand how work-related pressures impact employees' safety incidents and the boundary conditions that mitigate them.

Prior research indicates that under-reporting of work-related illness and injury among employees is widespread, with some estimates as high as 80 % (Probst & Graso, 2013). It is also the case that near misses have very similar causal pathways to, and are leading indicators of, actual work-related illnesses or injuries and thus should be measured when assessing safety (Winkler et al., 2019). Therefore, in order to obtain a more accurate indication of the extent of safety incidents and in line with recent calls to examine safety outcomes beyond reported injuries and accidents (Xu et al., 2020), it is important to assess reported and unreported incidents as well as near misses.

Our study makes a number of important contributions. A key

contribution of our study is that we address recent calls (Alfes et al., 2018; Cooper & Lu, 2019; Dodoo et al., 2021; He et al., 2021; Tucker et al., 2018) to examine supportive team environments that may protect employees from the negative outcomes of role overload such as safety incidents. Indeed, in their recent review examining whether teamwork can promote safety at work, Salas et al. (2020) identified the need for future research to identify the specific contextual influences of teamwork on safety within organizations. In particular, in this review Salas et al. (2020) proposed psychological safety as a potential, unaccounted-for group-level variable that may moderate relationships between antecedents and safety outcomes. It is also the case that prior studies examining role overload in relation to safety incidents and unsafe work practices have yielded associations of varying magnitude (Jacobs & Pienaar, 2017; Nahrgang et al., 2011), indicating that potential boundary conditions should be considered when testing these relationships. We explicitly address this need by examining the boundary condition of psychological safety on the role overload-safety incidents relationship.

Secondly, with our focus on safety incidents, we respond to recent calls for research that moves beyond subjective- and affect-based measures of well-being to also examine objective and physiological measures of health and safety (Lin et al, 2020). Thirdly, reviews of psychological safety (Edmondson & Lei, 2014; Newman et al., 2017) have noted that the construct has frequently been modelled as having a main or mediating effect. These authors converge on their view that psychological safety may, in fact, be more potent as a moderator. Among the limited studies that have examined psychological safety as a moderator, Leroy et al. (2012) found that the negative relationship between team priority for safety and treatment errors in medical teams was intensified when team psychological safety was higher. Similarly, Baer and Frese (2003) found that for organizations characterized by higher levels of psychological safety the relationship between process innovation and profitability was positive; however, for those organizations where psychological safety was lower, the relationship was negative. We directly answer the call for further research examining psychological safety as a moderator (Edmondson & Lei, 2014; Newman et al., 2017).

Importantly, we also respond to calls for individual- and team-level research in relation to psychological safety. In their reviews, Edmondson and Lei (2014) and Newman et al. (2017) noted the proliferation of single-level studies and called for multi-level research involving psychological safety. Indeed, Edmondson and Lei (2014) lamented that "studies have not attempted to understand how phenomena at different levels of analysis interact" (p. 39) and Newman et al. (2017) called on researchers to conduct more multi-level research "focused on factors that may interact with psychological safety to predict various outcomes at different levels of analysis" (p. 527). In the current study, we directly address these calls by simultaneously examining whether individual- and team-level psychological safety interact with individual-level role overload to predict safety incidents.

### 1.1. The relationship between role overload and safety incidents according to COR theory

COR theory (Hobfoll, 1989) provides a useful conceptual basis for understanding the effects of role overload as a stressor and the buffering effects of psychological safety on negative outcomes such as safety incidents. COR theory emphasizes the environment in the coping processes and places less emphasis on person-centered factors, which makes it well suited to examining the protective effects of psychological safety within teams (Hobfoll & Schumm, 2002). Moreover, in their recent review of psychological safety, Newman et al. (2017) encouraged researchers to apply COR theory as it provides a holistic and succinct explanation of how psychological safety protects employees from work stressors and contributes to resource gain. The central tenet of COR theory is that employees are motivated to gain resources to protect against resource depletion (Hobfoll, 1989). Resources can be objects, or they can be states or conditions that an employee values, such as their energy to complete their workload. Hobfoll (2014) also specifically identified safety, which includes safety from violence, psychological safety and workplace safety, as one of the five principal resource groups. An important characteristic of COR theory is the notion of *loss* spirals where resource loss in one domain begets resource loss in another domain (Hobfoll, 2001; Hobfoll et al., 2018). Role overload, according to COR theory, is a cost or stressor that may limit employees' capacity to maintain existing energy resources to effectively manage their workload (Knight et al., 2021). Depletion of employees' physical and emotional energy may cause a loss spiral where their reduced attention and vigilance places them at greater risk of experiencing a safety incident.

It is also likely that employees who perceive high workload pressures may focus their attention on completing the task at hand in order to cope with the high demand and focus less on working safely. In order to cope with role overload, they may apply "short-cut" work methods resulting in unsafe behaviors in order to save time and to conserve resources as these "short-cuts" typically require less effort (Gracia & Martínez-Córcoles, 2018; Halbesleben, 2014; Parizadeh & Arshadi, 2021). This is consistent with the corollary in COR theory that when individuals experience resource loss, they become more defensive and strategic in how they invest future resources (Halbesleben et al., 2014). Indeed, there is evidence that indicates that role overload affects employee decisions concerning their work behavior, in particular, decisions to invest motivational resources to perform tasks with a focus on safety and to avoid short-cuts (Halbesleben & Bowler, 2007). When working under pressure, maintaining a vigilant focus on safety consumes energy and may not lead to gains elsewhere. In response, according to COR theory, employees may strategically and defensively choose to enact short cuts to conserve their energy resources. Indeed, there is evidence which indicates that role overload is a significant predictor of suboptimal safety bahavior in the form of short-cuts (Hansez & Chmiel, 2010).

In summary, we apply COR theory to explain that resource depletion, caused by a stressor such as role overload makes employees more vulnerable to experiencing a safety incident. This is due to the increased potential for mistakes and errors as a result of cognitive processes such as inattention, fatigue, and distraction (Clarke, 2010), or by utilizing unsafe "short-cuts" to meet workload requirements, which places employees at greater risk of a safety incident. Based on COR theory, we hypothesise:

*H1: Role overload is positively related to safety incidents.*

### 1.2. The buffering effects of psychological safety

Recently, scholars (Salas et al., 2020) have moved away from a circumscribed focus on safe and unsafe behaviors and instead have looked towards employee perceptions regarding supportive work environments, as these may buffer the effects of stressors such as role overload on safety outcomes. Specifically, a buffering effect refers to the process where resources reduce the impact of stressors on an individual's physical or psychological well-being (Cummins, 2010). Resources acting as buffers can be internal to the individual (psychosocial factors such as optimism, personal control, etc.) or external (supervisor support, organizational support) (Kuhn & Brule, 2019). Prior research indicates that perceived support and trust from supervisors and co-workers buffer (i.e., protect) employees from the effects of role overload on safety incidents (Wang et al., 2020; Wang et al., 2021). In a *meta*-analysis, Nahrgang et al. (2011) found that supportive environments (i.e., leader support, co-worker support, safety climate, etc.) explained the largest amount of variance in safety incidents across industries. Nahrgang et al. (2011) suggested that one of the ways that supportive environments may confer safety compliance and protection from safety incidents is by buffering employees from the effects of demands or stressors such as role overload, but this has been less well tested.

Here we focus on examining the buffering effects of a supportive

environmental factor – psychological safety – on the relationship between role overload and safety incidents. In psychologically safe work teams, members ask for help, engage in open communication, feel comfortable in both admitting errors and learning from mistakes, and they seek feedback on their behavior and performance (Edmondson & Lei, 2014). In teams characterized by higher levels of psychological safety, members have respect for each other's competence, they believe that their colleagues will not reject them for being themselves, and they are able to engage in constructive conflict and confrontation (Newman et al., 2017). As a consequence, members are more likely to contribute suggestions and actions to collaborative enterprises and to speak up about errors and risks in the workplace (Edmondson, 1999; Edmondson & Lei, 2014). The research evidence supports this view. For example, psychological safety is predictive of employees disclosing what they know and can offer to their team (Mayer et al., 1995) and lower levels of reporting of treatment errors in healthcare environments (Leroy et al., 2012). Psychological safety is also positively associated with higher levels of voice behavior among employees (Bienefeld & Grote, 2014) and negatively related to employee silence behaviors (Brinsfield, 2013). Indeed, research indicates that if low initiative employees do not perceive their work environments as being psychologically safe, they will be unlikely to speak up even when they feel responsible for making improvements in their workplace (Starzyk & Sonnentag, 2019). The perception that a team is a psychologically safe environment also reduces the need for affirmation from authority figures in order for members to engage in help-seeking behaviors (Friedman et al., 2018).

In light of these findings, we expect that members of teams characterized by psychological safety are more likely to ask for help from their colleagues in managing high workloads and report that they have made a mistake without fear of negative repercussions or being ostracized. In addition, we expect that in psychologically safe environments, under stressful conditions when a team member might be less attentive to safety procedures, colleagues are more likely to "call out" unsafe behaviors.

COR theory also helps to explain the buffering effect of psychological safety on the relationship between role overload and safety incidents. An important principle in COR theory is resource investment, which states that employees invest resources in order to mitigate resource loss. As a consequence, resource gain in one domain is capable of offsetting resource loss in another domain. For example, Tucker et al. (2018) found that when both role ambiguity and role conflict were low, transport workers were buffered from the effects of role overload on their level of strain. Here we argue that employee perceptions that their team is a psychologically safe environment is a resource that can compensate for resource loss (energy depletion due to role overload) and protect against future potential resource loss by increasing safety compliance and preventing safety incidents. Specifically, while employees who experience role overload are likely to experience more safety incidents, these negative effects of role overload on safety incidents may be mitigated by the resource of psychological safety.

The findings of these empirical studies informed Edmondson's (1996, p. 70) argument that teams characterized by high levels of psychological safety operate as "self-correcting performance units" where members, when completing intensive tasks, anticipate and respond to one and others' actions, thereby providing help, correcting errors, and reducing safety incidents. In other words, teams characterized by psychological safety have a common sense of awareness and therefore are more effective at anticipating and coordinating interdependent tasks to yield safe outcomes when work pressures increase. Based on COR theory and Edmondson's (1996; 1999) propositions, we hypothesize:

*H2a: Individual-level psychological safety will moderate the relationship between role overload and safety incidents such that the positive relationship will be de-intensified when individual-level psychological safety is higher and intensified when psychological safety is lower.*

*H2b: Team-level psychological safety will moderate the relationship between role overload and safety incidents such that the positive relationship will be de-intensified when team-level psychological safety is higher and intensified when psychological safety is lower.*

Our multi-level conceptual model is presented below in Fig. 1.

## 2. Method

Data were gathered from an online survey of employees of a large health service in Australia that required approximately twenty minutes for respondents to complete. The questionnaire provided to participants included demographic questions, measures of workplace attitudes, and items assessing respondents' experience of safety incidents (each described in detail below in the Measures section). We focused on a health service for our study as employees in this sector typically work in high pressure environments, interdependently on tasks, in complex decision-making teams. It is also the case that healthcare is very hierarchical in terms of power, status, and prestige with those in certain roles, such as doctors, having more freedom to speak up or be themselves, compared to those in other roles such as nurses or orderlies (Li et al., 2022). As a consequence, we expected that psychological safety would be a particularly salient construct for healthcare teams in terms of encouraging those who are lower in the hierarchy to feel comfortable in asking for help, calling out errors, or admitting mistakes (Grailey et al., 2021).

Initially, permission to conduct the study was obtained from the Executive Leadership Group of the health service. After obtaining organizational permission, all employees of the health service were invited to participate in the study via an email sent from the human resource management department. Overall, 4,181 employees had the opportunity to participate in the survey. We received 841 responses, resulting in a 20 % response rate. Response rates among healthcare workers are typically low and it is not uncommon to find response rates between 10 and 15 %. (Timmins et al., 2022). When we compared our response rate to the average response rate across prior healthcare survey studies (19 %; Weaver et al., 2019), we found that they were quite similar. While we acknowledge that our response rate of 20 % may have implications in terms of non-response bias, recent research suggests that the impact of the former on the latter may be substantially less than previously thought (Hendra & Hill, 2019).

Respondents were dispersed over 100 teams (average team size = 8.4) across all divisions of the health service, including medical services, surgical services, community health and rehabilitation services, mental health, nursing and midwifery, aged care, and management and administrative support services. The majority of respondents identified

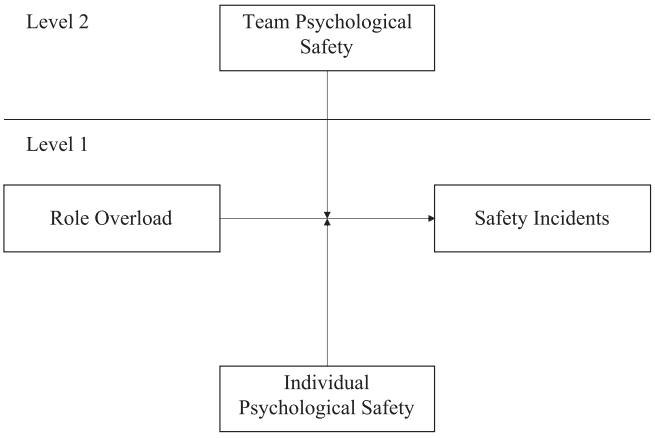


**Fig. 1.** Conceptual model showing the relationship between role overload and safety incidents and the individual- and team-level moderating effects of psychological safety.

as female (87 %), were working in a non-supervisory role (80 %), and were employed on a part-time basis (64 %) with over half (53 %) having five years or less tenure in their current role. Using chi square analysis, we found that respondents who identified as female were significantly over-represented in our sample, compared to the percentage of all employees of the health service who identified as female. However, there were no significant differences between the proportion of respondents who identified as female in our sample and the proportion of combined membership of the two largest healthcare unions in the State who identified as female. Chi square analysis also indicated that there was no significant difference between the employment status of respondents in our sample and the employment status of all workers at the health service. In addition, there was no significant difference between the percentage of respondents who were in a non-supervisory role in our sample, compared with the percentage of those in a non-supervisory role in total at the health service. With the exception of gender, the demographic characteristics of the sample were consistent with the overall demographic profile of employees at the health service. A comparison of early and late respondents to the survey showed no evidence of non-response bias. As a small incentive, participants were offered the opportunity to enter a draw to win two cinema tickets. All prospective respondents were assured that their responses were anonymous and confidential. University research ethics approval was obtained before the research commenced.

### 2.1. Measures

#### 2.1.1. Psychological safety

We measured psychological safety using Edmondson's (1999) 7-item scale. This scale captures the extent to which respondents believe that their team is a safe environment for admitting errors, pointing out mistakes that others have made, being themselves, and asking other team members for help. Edmondson's psychological safety scale is the most widely utilized measure of the construct in the literature and has been found to possess excellent psychometric properties across a range of studies (Newman et al., 2017). Items are presented as propositional statements, which are rated using a 7-point response format ranging from 1) "very inaccurate" through to 7) "very accurate". Example items are: "Members of this group are able to bring up problems and tough issues", "People in this team sometimes reject others for being different" (reversed), and "If you make a mistake in this team, it is often held against you" (reversed). Cronbach's alpha for the psychological safety scale was 0.74, indicating that this measure demonstrated acceptable internal consistency reliability.

#### 2.1.2. Role overload

The 5-item Quantitative Workload Inventory (QWI; Spector & Jex, 1998) was used to measure role overload. It is a measure of quantitative role overload and therefore assesses how much work is done and how quickly it is done. The items contained in this scale capture the amount of work an employee is required to complete, the effort to perform work tasks and time allocated for completion. Example items from the QWI are: "How often does your job leave you with little time to get things done?" and "How often does your job leave you with little time to get things done?" Respondents are required to indicate how frequently each occurs using a response format ranging from 1) "less than once per month or never" through to 5) "several times per day". The QWI has been deployed in a number of studies and has been found to be a psychometrically sound measure, with good evidence for convergent and discriminant validity as well as internal consistency reliability (Baka & Bazińska, 2016; Fox et al., 2001; Spector & Jex, 1998). We obtained a Cronbach's alpha of 0.90 for the QWI with our sample, indicating excellent internal consistency reliability.

#### 2.1.3. Safety incidents

Respondents were asked to indicate the number of safety incidents they had been personally involved in at work over the past 12 months. These self-report measures were: reported safety incidents (i.e., any incidents where the survey respondent experienced a work-related injury or illness that was serious enough to warrant reporting to management) and unreported safety incidents (any safety incidents that were not reported to management) and near misses (situations that could have caused an injury/illness, but did not) (Hayes et al., 1998; Probst & Estrada, 2010). Measuring safety incidents using multiple indicators that include unreported incidents is important because this provides a more complete picture of employees' safety outcomes (Petitta et al., 2017). Following earlier studies (e.g., Petitta et al., 2017; Probst et al., 2010; Shea et al., 2016; Sheehan et al., 2016; Zadow et al., 2017), we summed each of the incident types to measure the total number of safety incidents over the past 12 months. We log-transformed the total number of safety incidents to reduce non-normality.

#### 2.1.4. Controls

Prior studies have found that employees with shorter role tenure are more likely to report safety incidents than their colleagues with longer role tenure (Cioni & Savioli, 2016; Palali & van Ours, 2017). Research also indicates that, compared to their full-time counterparts, part-time employees tend to report fewer safety incidents (Huang et al., 2003). Finally, there is some evidence (Kreckler et al., 2009) that suggests that senior health care professionals (e.g., doctors, nurse team leaders) are less likely to report safety incidents than their junior colleagues (e.g., staff nurses). Based on these findings, in our study we controlled for role tenure (coded 1 = < 1 year to 5 = > 20 years), employment status (coded 1 = full-time, 0 = part-time), and organizational level (1 = supervisor, 0 = non-supervisor).

### 2.2. Method of analysis

As the study design was multi-level in nature, we used multi-level modelling using Mplus 8.4 to test our hypotheses at both the individual and team levels. Specifically, the analyses were conducted using multi-level structural equation modeling (MSEM) with the robust maximum likelihood estimator (MLR) (Preacher et al., 2010). Using MSEM, we tested the cross-level interaction implied in hypothesis 2b with a randomly varying slope at the individual level (also known as a "slopes as outcomes" model) with group-mean centering implied by the latent decomposition of psychological safety into its within – and between-team components (Asparouhov & Muthén, 2019).

## 3. Results

### 3.1. Construct validity

To test construct validity, a confirmatory factor analysis (CFA) of the multi-item measures of role overload and psychological safety was conducted. We used the weighted least squares means and variance adjusted (WLSMV) estimator (with a correction of chi-square for clustering of observations within teams) as the items are ordinal (Likert) response scales (Rhemtulla et al., 2012). The hypothesised 2-factor CFA yielded an acceptable fit to the data $\chi^2$ ($df = 53$) = 369; RMSEA = 0.08; TLI = 0.96; CFI = 0.97. A one-factor measurement model (where all indicators loaded onto a single factor), resulted in a poorer fit, $\chi^2$ ($df = 54$) = 2,422; RMSEA = 0.23; TLI = 0.70; CFI = 0.76. Taken together, these results provide evidence for construct validity of the two multi-item measures used in this study.

### 3.2. Validation of team-level psychological safety

The mean rwg (assuming a uniform null distribution) for the psychological safety scale was 0.86, indicating a high level of within-group agreement and the ICC2 was 0.63 (LeBreton & Senter, 2008). Given the favorable rwg, we were able to aggregate psychological safety scores to

the team level (referred to here as *team psychological safety)*. Although the ICC2 value for the psychological safety scale was moderate in magnitude, the use of MSEM to decompose observed variance into latent within and between components reduces the measurement bias commonly associated with using simple aggregated group means in multi-level modelling (Preacher et al., 2010).

### 3.3. Test of hypotheses

Table 1 presents the means, standard deviations, and correlations among the study variables. As shown in Table 1, there was a positive correlation between role overload and safety incidents ($r = 0.15$, 95 % bootstrap CI: 0.09 to 0.22). In terms of effect size, this estimate (and the range of plausible values in the confidence interval) are similar to those reported in the *meta*-analysis of Nahrgang et al. (2011), who found that physical work demands (a measure similar to role overload) was correlated with adverse safety events at 0.13 and with safety accidents and injuries at 0.09. This *meta*-analysis also found that in the health sector, a population similar to the present study, physical work demands was correlated with safety accidents and injuries at 0.22 and adverse safety events at 0.08.

The results of the MSEM analyses can be found in Table 2. Hypothesis 1 predicted that role overload is positively related to safety incidents. In support of hypothesis 1, with control variables included, we found a positive relationship between role overload and safety incidents ($\beta = 0.13$, SE = 0.03, $p < 0.01$).

Hypothesis 2a stated that individual-level psychological safety will moderate the relationship between role overload and safety incidents, such that the positive relationship will be de-intensified when individual-level psychological safety is higher and intensified when individual level psychological safety is lower. To test hypothesis 2a, we examined the individual-level interaction between psychological safety and role overload in predicting total safety incidents. Contrary to our prediction, we did not find a statistically significant individual-level interaction ($\beta = -0.01$, SE = 0.03, $p = 0.60$). However, we did find a main effect for individual-level psychological safety predicting fewer safety incidents ($\beta = -0.14$, SE = 0.05, $p < 0.01$).

Hypothesis 2b stated that team-level psychological safety will moderate the relationship between role overload and safety incidents, such that the positive relationship will be de-intensified when team-level psychological safety is higher and intensified when team psychological safety is lower. To test hypothesis 2b, we examined the cross-level interaction between team psychological safety and role overload in predicting total safety incidents. In support of hypothesis 2b we found a statistically significant cross-level interaction ($\beta = -0.24$, SE = 0.10, $p < 0.05$).

To aid in interpretation of the cross-level interaction, we plotted the *average* within-group simple slopes using the conventional values of one *SD* below the mean and one *SD* above the mean of the moderator – team psychological safety (Aiken & West, 1991). Fig. 2 shows that the relationship between role overload and safety incidents was weaker (de-intensified) with high (one SD above the mean) levels of team psychological safety and intensified when team psychological safety is low (one SD below the mean). Hence, hypothesis 2b was supported.

**Table 2**
Results of the MSEM analyses predicting safety incidents.

| | Model 1 Main effects | Model 2 Interactions |
|---|---|---|
| Level-1 (individual) | | |
| Role tenure | 0.12 (0.03)** | 0.11 (0.04)** |
| Employment status | 0.02 (0.03) | 0.03 (0.03) |
| Organizational level | −0.05 (0.04) | −0.04 (0.03) |
| Role overload | 0.13 (0.03)** | 0.13 (0.03)** |
| Psychological safety | −0.14 (0.05) ** | −0.15 (0.05) ** |
| Psychological safety x role overload | | −0.01 (0.03) |
| Level-2 (team) | | |
| Psychological safety | −0.35 (0.17)* | −0.53 (0.21)* |
| Psychological safety x role overload | | −0.24 (0.10)* |

N = 841 employees, 100 teams.
Standardized coefficients reported. Robust standard errors in parentheses.
* $p < 0.05$, ** $p < 0.01$.

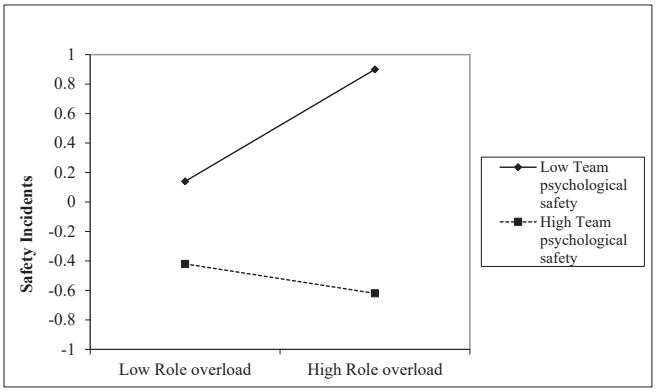


**Fig. 2.** The moderated effect of team psychological safety on the role overload – safety incidents relationship.

## 4. Discussion

The aim of this study was to provide important new knowledge regarding the relationship between role overload and safety incidents and the moderating role of both individual- and team-level psychological safety on this relationship. Firstly, our findings align with those obtained in a number of prior studies (Barling et al., 2002; Medeni, et al., 2024; Morrow & Crum, 2004; Parizadeh & Arshadi, 2021) and confirm that cognitively and/or physically demanding workplaces employees at greater risk of experiencing safety incidents. This is particularly concerning given the increasing intensification of work and strong pressures within organizations to complete work as quickly as possible. When exposed to high workloads, human information processing errors are likely to occur resulting in more frequent safety incidents. It is also the case that role overload may cause employees to focus more narrowly on

**Table 1**
Means, standard deviations, and correlations among the study variables.

| Variable | | M | SD | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Safety incidents (log transformed) | 0.19 | 0.32 | – | | | | | |
| 2 | Role overload | 3.80 | 1.03 | 0.15** | – | | | | |
| 3 | Psychological safety | 4.80 | 1.09 | −0.21** | −0.16** | – | | | |
| 4 | Role tenure | 2.61 | 1.10 | 0.15** | 0.07* | −0.09* | – | | |
| 5 | Employment status | 0.36 | 0.48 | −0.03 | −0.05 | 0.09** | −0.06 | – | |
| 6 | Organizational level | 0.20 | 0.40 | −0.04 | 0.06 | 0.16** | 0.06 | 0.24** | – |

Scores based on individual-level data (N = 841).
*$p < 0.05$, ** $p < 0.01$. Employment status coded 1 = full-time, 0 = part-time. Organizational level coded: 1 = supervisor, 0 = non-supervisor. Role tenure coded 1 = < 1 year to 5 = > 20 years.

a few specific features of their environment and therefore they may not identify and attend to hazards within their workplace, exposing them to greater risk of a safety incident (Medeni et al., 2024; Parizadeh & Arshadi, 2021). Role overload may also cause employees to have to make "productivity/safety trade-offs" where they come to believe that short-cut methods are expected because management values productivity above employee safety (Gracia & Martínez-Córcoles, 2018; Halbesleben, 2014; Parizadeh & Arshadi, 2021). These employees may feel that they have to engage in expedient, but potentially less safe, work practices to save time in order to meet productivity targets. However, we found a buffering effect for team-level psychological safety on this relationship, which we discuss below.

Most importantly, our findings indicate that psychological safety is a team-level resource that confers protection on members from the effect of role overload on safety incidents, by creating a supportive environment where employees feel comfortable in pointing out errors, raising concerns, and admitting mistakes. Prior studies (Wang et al., 2020; Wang et al., 2021) have found that perceived support from supervisors and co-workers buffer employees from the effects of role overload on safety incidents. Our study extends the findings of these studies by demonstrating that a supportive team environment characterized psychological safety, where members feel comfortable about asking for help, admitting mistakes, and calling out others' mistakes, also buffers the effects of role overload on safety incidents.

Our findings do not support the notion that psychological safety is an individual-level moderator, buffering employees from safety incidents related to role overload. While no prior studies have examined psychological safety as an individual-level moderator of the relationship between role overload and safety incidents, some prior studies (e.g., Miao et al., 2020) have found psychological safety to be an individual-level moderator of other attitude-behavior relationships. Our finding that team-level, but not individual-level, psychological safety buffered the effects of role overload on safety incidents challenges the homology assumption (Frazier et al., 2017) that the effects of psychological safety are the same at different levels of analysis. Interestingly however, we did find that individual-level psychological safety had a main effect, with higher individual levels of psychological safety associated with fewer incidents. This finding aligns with and extends the recent qualitative finding by Vogt, et al (2024): that workers who felt that their psychological safety was compromised also felt that their physical safety was at risk. Prior studies (Derickson et al., 2015; Leroy et al., 2012) have identified that psychological safety is important in terms of reducing errors and improving patient safety; however, no prior studies to our knowledge, have shown that team psychological safety provides protection, buffering employees from the effect of role overload in terms of their own personal safety.

### 4.1. Theoretical implications

Consistent with the shared perceptions approach (Roussin et al., 2016), our findings indicate firstly that psychological safety can be represented as a team-level resource. Some studies (Chen et al., 2014; Singh, et al., 2013; Liang et al., 2012) have modelled psychological safety as an individual-level resource; however, our findings show that it is potent as a team-level moderator, but not at the individual-level. Thus, as noted above, our findings challenge the homology hypothesis (Frazier et al., 2017), which proposes that the effects of psychological safety are the same at different levels (individual and team).

Secondly, consistent with COR theory (Hobfol et al., 2018), team psychological safety is a resource that insulates employees from the negative outcomes of stressors such as role overload. When team members share information about potential hazards and admit mistakes/noncompliance with safety protocols that may contribute to risks, in a supportive and non-threatening environment, safety incidents may be reduced. In addition, when confronted with high work pressures, members of teams with higher psychological safety may feel comfortable asking for help, when under strain, or alternatively offering help when someone observes that other members are struggling with their workload. This capacity of psychologically safe teams to support members, compensate for reduced individual performance, and identify as well as correct errors before they escalate, provides some protection from safety incidents.

Thirdly our study contributes to the literature by examining psychological safety as an environmental moderator. In doing so, we responded to calls in the conceptual literature for further empirical research examining psychological safety as a moderator (Edmondson & Lei, 2014; Newman et al., 2017; Salas et al., 2020). In addition, we have responded to the paucity of research on the boundary conditions specifically in terms of the relations between role overload and negative outcomes for employees (Montani & Dagenais-Desmarais, 2017; Tucker et al., 2018).

### 4.2. Practical implications

Given it is unlikely that work pressures will de-intensify prospectively, employees and leaders should focus on developing and deploying mitigation strategies to reduce safety incidents related to role overload. One broad strategy has looked towards developing supportive environments (Alfes et al., 2018; Salas et al., 2020), but the specific types of supportive environments or climates that ameliorate the negative effects of role overload on safety outcomes are still uncertain. The results of our study are therefore of significant practical value as they indicate that working in a team environment characterized by higher average levels of psychological safety buffers individual team members from safety incidents associated with role overload.

Employees can collectively and strategically invest resources in terms of their own time and energy to help develop a psychologically safe team environment to protect their own health and safety, as well as the health and safety of their colleagues (Halbesleben et al., 2014). Employees can contribute to fostering psychological safety within their teams by developing high quality "one-on-one" interpersonal relationships with other members, based on trust, integrity, and caring (Newman et al., 2017). Higher levels of psychological safety enable team members to engage in more advising, assisting, and help-seeking behaviors (Edmondson & Lei, 2014), thereby reducing the impact of role overload on their colleagues. Team environments characterized by higher levels of psychological safety also provide an impetus for "calling out" and changing unsafe work practices observed in their team during times of intense workload, because members feel confident about speaking up and raising concerns. By the same token, because psychologically safe teams enable members to take interpersonal risks and admit shortfalls and errors, they are more likely to ask for help when experiencing role overload (Harris, 2018).

Identification of the workplace characteristics, practices, and environments that remove or mitigate injury or illness consequences for employees is of primary interest to organizations and their leaders (Alfes et al., 2018; Salas et al., 2020). Team leaders play a crucial role in developing, shaping, and maintaining team contexts that enable members to learn, perform tasks more effectively, and remain safe and healthy at work (Huang et al., 2018). A key implication from our study is that team leaders should develop psychological safety in work teams to mitigate the negative consequences of role overload on safety outcomes.

In order to promote psychological safety within work teams, leaders should put in place structures and procedures that stimulate and nurture initiative-taking as research indicates that psychological safety is enhanced when team members are empowered by decision-making autonomy (Chandrasekaran & Mishra, 2012; Bunderson & Boumgarden, 2010). Research indicates that employees with lower job strain and higher decision-making authority are less susceptible to negative health and well-being outcomes (Fan et al., 2019). Creating opportunities for employees to engage in autonomous activities may be particularly important as there is evidence (Felstead et al., 2015) that while work

intensity has generally increased in organizations, levels of autonomy have typically declined.

While learning is a key outcome of psychological safety, it is also the case that targeted training and development interventions can help facilitate psychological safety within teams. Leaders can help to improve relationships among employees by designing and implementing team-building programs that encourage enhanced communication, team monitoring, problem solving, self-efficacy, and conflict resolution skills. These skills and competencies are important in terms of creating a psychologically safe team environment, in which members speak up about hazards, errors or unsafe behaviors, without fearing undesirable interpersonal consequences (Brueller & Carmeli, 2011). Indeed, research indicates that higher levels of communication among team members and team monitoring are useful informal strategies in terms of mitigating fatigue (Dawson et al., 2015).

Leaders are potent actors within teams who signal vital information to members about norms and acceptable team behaviors (Wiesenfeld et al., 2001). Organizations could provide training programs for team leaders to facilitate the development of supportive leadership behaviors, as these have been found to be key drivers of psychological safety. For example, leader behaviors such as transparency (Han et al., 2017), sharing feedback (Coutifaris & Grant, 2022), competence (Mao et al., 2019), and active listening (Castro et al., 2018) have been found to be positively related to psychological safety.

Leaders can structure their teams to promote psychological safety. For instance, research indicates that teams with more structure are more likely to have higher levels of psychological safety as role expectations and accountability are unambiguous and therefore, team members are more predisposed to monitor errors and reflect on mistakes (Bresman & Zellmer-Bruhn, 2013). Leaders should also organize their teams to promote shared accountability for team outcomes. When there is shared accountability, members are more likely to participate in safety communication, by speaking up when a colleague behaves in an unsafe way, and are more likely to feel that it is appropriate to push team members to be more safety conscious in their approach to their work (Salas et al., 2020).

### 4.3. Limitations and future research directions

Our study has a number of strengths. For example, our sample included a large number of teams, we examined the moderating effects of both individual- and team-level psychological safety, using multi-level modelling to contribute to a literature that is dominated by single level studies (Edmondson & Lei, 2014; Newman et al, 2019). As the data were gathered from the same source, we cannot rule out the possibility of common method variance (CMV) (Cooper et al., 2020). It is the case that CMV can result in spurious results as it can lead to inflation of the associations between the study variables. However, CMV is less likely with objective outcome indicators such as reported safety incidents (Spector, 2006). Furthermore, although CMV can inflate correlation coefficients and main effects, it is extremely unlikely to artificially inflate or bias interaction effects (Podsakoff et al., 2012; Podsakoff et al., 2023). It is also the case that, in our multi-level analyses, some CMV would be eliminated because our focus on the team-level variable is less susceptible to individual response biases. In addition, the survey instructions communicated to participants that there were no wrong or right answers and that they should respond honestly, as well as assuring them that their responses would remain anonymous. These instructions were designed to reduce socially desirable responding and evaluation apprehension as both of these factors can contribute to CMV (Podsakoff et al., 2023). Nonetheless, we cannot rule out the possibility of CMV in our study and therefore future studies should utilize multi-source data or longitudinal research designs as temporal separation between the predictor and criterion has been found to mitigate CMV (Cooper et al., 2020; Johnson et al., 2011).

We purposively selected the healthcare sector as our research context as we expected that psychological safety would be particularly pertinent in this hierarchical and high stakes environment in terms of buffering the effect of role overload on staff safety. In addition to healthcare, research on psychological safety has been conducted in sectors such as education, hospitality, construction, and engineering. A recent review of psychological safety indicates that, while there are some differences, the findings across industry sectors are remarkably consistent (Edmondson & Bransby, 2023). While this may be the case, we believe that some caution should be exercised when applying the findings for this study to workers in other sectors and we call for more research in sectors outside those listed above.

It is also the case that our study was conducted in a Western context (Australia) and some scholars (Frazier et al., 2017) have cautioned that there may be cross-cultural differences in terms of psychological safety. For example, employees from high uncertainty avoidance cultures may be hesitant to speak up or challenge the status quo. Edmondson – the leading theorist on psychology safety – has stated that reassuringly findings in relation to psychological safety in different countries are broadly consistent. Nonetheless, Edmondson qualified this assertion stating, “However, studies with data from multiple countries at the same time remain sorely needed” (Edmondson & Bransby, 2023, p. 71). We echo this call for more research focused on establishing the cross-cultural invariance of psychological safety via multi-country studies.

In terms of future research directions, there is also the possibility that very high levels of psychological safety within teams may produce negative consequences. Few studies have examined the undesirable effects of too much psychological safety. However, Pearsall and Ellis (2011) found that teams characterized by higher levels of psychological safety were more likely to engage in unethical work practices as team members were willing to support unethical suggestions, given the psychologically safe climate within their teams. It is also plausible that team members may become personally less vigilant of risks to themselves arising from role overload, as they have been conditioned to rely on other team members to monitor their behavior and pick up on errors. Hence, future studies should examine the potential consequences of having too much team-level psychological safety on safety outcomes.

### 4.4. Conclusions

In line with COR theory, our study found that role overload is a stressor that can expose employees to greater risk of experiencing a safety incident. Also consistent with the shared perceptions approach and COR theory, we found that team-level, but not individual-level, psychological safety is an important moderating resource that confers protection on members by buffering the effect of role overload on safety incidents. This finding challenges the homology hypothesis regarding psychological safety which has generally been assumed in the literature. Although, our findings did not show evidence of individual-level moderation, we found a main effect for psychological safety at the individual level, with higher levels of psychological safety associated with fewer incidents.

Specifically, our finding that role overload increases the likelihood of experiencing a safety incident provides support for COR theory’s proposition that workplace stressors constrain an individual’s ability to sustain the energy resources needed to deal with their workload. This finding also supports the COR theory notion of loss spiral, where an employee’s depleted energy also reduces their vigilance and focus, exposing them to greater risk of experiencing a safety incident. Importantly, our finding, that psychological safety provides protection from the effect of role overload on safety incidents, supports the COR theory principle that investment of resources in one domain (psychological safety) is capable of offsetting resource loss in another domain (energy loss due to role overload).

These findings provide the basis for key insights for organizations and leaders to develop autonomous work practices, team-building, and leadership-development interventions to encourage and maintain team

environments characterized by high levels of psychological safety. By doing so, organizations can help to reduce the negative consequences of role overload, making workplaces safe for employees and the broader community.

## CRediT authorship contribution statement

**Ross Donohue:** Writing – review & editing, Methodology, Writing – original draft, Conceptualization, Investigation. **Brian Cooper:** Writing – review & editing, Methodology, Formal analysis, Writing – original draft, Investigation, Conceptualization. **Helen De Cieri:** Writing – review & editing, Investigation, Writing – original draft, Conceptualization. **Cathy Sheehan:** Investigation, Writing – original draft, Writing – review & editing, Methodology, Conceptualization. **Tracy Shea:** Methodology, Data curation, Writing – review & editing, Project administration, Writing – original draft, Formal analysis.

## Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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