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Fostering workplace safety with a gender-diverse workforce

Abstract

Design/methodology/approach: Employing a two-way fixed effect regression analysis, this research assesses the relationship between gender diversity of employees and workplace injuries of firms. The analysis is strengthened through several robustness checks and further analysis, including alternative measurement approaches, generalized method of moments (GMM) regression, and quantile regression.

Purpose: This study explores the impact of workforce gender composition on operational safety within U.S.-listed firms. The aim is to understand how gender diversity within firms can contribute to fewer workplace accidents and provide a reference for safety management that promotes gender diversity as a safety measure.

Findings: The findings indicate that firms with a more gender-diverse workforce composition report fewer time-lost injuries. This effect is especially pronounced in companies with large income stream variability and those experiencing high labor turnover. These results suggest that a gender-diverse workforce is not only beneficial but critical for enhancing psychologically safe and inclusive climates in the workplace, thereby reducing the frequency and severity of workplace injuries.

Originality/value: This research contributes uniquely to the field of operations management by highlighting the overlooked aspect of gender composition in operational safety amid various operational environments. The insights from this study can assist managers in leveraging gender diversity for safety enhancement and help government agencies in developing policies that encourage a safer and more inclusive workplace environment.

Keywords: Gender diversity; Occupational health and safety; Workplace accidents; Psychological safety

1. Introduction

Nearly three million workers die every year due to work-related accidents and diseases, with the economic burden reaching approximately 4% of global gross domestic product (International Labor Organization, 2022, 2023). In response to these challenges, operations management (OM) researchers have investigated various approaches to enhancing safety performance, including the cultivation of a safety culture (de Koster *et al*., 2011), the implementation of safety management systems (Lo *et al*., 2014), the increase of operating slack (Wiengarten *et al*., 2017), and the control over corporate debt growth (Pagell *et al*., 2019). Given that most workplace accidents occur in operational settings, it is also crucial to consider these attributes as potential determinants of occupational health and safety (OHS) outcomes (Lo *et al*., 2014). Workforce attributes such as age (Peng and Chan, 2019), managerial characteristics (deVries *et al*., 2016), and individual traits (Christian *et al*., 2009) have been shown to influence OHS outcomes.

Among workforce attributes, gender diversity—the equitable representation of people of different genders within an organization (Sytsma, 2006)—emerges as a critical yet underexplored factor in shaping OHS outcomes. The importance of gender diversity in operational safety extends beyond demographic representation or increased female workforce participation (World Bank, 2022). It could potentially influence workplace interpersonal dynamics (Corbett and Narayanan, 2022; Metters and George, 2024), particularly through its potential to foster a psychologically safe organizational climate (Tang *et al*., 2021). Psychological safety refers to a shared belief among employees that the workplace is safe for interpersonal risk-taking, such as speaking up, voicing concerns, admitting mistakes, or asking for help (Edmondson, 1999). This concept is particularly relevant in operational settings where effective communication and trust are critical for identifying and mitigating safety risks.

However, the relationship between gender diversity and organizational outcomes, such as OHS performance, is complex and paradoxical. The broader literature in business has extensively examined gender diversity's impact on various organizational outcomes, such as productivity, innovation, decision-making, and financial performance (Apesteguia *et al*., 2012; Dezsö and Ross, 2012; Ranganathan and Shivaram, 2021; Wowak *et al*., 2021), yielding mixed results (Ujunwa, 2012; Wowak *et al*., 2021). While a gender-diverse environment can foster psychological safety, it may also lead to increased cognitive conflicts that could potentially impede performance (Mannix and Neale, 2005).

Given these considerations, we investigate how gender diversity influences a firm's occupational health and safety outcomes through the theoretical lens of psychological safety. We pose our first research question (RQ1): *How does gender diversity in the workforce influence OHS outcomes, as indicated by time-lost workplace injuries, in a firm's operations?* We argue that a gender-diverse workforce helps foster a psychologically safe organizational climate (Tang *et al*., 2021), which in turn reduces employees' interpersonal risk and enhances overall safety performance (Zadow *et al*., 2017).

While psychological safety serves as a crucial mechanism linking gender diversity to safety outcomes, its importance may vary under different organizational conditions. One particular concern is how organizational uncertainty might affect this relationship. High uncertainty, such as income stream variability and labor turnover, creates environments where maintaining safety becomes exponentially more challenging. We propose that these uncertainties amplify the need for gender diversity's benefits, making the psychologically safe climate and cognitive diversity more critical for maintaining safety under challenging conditions. Specifically, we address the following research question (RQ2): *When firms face higher levels of uncertainty — income stream variability and labor turnover, does gender diversity's contribution to psychological safety become more vital for safety outcomes, thereby strengthening its positive impact on operational safety?*

Utilizing secondary data from the Thomson Reuters ESG and Compustat databases, spanning 435 U.S.-listed firms from 2005 to 2019, we employ a two-way fixed effect regression model to explore these questions. The findings reveal that a more biologically gender-diverse workplace correlates with fewer time-lost injuries, especially in firms with high income stream variability and those facing high-turnover conditions. These results underscore the potential of gender diversity to foster safer and more reliable operations.

Our study makes contributions to OM literature and offers practical insights for operational managers and policymakers. From a theoretical perspective, our research extends the existing knowledge on the organizational determinants of workplace safety by highlighting the crucial role of workforce gender diversity in shaping OHS performance and offering a new lens to understand the complex dynamics of workplace safety. From a practical perspective, our study offers valuable guidance for operational managers and policymakers seeking to mitigate OHS risks and create safer and more inclusive work environments. This insight can inform the development of targeted human resources practices and policies aimed at attracting and retaining diverse talent.

2. Literature review

2.1. Gender diversity in business literature

Gender diversity has received significant attention in various fields of business studies, including strategic management, finance, accounting, and business ethics. Several theories attempt to explain the impact of gender diversity on firm outcomes, with mixed empirical findings. For example, social identity theory and the concept of homophily suggest that gender diversity may lead to increased conflicts and communication difficulties within groups, potentially hindering performance (Mannix and Neale, 2005). Some studies have found no significant relationship or even negative effects of gender diversity on firms' financial performance (Haslam *et al*., 2010; Ujunwa, 2012; Gregory-Smith *et al*., 2014).

Another school of thought considers that gender diversity fosters a more inclusive environment, yielding substantial organizational benefits. For example, the resource-based view (Barney, 1991) suggests that gender diversity is inclusive to broader talent pool and range of perspectives, which can enhance decision-making and problem-solving (Hillman *et al*., 2007). Information processing theory posits that diverse groups process information more thoroughly and inclusively, contributing to problem-solving (Van Knippenberg *et al*., 2004). Signaling theory suggests that gender diversity signals an inclusive and supportive culture, helping attract talent and customers (Lamkin Broome and Krawiec, 2008). Many studies have found a positive association between gender diversity and various aspects of firm performance, such as stock returns (Francoeur *et al*., 2008), financial performance (Reguera-Alvarado *et al*., 2017), innovation (Griffin *et al*., 2021), productivity (Ranganathan and Shivaram, 2021), and corporate social responsibility (Bear *et al*., 2010).

The inconsistency in findings can be attributed to various factors, including the macro environment and task characteristics. In contexts with traditional gender roles and less supportive institutional environments, the benefits of gender diversity may be hindered by rooted biases and resistance to change (Metcalfe and Woodhams, 2012). In addition, for simple tasks that require little collaboration or communication, the benefits of gender diversity may be less pronounced or even detrimental, as potential conflicts and communication difficulties may outweigh the benefits of diverse perspectives (Jehn *et al*., 1999). However, the positive effects of gender diversity may be more pronounced in certain contexts, such as countries with more egalitarian cultural values and supportive institutional frameworks (Post and Byron, 2015), and for complex and interdependent tasks that require cooperation and a variety of skills and perspectives (Gul *et al*., 2011; Van Knippenberg and Mell, 2016). Safety management in operational settings represents an interdependent endeavor that requires the collective efforts of all individuals in a collaborative climate to cope with multifaceted safety hazards.

While the body of literature addressing gender in OM is still relatively small, there has been a growing interest in exploring how gender influences operational processes, decision-making, and outcomes. Scholars have started to address gender differences, with emerging research investigating issues of gender fairness (Ip *et al*., 2020; Pierce *et al*., 2021; Cui *et al*., 2022). In addition, research has begun to assess the direct impact of female workers on operational performance, finding advantages in supply chain collaboration (Ma *et al*., 2021) and a propensity for firms with female directors to initiate product recalls more promptly (Wowak *et al*., 2021). Studies have also investigated how gender compositions influence teams' outcomes, highlighting the advantages of gender-diverse teams (Hoogendoorn *et al*., 2013; Sunder *et al*., 2024). Table 1 summarizes recent literature on gender diversity in OM journals.

Building on these foundations, our study seeks to expand the discourse by examining the role of gender diversity in enhancing operational safety, moving beyond the focus on leadership roles to encompass the broader female workforce. This approach aims to yield insights more directly applicable to operational managers, addressing a gap in the current literature and contributing to a more comprehensive understanding of gender dynamics within firms.

[Insert Table 1 about here]

2.2. Gender diversity and psychological safety

Psychological safety is a key factor in team effectiveness. It creates an environment of interpersonal trust and mutual respect in which people feel comfortable being themselves (Edmondson, 1999). They believe they can speak up, ask questions, raise concerns, and pitch ideas without fear of negative consequences. Teams with a more balanced gender composition tend to exhibit higher levels of psychological safety compared to less balanced teams (Roberge and van Dick, 2010; Tang *et al.*, 2021). This section reviews the literature and discusses three key mechanisms through which gender diversity fosters psychological safety: mitigating dominance effects, reducing tokenism, and broadening cognitive diversity.

First, gender diversity in workplace can help mitigate the "dominance effects" which is often seen in homogeneous groups (Tannen, 1994). In such groups, members of the dominant category tend to speak more frequently, assertively, and influentially, while members of underrepresented categories may feel pressure to conform or stay quiet to avoid negative stereotyping (Mendelberg and Karpowitz, 2014). In contrast, when teams have a more balanced gender composition, it prevents any single group from dominating. All members have a greater opportunity to participate meaningfully and influence team processes (Joshi and Roh, 2009). Therefore, gender diversity creates more space for underrepresented members to feel included and have their voices heard (Apesteguia *et al*., 2012).

Second, increasing gender diversity can help reduce feelings of tokenism. Being the only member of one's gender in an otherwise homogeneous group can create a sense of being a symbolic representative rather than a valued individual (Kanter, 1977). These "token" members often experience heightened visibility and pressure to positively represent their entire social category, leading to psychological stress (Stoker *et al*., 2012). However, when teams have a critical mass of members from different gender groups, the salience of any single category is reduced. People can focus less on symbolic representation and more on authentic engagement without fear that individual missteps will be unfairly generalized (Stoker *et al*., 2012). This shift from tokenism to true inclusion lays the groundwork for psychological safety.

Third, gender diversity broadens a team's cognitive and experiential range. Due to differences in socialization, gender roles, and societal expectations, individuals of different genders often develop distinct knowledge, perspectives, and behaviors (Eagly and Wood, 2012). When teams include a balanced mix of genders, they gain access to a wider array of perspectives and approaches. Moreover, the mere presence of gender diversity sends a powerful meta-message about the team's values and norms. It communicates that the team is committed to inclusion and values the unique contributions of members from different identity groups (Van Knippenberg *et al*., 2004). In this way, the legitimization of diverse perspectives through gender diversity directly enhances psychological safety.

By promoting an environment where employees feel secure in taking interpersonal risks, psychological safety reduces the emotional labor associated with navigating difficult workplace interactions. Consequently, workers who operate in a psychologically safe environment experience lower levels of stress, which can lead to safer working behaviors and improved overall safety performance (Zadow *et al.*, 2017). Building on these theoretical foundations, the next section develops hypotheses on the relationship between gender diversity and workplace safety.

3. Hypotheses development

3.1. Gender-diverse workforce and workplace safety

We argue that workforce gender diversity can have a positive impact on workplace safety. Gender diversity can contribute to the development of psychological safety within a firm (Tang *et al.*, 2021). When employees feel valued, respected, and included—regardless of gender—they are more likely to communicate openly and collaborate effectively (Edmondson and Lei, 2014). In psychologically safe environments, employees feel comfortable sharing their concerns, ideas, and experiences related to safety issues (Nembhard and Edmondson, 2006; Keck and Tang, 2018). Open communication is crucial for identifying and mitigating safety hazards before they lead to accidents.

Second, gender diversity may reduce interpersonal risk and distractions that can lead to accidents. Research has shown that interpersonal conflicts, harassment, and discrimination can undermine employees' attention to safety and increase the risk of injuries (Wang *et al*., 2018). By promoting a more harmonious and supportive work environment (Bronkhorst, 2015), gender diversity can help mitigate these relational risks. When employees experience less social friction and feel more accepted by their coworkers, they can focus their cognitive and emotional resources on performing their jobs safely.

In addition, gender diversity can enhance team decision-making and problem-solving around safety issues. Just as gender-diverse teams consider a wider range of perspectives and alternatives when making business decisions (Apesteguia *et al*.,2012), they may also engage in more thorough safety planning and hazard analysis. The cognitive diversity brought by gender diversity can help teams to identify potential risks, develop comprehensive safety procedures, and adapt to changing conditions (Van Knippenberg and Mell, 2016). Psychological safety ensures that cognitive diversity is fully utilized, as employees feel comfortable sharing ideas and perspectives, while cognitive diversity reinforces psychological safety by enabling teams to collaboratively address complex challenges, building trust and confidence among members. Based on these arguments, we hypothesize:

H1: A more gender-diverse workplace is associated with fewer time-lost workplace accidents.

3.2. The moderating role of income stream variability and labor turnover

Organizational uncertainty poses a fundamental challenge in operational environments by introducing unpredictability in conditions, processes, and outcomes (Milliken, 1987). This uncertainty often increases job demands, as employees facing instability tend to experience heightened anxiety and diminished trust in their work environment (Rafferty and Griffin, 2006). As a result, established routines can be disrupted and coordination efforts complicated, significantly challenging operational safety (Weick and Sutcliffe, 2015).

Safety practices become especially valuable when organizations face elevated safety challenges (Lo et al., 2014). Accordingly, we examine the role of gender diversity in helping firms adapt and remain resilient amid uncertainty. We focus on two key operational challenges indicating organizational uncertainty: income stream variability and high labor turnover. We argue that the positive impact of gender diversity on workplace safety is particularly pronounced under these conditions.

In environments with high income stream variability, firms face significant fluctuations in demand, pricing, and customer preferences (Palmer and Wiseman, 1999), creating organizational stress by complicating revenue forecasts, production planning, and resource allocation. This financial uncertainty may lead managers to prioritize short-term productivity over long-term safety investments (Wiengarten *et al.*, 2017), reducing critical safety measures such as training, equipment maintenance, and staffing levels (Nahrgang *et al*., 2011). Additionally, employees facing job insecurity due to financial uncertainty may feel compelled to work faster, take more risks, or underreport safety incidents to prove their value to the organization (Nordlöf *et al*., 2015). These behaviors can undermine the overall safety climate and increase the likelihood of accidents.

In this context, gender diversity can mitigate these negative consequences by fostering psychological safety and cognitive diversity within firms. In psychologically safe environments, employees feel more comfortable speaking up about safety concerns, admitting mistakes, and challenging unsafe practices, even in the face of financial pressures (Nembhard and Edmondson, 2006). This open communication is essential during financial uncertainty, as employees facing job insecurity or managerial pressures might otherwise remain silent about potential hazards. By reducing the fear of interpersonal risk, psychological safety ensures timely identification, discussion, and resolution of safety issues before they escalate into accidents. Gender diversity enhanced cognitive diversity enriches collective problem-solving and decision-making capabilities (Apesteguia *et al*.,2012). When faced with volatile financial conditions, this diversity allows firms to manage safety challenges creatively, identify risks more comprehensively, and adapt their operational strategies effectively (Van Knippenberg and Mell, 2016). Therefore, employees feel confident in contributing diverse ideas without fear of judgment, leading to improved decision quality and adaptive capacity in uncertain scenarios. Based on these considerations, we hypothesize:

H2: The negative relationship between gender diversity and workplace accidents is more salient in firms with high income stream variability.

Labor turnover introduces additional uncertainty into safety management by continually changing workforce composition. As experienced employees leave, firms face the risk of losing valuable tacit knowledge and skills related to safety practices (De Winne *et al*., 2019). This loss of human capital can create knowledge gaps and weaken the organization's overall safety competence, increasing the likelihood of errors and accidents (Hancock *et al*., 2013). Moreover, frequent changes in team composition can undermine the development of a shared understanding of safety risks, procedures, and responsibilities. New employees may bring different assumptions, habits, and attitudes towards safety, which can clash with established norms and practices (Burt *et al*., 2009). These differences can lead to confusion, miscommunication, and inconsistent behavior, further eroding the organization's safety performance.

However, gender-diverse teams may be better equipped to handle these challenges. By fostering a psychologically safe environment, gender-diverse teams enable employees to openly communicate, share knowledge, and address challenges collaboratively. In such an environment, new hires feel more comfortable asking questions, seeking guidance, and admitting mistakes without fear of negative consequences (Carmeli and Gittell, 2009). This openness allows gender-diverse teams to help new employees quickly acquire the necessary safety knowledge and skills, reducing the risks associated with the onboarding process (Cable *et al*., 2013). Additionally, the inclusive climate fostered by gender-diverse environments provides new employees with emotional and social support, reducing stress and anxiety related to adjusting to a new team and increasing their willingness to engage actively with safety protocols (Nesheim and Gressgård, 2014).

Gender-diverse teams can also leverage their diverse expertise to quickly adapt and redistribute safety responsibilities in response to frequent personnel changes, maintaining operational continuity and safety standards (Van Knippenberg *et al*., 2004; Sunder *et al*., 2024). Exposure to diverse viewpoints can help new employees' learning and help them develop a more comprehensive understanding of the organization's safety system, reducing the time they spend in the novice stage where they are more prone to accidents (Oleinick *et al*., 1995). Therefore, by leveraging the strengths of a gender-diverse workforce—through open communication, emotional support, and adaptive decision-making processes—firms can more rapidly socialize new employees into the safety system and manage challenges posed by turnover. We thus propose:

H3: The negative relationship between gender diversity and workplace accidents is more salient in those firms with high labor turnover.

Figure 1 presents the theoretical framework of our study.

[Insert Figure 1 about here]

4. Methods

4.1. Samples

We use secondary data collected from the Compustat and Thomson Reuters ESG databases to examine the above hypotheses. The data collection process starts with a pool of 1,628 U.S.-listed firms with available employee gender data (for the key independent variable) taken from the Thomson Reuters ESG database. This initial pool yields 7,248 firm-year observations from 2005–2019. We end the observation period in 2019 because of potential confounding effects of the COVID-19 pandemic (Kniffin *et al*., 2021).

We then collect accident data (the key dependent variable) and turnover data from the ESG database. The accident data is available for 582 firms with 3,004 observations. Finally, we obtain financial data and workplace-related data (for control variables) from these two databases. The final sample set for analysis comprises 435 firms with 2,069 observations (a firm-year panel dataset). There is a substantial reduction in the final sample because of the missing accident data, which may potentially lead to selection bias issue. Therefore, we employ a Heckman two-stage model to mitigate this concern (see section 4.3 and Appendix A for further details).

[Insert Table 2 about here]

4.2. Measurements

Table 2 compiles the variable measurements and references. *Workplace accidents* is our dependent variable. These accidents can be categorized into two types: some lead to worker injuries that cause work time losses, and others do not. Accidents involving time-lost injuries are generally more serious. Serious accidents cause more harm to workers and more disruption to operations. Thus, we focus on this type of accident. Specifically, the variable has been calculated as the annual total number of time-lost injuries caused by workplace accidents per million work hours. In our sample, the mean of this variable is 2.823. The industry that has the highest average accident is SIC45: Transportation by Air (18.10). The average percentage of workplace accidents by industries is shown in Appendix B.

Gender diversity is our key independent variable. We measure it as the Blau's index which considers both the number of categories and their relative proportions (Blau, 1977). It is a widely used measure of diversity in business and social sciences literature (Ali *et al*., 2011; Richard *et al*., 2021).

$$Gender\ diversity_{i,t} = 1 - \sum_{i=1}^{n} P_{i,t}^{2} \tag{1}$$

where $P_{i,t}$ is the proportion of employees in the ith category in year t, and n is the total number of categories. In the context of gender diversity, the categories represent different genders. Given the available reported gender data only for male and female employees, n is equal to 2 in this case. The Blau's index ranges from 0 to 0.5. A value of 0 represents the lowest level of gender diversity, where a firm comprises only one gender. And 0.5 indicates the most diverse gender composition, with an equal proportion of male and female employees. Appendix C provides the yearly distributions of specific gender categories and the average gender diversity index across industries.

Income stream variability is the moderator in *H2*. This variable is measured as the variance in a firm's return on assets (ROA) over the previous five years (Palmer and Wiseman, 1999). This approach captures the volatility and unpredictability of a firm's financial performance. In our sample, the mean income stream variability is 0.036, with a standard deviation of 0.049.

Labor turnover is the moderator in *H3*. We measure labor turnover as the ratio of the number of workers who left to the average number of workers (Keller,1984). And the average number of workers is calculated as the average between the number of workers at year t and the number of workers at year t–1. In our dataset, the top three industries with the highest turnover rates are SIC58 (Retail Trade - Eating and Drinking Places, 26.16%), SIC53 (Retail Trade - General Merchandise Stores, 25.72%), and SIC23 (Manufacturing - Apparel and Other Textile Products, 20.87%).

We have considered a set of control variables to enhance the validity of the analysis. First, we include return on sales (ROS) and total assets (naturally logarithm transformed) to control *firm profitability* and *firm size* because profitable and large firms might have extra resources for OHS management (Lo *et al*., 2014). Additionally, firms with increased slack resources may have additional production capacity to cope with demand uncertainty, thereby avoiding productivity pressures that could harm OHS. We thus include the value of property, plant, and equipment scaled by firm sales to control for *operating slack* (Fan and Zhou, 2018). We also include the quick ratio to control for *financial slack* (Wiengarten *et al*., 2017). We include debt/assets ratio to control for *financial leverage*; studies show that debt pressures may put operational workers' OHS at risk (e.g., Pagell *et al*., 2019). Furthermore, we control for *board gender diversity* because workers at the upper echelon may be more able to influence policy and the safety climate (deVries *et al*., 2016). We also incorporate *Training* on employees as one of control variables, as it is an indicator of a firm's investment in safety education and awareness (Shrivastava *et al*., 2009). Safety certification *OHSAS 18001* is a control variable as it represents a firm's adoption of a comprehensive and internationally recognized OHS management system. We have followed Fan *et al*. (2021) to code the firm at year *t* with an OHSAS 18001 certification as "1," and those without as "0." Industry level factors, such as *industrial competition* and *industrial labor intensity*, could increase environmental complexity and potential harm to OHS (Lo *et al*., 2014). Therefore, we add them as control variables in the main model. Table 3 shows the descriptive statistics and correlations of these variables in our sample.

[Insert Table 3 about here]

4.3. Estimation

This study has taken several measures to mitigate endogeneity issues and increase robustness. First, we have used the one-year lag (year *t*–1) data for the independent variable (*gender diversity*) and control variables to the dependent variable (*workplace accidents*, year *t*) to mitigate endogeneity concern is reverse causality (Wiengarten *et al*., 2017).

Second, although control variables have been included, the association between gender diversity and workplace accidents may be confounded by omitted unobservable variables. For example, firms that more closely attend to social issues might tend to improve the gender diversity within employees; in the meantime, they would require more resources to improve worker safety. Hence, we have followed Ketokivi and McIntosh (2017) and Wowak *et al*. (2021), using the two-way fixed effect estimator to eliminate confounding effects from these unobservable time-invariant variables.

Two-way fixed effect regression takes advantage of the panel data structure to include the firm-level and year fixed effects. The former mitigates the time-invariant heterogeneities across firms and allows within-firm analysis. The latter mitigates the impacts of secular changes in the environment, such as economic downturn and inflation (Wooldrige, 2021). Therefore, the coefficients in this estimator should be interpreted as the effect of increased gender diversity within a firm across time, on the change (decrease) in future accidents within the same firm across time. Specifically, the model to test *H1* is specified below:

$$Workplace\ accidents_{i,t+1} = \alpha + \beta Gender\ diversity_{i,t} + \gamma Z_{i,t} + \varepsilon_{i,t} \quad (2)$$

In this equation, $Workplace\ accidents_{i,t+1}$ represents the time-lost injuries of firm *i* in year *t+1*. $Gender\ diversity_{i,t}$ refers to the Blau's index of firm *i* in year *t*, and $Z_{i,t}$ is the matrix of control variables of firm *i* in year *t*, including *firm profitability*, *firm size, operating slack, financial slack, financial leverage, board gender diversity, training, OHSAS 18001, industrial competition* and *industrial labor intensity*. α is the intercept of the model. β and γ are coefficients of $Gender\ diversity_{i,t}$ and $Z_{i,t}$, respectively. The error term in the model is represented by $\varepsilon_{i,t}$.

For the moderating effects, the model to test *H2* and *H3* is specified below:

$$Workplace\ accidents_{i,t+1} = \alpha + \beta Gender\ diversity_{i,t} + \beta_1 Gender\ diversity_{i,t} \times Moderator_{i,t} + \beta_2 Moderator_{i,t} + \gamma Z_{i,t} + \varepsilon_{i,t} \quad (3)$$

Here, $Workplace\ accidents_{i,t+1}$, $Gender\ diversity_{i,t}$, $Z_{i,t}$, α, β, γ, and ε_{it} remain the same. $Moderator_{i,t}$ represents either income stream variability or labor turnover of firm *i* in year *t*. β_1 and β_2 are coefficients of the interaction term and $Moderator_{i,t}$, respectively.

In addition, our final sample size experiences a substantial reduction from the initial sample pool due to missing accident data. This reduction could potentially lead to selection bias, as firms that regularly report workplace injury data may have systematic characteristics. For instance, well-governed firms may tend to be transparent, thus increasing the likelihood of reporting workplace injuries. To mitigate this potential bias, we adopt a Heckman two-stage analysis approach (Heckman, 1979). Initially, we conduct a Probit analysis in the first stage (i.e., the selection model), where we create a dependent variable to indicate whether a firm disclosed its accident data in a given year. Further details of the Probit analysis can be found in Appendix A. Subsequently, an inverse Mills ratio (IMR) variable is generated from the Probit regression analysis and incorporated into our models to reduce the potential selection bias issue.

[Insert Table 4 about here]

5. Results

Table 3 is a summary describing statistics and correlations among the variables. The maximum variation inflation factor is 1.54, indicating that the multi-collinearity concern is not significant in our models. Table 4 shows the hypotheses testing results. Model 1 includes all the control variables, and the independent variable *gender diversity*. The resulting coefficient is significantly negative (–5.653, $p < 0.01$). A 1% increase in the workforce gender diversity is associated with a decrease of 5.653 injuries per million work hours in the workplace within the firm across time. Thus, *H1* is supported.

We insert the moderators and the interaction terms of gender diversity with income stream variability and labor turnover, in Models 2 and 3, respectively. Model 2 reveals a significant negative coefficient for the interaction between gender diversity and income stream variability (–29.757, $p < 0.05$). We define the high income stream variability level (0.085) as one standard deviation (0.049) above the mean value (0.036). The findings suggest that for firms facing high levels of income stream variability, a 1% increase in the workforce gender diversity is associated with a further reduction of 1.458 injuries per million work hours, compared to firms operating at the mean level of income stream variability. Thus, the finding supports *H2*.

Model 3 shows that the coefficient of gender diversity*labor turnover is also significantly negative (–26.655, $p < 0.01$). Similarly, we define the high labor turnover level (0.188) as one standard deviation (0.065) above the mean value (0.123). A 1% increase in the workforce gender diversity can reduce an additional 1.733 injuries per million work hours in firms with a high level of labor turnover, compared to firms with the mean level of labor turnover. Thus, *H3* is supported. Model 4 includes all the interaction terms simultaneously, further confirming *H2* and *H3*.

Our analysis also reveals that firms with greater financial slack tend to experience fewer workplace injuries, consistent with previous research (e.g., Wiengarten *et al*., 2017), which suggests that such firms have more resources to invest in safety measures and risk management. Our analysis also demonstrates that firms with OHSAS 18001 certification experience significantly fewer workplace accidents, highlighting the importance of a systematic and comprehensive approach to safety management (Lo *et al*., 2014).

6. Robustness checks and further analysis

6.1. Alternative measurements

Our primary model uses time-lost injuries as the measurement to indicate serious accidents that cause lost work hours. Although not all accidents will lead to lost work hours, the non-time-lost injuries can still undermine workers' productivity. We thus use the *non-time-lost injuries* (per million work hours) as an alternative measurement for workplace accidents and re-run the analysis. Model 5 in Table 5 shows that the coefficient of gender diversity remains significantly negative (–18.100, $p < 0.01$). This result is also consistent when using *total injuries* (the sum of time-lost and non-time-lost injuries) as the dependent variable in Model 6, where the coefficient of gender diversity is significantly negative (–18.229, $p < 0.01$).

In addition, workplace safety includes keeping workers free from occupational diseases. Diseases are often less urgent than injuries but may have long-term impacts on workers. We then use the number of *occupational diseases* (per million work hours) as the alternative dependent variable and re-run the analysis. Model 7 shows that the coefficient is significantly negative (–10.341, $p < 0.01$). Finally, fatalities are the most serious accident cases. We thus also use the number of *fatalities* (per million work hours) as the alternative dependent variable for a robustness check. Model 8 shows that the coefficient of gender diversity is also significantly negative (–8.458, $p < 0.01$). These robustness checks provide further support for *H1*, illustrating that workforce gender diversity is negatively associated with not only time-lost injuries but also non-time-lost injuries, total injuries, occupational diseases, and fatalities.

[Insert Table 5 about here]

6.2. Generalized method of moments (GMM) regression

We use the two-way fixed effect estimator to control for unobservable time-invariant confounding factors. However, the unobservable time-variant factors are not accounted for. Thus, we take advantage of the panel data structure and follow Wiengarten *et al*. (2017) to use GMM as an alternative estimator to mitigate the endogeneity concern from the confounding factors that are time-variant. Specifically, we use the lagged endogenous variables (i.e., gender diversity and that variable's interaction terms with moderators at t–1 to t–3) as the instrumental variables. Table 6 shows the analysis results. Model 9 illustrates that the coefficient of gender diversity remains significantly negative. Models 10 and 11 also demonstrate that the coefficients of two interaction terms are significantly negative. Both models have significant results in AR (1) but non-significant results in AR (2). The Hansen tests also show non-significant results. Therefore, these checks illustrate that the GMM analysis is valid. These results further support *H1*, *H2*, and *H3*.

[Insert Table 6 about here]

6.3. Other robustness checks

Some may argue that not only the injury data reporting, but also the gender composition reporting may cause selection bias. The current design of Heckman two-stage analysis has mitigated the concern from the former, whereas the concern from the latter was not accounted for. We thus redesign the Heckman two-stage analysis to potential selection bias caused by gender composition reporting. The redesigned Heckman two-stage analysis finds that the concern does not falsify our conclusion (Appendix Table D1 and D2).

6.4. Further analysis

We conduct additional analyses using quantile regression and subsample regression techniques to investigate the threshold in the relationship between gender diversity and workplace accidents. Additionally, we check the relationship at the industry level.

Quantile regression is a useful approach for examining the heterogeneous effects of an independent variable across different levels or quantiles of the dependent variable (Koenker and Hallock, 2001). Our quantile regression results in Table 7 show that the effect of gender diversity on reducing workplace accidents is statistically significant at the lower quantiles of the accident rate distributions (i.e., below the 50th percentile), but becomes non-significant at higher quantiles. This suggests that the benefits of gender diversity for workplace safety may be most evident in organizations that already have relatively low accident rates, but it may be less impactful in organizations with more severe safety problems.

[Insert Table 7 about here]

Furthermore, our subsample regression analysis, in which we split our sample into female-dominated firms (where the proportion of female workers exceeds 50%) and male-dominated firms (where the proportion of female workers is below 50%), reveals additional threshold effects of gender diversity. As shown in Table 8, we find that the effect of gender diversity on workplace accidents remains significantly negative in male-dominated firms, but it is statistically insignificant in female-dominated firms. One possible explanation for this finding is that the smaller sample size (N=73) for female-dominated firms in our dataset may have limited our statistical power to detect significant effects in this subsample.

[Insert Table 8 about here]

Lastly, some may argue that gender diversity, workplace accidents, and their relationship are highly industry-dependent, or it is possible that changes in female labor force participation are more pronounced at the industry level. To address these concerns, we conduct analysis at the industry level. Specifically, we calculate the industry-level averages (identified by four-digit SIC codes) for all variables included in our original model and perform the two-way fixed effect regression using these aggregated measures. The results, presented in Table 9, indicate that gender diversity at the industry level remains significantly negatively associated with workplace accidents. This finding is consistent with our main result, further supporting the robustness of our conclusions across different levels of analysis.

[Insert Table 9 about here]

7. Discussion and conclusions

This study has examined the effects of gender diversity in the labor force on operational safety. Sampling U.S.-listed firms, the analysis results show that a more gender-diverse workplace is associated with fewer workplace accidents within firms across time. This negative relationship is more salient when the firms have high levels of income stream variability and labor turnover in workplace environments.

However, the quantile regression results also suggest that the impact of gender diversity on workplace safety is not consistent across all contexts. The finding that gender diversity has a significant effect on reducing accidents in firms with relatively low accident rates suggests that there may be a threshold effect. This implies that firms may need to achieve a certain level of safety performance before they can fully leverage the benefits of gender diversity. Additionally, the results indicate that gender diversity is more effective in reducing accidents in male-dominated industries, highlighting the importance of considering industry-specific factors when examining the impact of diversity on safety outcomes. This suggests that the value of gender diversity may be more pronounced in contexts where women are underrepresented and where their unique perspectives and experiences can bring new insights to safety management.

Another important implication of the study is that the benefits of gender diversity may be amplified in firms with high income stream variability or labor turnover. In these challenging environments, gender-diverse organizations can leverage their cognitive diversity and psychological safety to adapt more effectively to uncertain circumstances. This suggests that fostering gender diversity may be particularly valuable for organizations seeking to build resilience and adaptability in complex and dynamic environmental conditions.

7.1. Implications for scholars

Our study makes several valuable contributions to existing literature. Differing from the current operational safety literature focusing on the safety management system (Lo *et al*., 2014), operational slacks (Wiengarten *et al*., 2017) and debt structure (Pagell *et al*., 2019), we have expanded this field of study by taking a fresh perspective on workforce composition. By examining the role of gender diversity in workplace safety, our findings offer a new dimension to understanding how workforce heterogeneity can enhance safety outcomes in complex operational environments. This study thus opens avenues for future research. First, while we focus on gender diversity, future studies could explore the effects of other dimensions of diversity—such as ethnicity, or experience—on workplace safety. Additionally, our results raise new questions about the mechanisms underlying the relationship between workforce diversity and safety performance. Addressing these questions is particularly timely and important as employees, consumers and investors are increasingly requiring firms to incorporate inclusiveness as an important dimension of corporate social responsibility.

Second, we contribute to the OM literature on gender issues by shifting the focus from gender diversity in leadership roles (e.g., Ranganathan and Shivaram, 2021; Wowak *et al*., 2021) to a broader examination of gender diversity across the entire workforce. This shifts the focus from a top-down perspective to recognizing the collective value of diversity across an entire organization. Scholars should therefore not limit their diversity focus to leadership roles but should actively promote gender diversity throughout all ranks of the organization. Future studies could investigate how the distribution of gender diversity across different departments or functional areas impacts organizational outcomes.

In addition, our study departs from the traditional literature that often focuses on comparing male versus female performance outcomes (e.g., Cui *et al*., 2022). Instead, we adopt an organizational perspective by examining the performance outcomes of gender-diverse versus gender-homogeneous workforces. This shift in perspective is critical because it moves beyond binary comparisons and simplistic categorizations of gender to explore how the overall composition of a workforce—whether diverse or homogeneous—impacts organizational performance.

We also expand psychological safety literature (e.g., Nembhard and Edmondson, 2006; Carmeli and Gittell, 2009) by theoretically elucidating how gender diversity can foster a psychologically safe environment that enhances operational safety outcomes in OM context. We demonstrate that gender diversity can significantly contribute to fostering psychological safety. This expands our understanding of the organizational factors that shape psychological safety and highlights the importance of considering diversity as a key driver of psychologically safe climates. In our research setting, this merit outweighs the concern that gender diversity may lead to cognitive conflicts, which could undermine organizational outcomes (Mannix and Neale, 2005). Additionally, by integrating psychological safety into discussions of operational safety performance, we extend its application beyond traditional outcomes such as innovation or effectiveness (e.g., Tang et al., 2021; Chan et al., 2023).

Our moderating analyses contribute to the existing body of work on OHS management and organizational resilience (e.g., Wiengarten *et al*., 2017; Ortiz-de-Mandojana and Bansal, 2016). Our study identifies gender diversity as a key factor in maintaining safety performance during times of financial uncertainty. This suggests that diversity is not merely a "nice-to-have" attribute but a critical resource that can enhance a firm's resilience in the face of economic volatility. Furthermore, our research introduces a new dimension by demonstrating that gender diversity can help mitigate the risks associated with high turnover. This suggests that the impact of turnover on organizational outcomes is not uniform (e.g., Nishii and Mayer, 2009) but is instead contingent on the demographic composition of the workforce. Theoretically, this insight highlights the need for a more nuanced understanding of the boundary conditions of turnover's effects and the role of workforce characteristics. Our analysis opens an avenue for future research to explore the boundary effects of diversity on safety performance.

7.2. Managerial and policy implications

The findings of this study offer several valuable insights for managers. First, they underscore the importance of promoting gender diversity in the workplace, not only for ethical and social reasons but also for enhancing operational safety. Managers should prioritize diversity and inclusion initiatives, such as recruiting and retaining a diverse workforce, fostering a psychological and inclusive culture, and providing equal opportunities for career advancement.

Second, our study highlights the crucial role of psychological safety in translating gender diversity into improved safety outcomes. Managers should prioritize creating a psychologically safe environment. This can be achieved through various practices, such as encouraging open communication, modeling inclusive leadership behaviors, and rewarding employees for raising safety issues. By cultivating a psychological safe culture, organizations can leverage the full potential of gender diversity to enhance performance.

Our findings also provide implications for policymaking and enforcement. We suggest that safety regulation enforcement bodies include the gender composition factor when evaluating firms' OHS risk for planning inspection intensity. In addition, based on our study's illustration that gender diversity can improve reliability of operations, we recommend that government agencies use our data as support in promoting workplace gender equality. By embedding incentives for gender diversity into OHS regulations, policymakers can drive a two-fold impact: improving workplace safety standards and advancing gender equality in the labor market. This approach requires a nuanced understanding of the interplay between gender composition and safety performance, emphasizing the role of policy in shaping organizational practices that are both safe and inclusive. Such policy measures could serve as a catalyst for broader societal change, fostering a workplace environment that values diversity as a key pillar of operational excellence and social responsibility.

7.3. Limitations

This research has several limitations. First, the study relies on a binary biological gender framework due to gender data reporting. Previous literature on gender diversity has been primarily focused on increasing representation of women (Dezsö and Ross, 2012; Ruel and Fritz, 2021; Metters and George, 2024).), while the scope also has expanded to consider gender minorities and pursue a balanced composition of different genders (Hoogendoorn *et al*., 2013; Sunder *et al*., 2024). Thus, future research could expand this framework to include more diverse gender identities, such as non-binary and transgender individuals. This would provide a more comprehensive and inclusive understanding of the relationship between gender diversity and workplace safety. Second, we have focused on firms in the U.S., which has comprehensive safety and labor laws to protect worker welfare. The protection is less developed in transitioning and emerging economies. Given that the effect of gender diversity on firm performance may vary across different cultural and institutional contexts, future research could examine this relationship in other countries, particularly in transitioning and emerging economies. Third, we have used secondary data and have taken a first-step exploration of gender–workplace safety relationships. We recommend that future studies use qualitative or primary data to reveal the differences in safety behaviors between or among genders.

References

Ali, M., Kulik, C.T. and Metz, I., 2011. The gender diversity-performance relationship in services and manufacturing organizations. *The International Journal of Human Resource Management*, *22*(07), pp.1464–1485.

Apesteguia, J., Azmat, G. and Iriberri, N., 2012. The impact of gender composition on team performance and decision making: Evidence from the field. *Management Science*, *58*(1), pp.78–93.

Baumann-Pauly, D., Wickert, C., Spence, L.J. and Scherer, A.G., 2013. Organizing corporate social responsibility in small and large firms: Size matters. *Journal of Business Ethics*, *115*, pp.693–705.

Barney, J., 1991. Firm resources and sustained competitive advantage. *Journal of Management*, *17*(1), pp.99–120.

Bear, S., Rahman, N. and Post, C., 2010. The impact of board diversity and gender composition on corporate social responsibility and firm reputation. *Journal of Business Ethics*, *97*, pp.207–221.

Blau, P.M., 1977. *Inequality and Heterogeneity*. Free Press, New York, NY.

Bronkhorst, B., 2015. Behaving safely under pressure: The effects of job demands, resources, and safety climate on employee physical and psychosocial safety behavior. *Journal of Safety Research*, *55*, pp.63–72.

Burt, C. D., Chmiel, N., and Hayes, P., 2009. Implications of turnover and trust for safety attitudes and behaviour in work teams. *Safety Science*, *47*(7), pp.1002–1006.

Cable, D. M., Gino, F., and Staats, B. R., 2013. Reinventing employee onboarding. *MIT Sloan Management Review*, *54*(3), p.23.

Carmeli, A. and Gittell, J.H., 2009. High-quality relationships, psychological safety, and learning from failures in work organizations. *Journal of Organizational Behavior: The International Journal of Industrial, Occupational and Organizational Psychology and Behavior*, *30*(6), pp.709-729.

Chan, T.H., Liu, H., Keck, S. and Tang, W., 2023. When do teams generate valuable inventions? The moderating role of invention integrality on the effects of expertise similarity, network cohesion, and gender diversity. *Production and Operations Management*, *32*(6), pp.1760–1777.

Christian, M.S., Bradley, J.C., Wallace, J.C. and Burke, M.J., 2009. Workplace safety: a meta-analysis of the roles of person and situation factors. *Journal of Applied Psychology*, *94*(5), p.1103.

Corbett, C.J., Montes-Sancho, M.J. and Kirsch, D.A., 2005. The financial impact of ISO 9000 certification in the United States: An empirical analysis. *Management Science*, *51*(7), pp.1046-1059.

Corbett, C.J. and Narayanan, S., 2022. Special issue of production and operations management on "diversity, equity, and inclusion in operations and supply chain management". *Production and Operations Management*, *31*(7), pp.3061-3063.

Cui, R., Ding, H. and Zhu, F., 2022. Gender inequality in research productivity during the COVID–19 pandemic. *Manufacturing & Service Operations Management*, *24*(2), pp.707–726.

de Koster, R.B., Stam, D. and Balk, B.M., 2011. Accidents happen: The influence of safety–specific transformational leadership, safety consciousness, and hazard reducing systems on warehouse accidents. *Journal of Operations Management*, *29*(7–8), pp.753–765.

De Winne, S., Marescaux, E., Sels, L., Van Beveren, I. and Vanormelingen, S., 2019. The impact of employee turnover and turnover volatility on labor productivity: a flexible non–linear approach. *The International Journal of Human Resource Management*, *30*(21), pp.3049–3079.

deVries, J., deKoster, R., and Stam, D., 2016. Safety does not happen by accident: Antecedents to a safer warehouse. *Production and Operations Management*, *25*(8), pp.1377–1390.

Dezsö, C.L. and Ross, D.G., 2012. Does female representation in top management improve firm performance? A panel data investigation. *Strategic Management Journal*, *33*(9), pp.1072–1089.

Eagly, A. H., and Wood, W., 2012. Social role theory. *Handbook of Theories of Social Psychology*, *2*, pp.458–476.

Edmondson, A., 1999. Psychological safety and learning behavior in work teams. *Administrative Science Quarterly*, *44*(2), pp.350–383.

Edmondson, A.C. and Lei, Z., 2014. Psychological safety: The history, renaissance, and future of an interpersonal construct. *Annu. Rev. Organ. Psychol. Organ. Behav.*, *1*(1), pp.23–43.

Fan, D. and Zhou, Y., 2018. Operational safety: The hidden cost of supply–demand mismatch in fashion and textiles related manufacturers. *International Journal of Production Economics*, *198*, pp.70–78.

Fan, D., Lo, C.K. and Zhou, Y., 2021. Sustainability risk in supply bases: The role of complexity and coupling. *Transportation Research Part E: Logistics and Transportation Review*, *145*, p.102175.

Fan, D., Yeung, A.C., Yiu, D.W. and Lo, C.K., 2022. Safety regulation enforcement and production safety: The role of penalties and voluntary safety management systems. *International Journal of Production Economics*, *248*, p.108481.

Francoeur, C., Labelle, R. and Sinclair–Desgagné, B., 2008. Gender diversity in corporate governance and top management. *Journal of Business Ethics*, *81*, pp.83–95.

Gray, W.B. and Mendeloff, J.M., 2005. The declining effects of OSHA inspections on manufacturing injuries, 1979–1998. *ILR Review*, *58*(4), pp.571–587.

Gregory-Smith, I., Main, B.G. and O'Reilly III, C.A., 2014. Appointments, pay and performance in UK boardrooms by gender. *The Economic Journal*, *124*(574), pp.F109–F128.

Griffin, D., Li, K. and Xu, T., 2021. Board gender diversity and corporate innovation: International evidence. *Journal of Financial and Quantitative Analysis*, *56*(1), pp.123–154.

Gul, F.A., Srinidhi, B. and Ng, A.C., 2011. Does board gender diversity improve the informativeness of stock prices? *Journal of Accounting and Economics*, *51*(3), pp.314–338.

Hancock, J.I., Allen, D.G., Bosco, F.A., McDaniel, K.R. and Pierce, C.A., 2013. Meta-analytic review of employee turnover as a predictor of firm performance. *Journal of Management*, *39*(3), pp.573–603.

Haslam, S.A., Ryan, M.K., Kulich, C., Trojanowski, G. and Atkins, C., 2010. Investing with prejudice: The relationship between women's presence on company boards and objective and subjective measures of company performance. *British Journal of Management*, *21*(2), pp.484–497.

Heckman, J., 1979. Sample selection bias as a specification error. *Econometrica*.

Hillman, A.J., Shropshire, C. and Cannella Jr, A.A., 2007. Organizational predictors of women on corporate boards. *Academy of Management Journal*, *50*(4), pp.941–952.

Hoogendoorn, S., Oosterbeek, H. and Van Praag, M., 2013. The impact of gender diversity on the performance of business teams: Evidence from a field experiment. *Management Science*, *59*(7), pp.1514–1528.

International Labour Organization. 2023. "*Nearly 3 million people die of work-related accidents and diseases*." Retrieved 5/9/2024 from https://www.ilo.org/resource/news/nearly-3-million-people-die-work-related-accidents-and-diseases

International Labour Organization. 2022. "*Decent Work SmartLab Series 2022: Reported work-related accidents and deaths increase again in 2021*." Retrieved 5/9/2024 from https://www.ilo.org/resource/news/decent-work-smartlab-series-2022-reported-work-related-accidents-and-deaths

Ip, E., Leibbrandt, A. and Vecci, J., 2020. How do gender quotas affect workplace relationships? Complementary evidence from a representative survey and labor market experiments. *Management Science*, *66*(2), pp.805–822.

Jehn, K.A., Northcraft, G.B. and Neale, M.A., 1999. Why differences make a difference: A field study of diversity, conflict and performance in workgroups. *Administrative Science Quarterly*, *44*(4), pp.741–763.

Joshi, A., and Roh, H., 2009. The role of context in work team diversity research: A meta-analytic review. *Academy of Management Journal*, *52*(3), pp.599–627.

Kanter, R. M., 1977. Some effects of proportions on group life: Skewed sex ratios and responses to token women. *American Journal of Sociology*, *82*(5), pp.965–990.

Keck, S., and Tang, W., 2018. Gender composition and group confidence judgment: The perils of all-male groups. *Management Science*, *64*(12), pp.5877–5898.

Keller, R.T., 1984. The role of performance and absenteeism in the prediction of turnover. *Academy of Management Journal*, *27*(1), pp.176–183.

Ketokivi, M. and McIntosh, C.N., 2017. Addressing the endogeneity dilemma in operations management research: Theoretical, empirical, and pragmatic considerations. *Journal of Operations Management*, *52*, pp.1–14.

Kniffin, K.M., Narayanan, J., Anseel, F., Antonakis, J., Ashford, S.P., Bakker, A.B., Bamberger, P., Bapuji, H., Bhave, D.P., Choi, V.K. and Creary, S.J., 2021. COVID-19 and the workplace: Implications, issues, and insights for future research and action. *American Psychologist*, *76*(1), p.63.

Koenker, R. and Hallock, K.F., 2001. Quantile regression. *Journal of Economic Perspectives*, *15*(4), pp.143–156.

Kroes, J., Land, A., Manikas, A.S. and Klein, F., 2024. Gender diversity and injustice among supply chain executives: exploring outcomes that advance social justice. *International Journal of Operations & Production Management*. Forthcoming.

Lamkin Broome, L. and Krawiec, K.D., 2008. Signaling through board diversity: Is anyone listening. *U. Cin. L. Rev.*, *77*, p.431.

Leung, S.F. and Yu, S., 1996. On the choice between sample selection and two-part models. *Journal of Econometrics*, *72*(1–2), pp.197–229.

Lo, C.K., Pagell, M., Fan, D., Wiengarten, F. and Yeung, A.C., 2014. OHSAS 18001 certification and operating performance: The role of complexity and coupling. *Journal of Operations Management*, *32*(5), pp.268–280.

Ma, S., Hao, L. and Aloysius, J.A., 2021. Women are an advantage in supply chain collaboration and efficiency. *Production and Operations Management*, *30*(5), pp.1427–1441.

Mannix, E. and Neale, M.A., 2005. What differences make a difference? The promise and reality of diverse teams in organizations. *Psychological Science in the Public Interest*, *6*(2), pp.31–55.

Martínez-Ferrero, J., and García-Sánchez, I. M., 2017. Coercive, normative and mimetic isomorphism as determinants of the voluntary assurance of sustainability reports. *International Business Review*, *26*(1), pp.102–118.

Mendelberg, T., Karpowitz, C. F., and Goedert, N., 2014. Does descriptive representation facilitate women's distinctive voice? How gender composition and decision rules affect deliberation. *American Journal of Political Science*, *58*(2), pp.291–306.

Metcalfe, B.D. and Woodhams, C., 2012. Introduction: New directions in gender, diversity and organization theorizing–re-imagining feminist post-colonialism, transnationalism and geographies of power. *International Journal of Management Reviews*, *14*(2), pp.123–140.

Metters, R. and George, J., 2024. Research in Diversity: Lessons for operations management from the women's studies field. *Production and Operations Management*. Forthcoming.

Milliken, F. J., 1987. Three types of perceived uncertainty about the environment: State, effect, and response uncertainty. *Academy of Management Review*, 12(1), pp.133–143.

Nahrgang, J. D., Morgeson, F. P., and Hofmann, D. A., 2011. Safety at work: a meta-analytic investigation of the link between job demands, job resources, burnout, engagement, and safety outcomes. *Journal of Applied Psychology*, *96*(1), p.71.

Nembhard, I.M. and Edmondson, A.C., 2006. Making it safe: The effects of leader inclusiveness and professional status on psychological safety and improvement efforts in health care teams. *Journal of Organizational Behavior: The International Journal of Industrial, Occupational and Organizational Psychology and Behavior*, *27*(7), pp.941–966.

Nesheim, T. and Gressgård, L.J., 2014. Knowledge sharing in a complex organization: Antecedents and safety effects. *Safety Science*, *62*, pp.28–36.

Nishii, L.H. and Mayer, D.M., 2009. Do inclusive leaders help to reduce turnover in diverse groups? The moderating role of leader–member exchange in the diversity to turnover relationship. *Journal of Applied Psychology*, *94*(6), p.1412.

Nordlöf, H., Wiitavaara, B., Winblad, U., Wijk, K., and Westerling, R., 2015. Safety culture and reasons for risk-taking at a large steel-manufacturing company: Investigating the worker perspective. *Safety Science*, *73*, pp.126–135.

Oleinick, A., Gluck, J. V., and Guire, K. E., 1995. Establishment size and risk of occupational injury. *American Journal of Industrial Medicine*, *28*(1), pp.1–21.

Ortiz-de-Mandojana, N. and Bansal, P., 2016. The long-term benefits of organizational resilience through sustainable business practices. *Strategic Management Journal*, *37*(8), pp.1615–1631.

Pagell, M., Wiengarten, F., Fan, D., Humphreys, P., and Lo, C. K., 2019. Managerial time horizons and the decision to put operational workers at risk: The role of debt. *Decision Sciences*, *50*(3), pp.582–611.

Palmer, T. B., and Wiseman, R. M., 1999. Decoupling risk taking from income stream uncertainty: A holistic model of risk. *Strategic Management Journal*, *20*(11), pp.1037–1062.

Peng, L. and Chan, A.H., 2019. A meta-analysis of the relationship between ageing and occupational safety and health. *Safety Science*, *112*, pp.162–172.

Pierce, L., Wang, L.W. and Zhang, D.J., 2021. Peer bargaining and productivity in teams: Gender and the inequitable division of pay. *Manufacturing & Service Operations Management*, *23*(4), pp.933–951.

Post, C. and Byron, K., 2015. Women on boards and firm financial performance: A meta-analysis. *Academy of Management Journal*, *58*(5), pp.1546–1571.

Rafferty, A.E. and Griffin, M.A., 2006. Perceptions of organizational change: a stress and coping perspective. *Journal of Applied Psychology*, *91*(5), p.1154.

Ranganathan, A. and Shivaram, R., 2021. Getting their hands dirty: How female managers motivate female worker productivity through subordinate scut work. *Management Science*, *67*(5), pp.3299–3320.

Reguera-Alvarado, N., De Fuentes, P. and Laffarga, J., 2017. Does board gender diversity influence financial performance? Evidence from Spain. *Journal of Business Ethics*, *141*, pp.337–350.

Richard, O.C., Triana, M.D.C. and Li, M., 2021. The effects of racial diversity congruence between upper management and lower management on firm productivity. *Academy of Management Journal*, *64*(5), pp.1355–1382.

Roberge, M. É., and Van Dick, R. 2010. Recognizing the benefits of diversity: When and how does diversity increase group performance? *Human Resource Management Review*, *20*(4), pp.295–308.

Ruel, S., and Fritz, M. M. 2021, July. Gender diversity in supply chains: Towards more sustainable decisions? Evidence from interviews. In *Supply Chain Forum: An International Journal* (Vol. 22, No. 3, pp.205–222).

Scott, A., Davis-Sramek, B. and Ketchen Jr, D.J., 2024. Men at work… unsafely: Gender differences in compliance with safety regulations in the trucking industry. *Production and Operations Management*. Forthcoming.

Shrivastava, S., Sonpar, K. and Pazzaglia, F., 2009. Normal accident theory versus high reliability theory: a resolution and call for an open systems view of accidents. *Human Relations*, *62*(9), pp.1357–1390.

Stoker, J. I., Van der Velde, M., and Lammers, J., 2012. Factors relating to managerial stereotypes: The role of gender of the employee and the manager and management gender ratio. *Journal of Business and Psychology*, *27*, pp.31–42.

Sunder M, V., Gangwar, M. and Modukuri, S., 2024. Do Gender-Diverse Teams Deliver Better Operational Performance: An Experimental Study. *Production and Operations Management*. Forthcoming.

Sytsma, S. E. (Ed.), 2006. *Ethics and Intersex* (Vol. 29). Dordrecht: Springer.

Tang, S., Nadkarni, S., Wei, L., and Zhang, S. X., 2021. Balancing the yin and yang: TMT gender diversity, psychological safety, and firm ambidextrous strategic orientation in Chinese high-tech SMEs. *Academy of Management Journal*, *64*(5), pp.1578–1604.

Tannen, D., 1994. *Gender and discourse*. Oxford University Press.

Tirole, J., 1988. *The theory of industrial organization*. MIT press.

Ujunwa, A., 2012. Board characteristics and the financial performance of Nigerian quoted firms. *Corporate Governance: The International Journal of Business in Society*, *12*(5), pp.656–674.

Van Knippenberg, D., De Dreu, C.K. and Homan, A.C., 2004. Work group diversity and group performance: an integrative model and research agenda. *Journal of Applied Psychology*, *89*(6), p.1008.

Van Knippenberg, D. and Mell, J.N., 2016. Past, present, and potential future of team diversity research: From compositional diversity to emergent diversity. *Organizational Behavior and Human Decision Processes*, *136*, pp.135–145.

Wang, D., Wang, X., and Xia, N., 2018. How safety-related stress affects workers' safety behavior: The moderating role of psychological capital. *Safety Science*, *103*, pp.247–259.

Weick, K. E., & Sutcliffe, K. M. 2015. Managing the unexpected: Sustained performance in a complex world. Hoboken, NJ: John Wiley & Sons

Wiengarten, F., Fan, D., Lo, C.K. and Pagell, M., 2017. The differing impacts of operational and financial slack on occupational safety in varying market conditions. *Journal of Operations Management*, *52*, pp.30–45.

Wooldridge, J.M., 2021. Two-way fixed effects, the two-way mundlak regression, and difference-in-differences estimators. *Available at SSRN 3906345*.

World Bank, 2022. "Female labor force participation." Retrieved 9/7/2024 from https://genderdata.worldbank.org/data-stories/flfp-data-story/#:~:text=The%20global%20labour%20force%20participation,do%20work%2C%20they%20earn%20less.

Wowak, K.D., Ball, G.P., Post, C. and Ketchen Jr, D.J., 2021. The influence of female directors on product recall decisions. *Manufacturing & Service Operations Management*, *23*(4), pp.895–913.

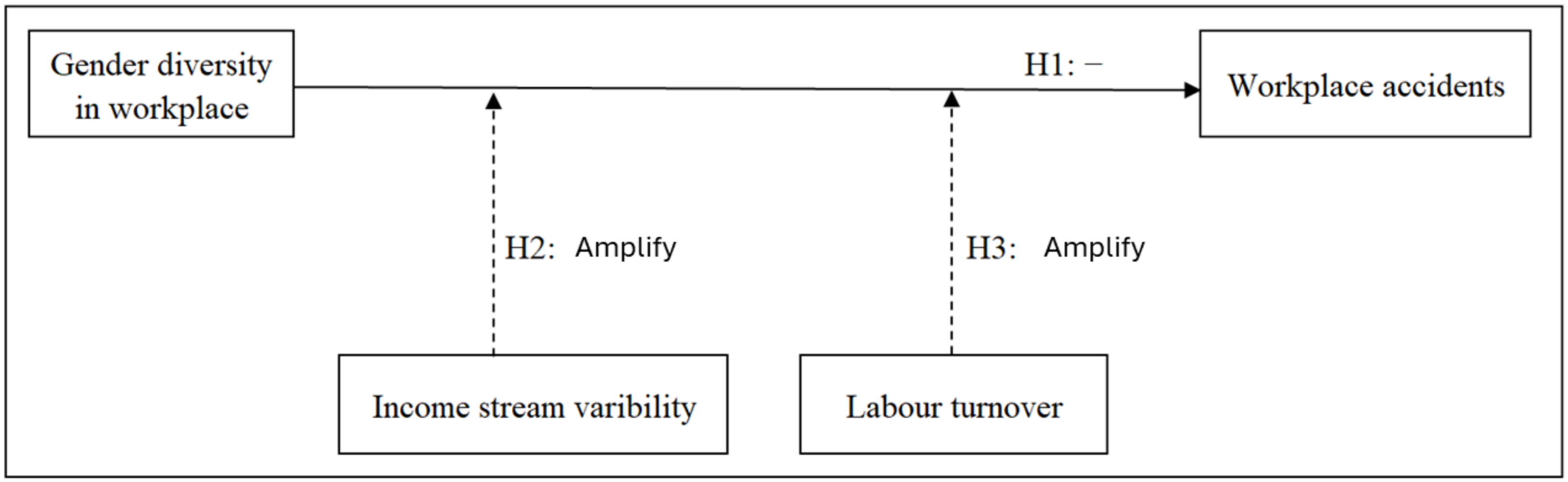
Zadow, A. J., Dollard, M. F., Mclinton, S. S., Lawrence, P., and Tuckey, M. R., 2017. Psychosocial safety climate, emotional exhaustion, and work injuries in healthcare workplaces. *Stress and Health*, *33*(5), pp.558–569.

Table 1: Gender diversity in OM journals

Authors	Objective(s)	Methods	Results	Theoretical foundations
Apesteguia *et al*. (2012)	To investigate whether gender composition affects teams' economic performance	Experiment	For teams of three members, all-female teams are outperformed by other compositions. But teams with two men and one woman perform better at the top.	Different genders have differential ability skills. Females are less aggressive.
Chan *et al*. (2023)	To examine the impact of gender diversity on teams' invention outcomes	Archival data	On average, mixed-gender teams negatively affect invention value. But when working on integral inventions, mixed-gender teams have better performance than all-male teams.	Female investors experience specific obstacles and inequity in patented inventions. Gender-diverse teams make mental shift to team-oriented norms and psychological safety, which contributes to effective coordination.
Hoogendoorn *et al*. (2013)	To examine the impact of gender diversity on teams' business performance	Experiment	Balanced-gender teams perform better than male-dominated teams regarding sales and profits.	Mutual monitoring: Boards with more diverse gender are associated with more intense monitoring practices.
Keck and Tang (2018)	To examine the effects of group decision making and gender composition on group confidence judgment	Experiment	Compared to all-male groups, groups with female members have better quality of group confidence judgment.	Gender-diverse groups cause a mental shift towards more group-oriented norms. This positive, psychologically safe atmosphere promotes knowledge sharing and opinion expression.
Kroes *et al*. (2024)	To examine whether gender injustices exist in SCM	Archival data	Women account for a small proportion of SCM executives, but they receive higher compensation.	Due to unfairness and gender stereotypes, females are required to demonstrate superior performance to succeed in unjust environments. Female leaders are more collaborative and trustworthy.
Ma *et al*. (2021)	To examine how women affect supply chain collaboration and efficiency.	Experiment	Women are more collaborative and efficient than men.	Different genders behave differently in social contexts. Females are more inclined to harmonious group relations.

Ranganathan and Shivaram (2021)	To investigate whether and how manager gender affects female worker productivity	Survey, interview and experiment	Female managers stimulate greater worker productivity than male managers.	Through leading by example and engaging in helping behaviors, female managers motivate greater female worker productivity.
Ruel and Fritz (2021)	To investigate how gender diversity influences sustainable decision making in supply chain management (SCM)	Interview	Gender diversity in SCM would improve social dimension of sustainability.	Gender diversity brings softer skills (e.g., empathy and social responsibility)
Scott *et al*. (2024)	To investigate gender differences in following safety rules in the trucking industry	Archival data	Men truck drivers are more likely to have unsafe driving violation than women.	Men are more inclined to take risky actions and break rules.
Sunder *et al*. (2024)	To examine how gender diversity in teams impacts performance	Experiment	Balanced-gender teams achieve better operational performance on efficiency.	Gender diverse teams have better stability of coordination and adaptability to organizational changes than homogeneous teams.
Wowak *et al*. (2021)	To investigate the influence of female directors on product recall	Interview and archival data	When adding more female directors, firms issue more medical product recalls that are low in severity.	Female directors are more rule-following than male.

Source: Authors own work



Source: Authors own work

Figure 1 Theoretical framework

Table 2: Variable descriptions

Variable	Measurement	Reference	Database
Workplace accidents	Time-lost injuries: Annual number of time-lost injuries/million work hours	Gray and Mendeloff (2005)	Thomson Reuters ESG
Gender diversity	The Blau's index: $1 - \sum_{i=1}^{n} P_i^2$, where P_i is the proportion of employees in the ith category, and *n* is the number of categories	Blau (1977)	Thomson Reuters ESG
Income stream variability	Variation in ROA	Palmer and Wiseman (1999)	Compustat
Labor turnover	Number of workers left/average number of workers	Keller (1984)	Thomson Reuters ESG
Firm profitability	ROS: (Sales – cost of goods sold) / sales	Corbett *et al*. (2005)	Compustat
Firm size	Ln (total assets)	Corbett *et al*. (2005)	Compustat
OHSAS 18001	Whether a firm has adopted OHSAS 18001 certification: "1" = yes, "0" = no	Fan *et al*. (2022)	Thomson Reuters ESG
Operating slack	Property, plant, and equipment (PP&E) / sales	Fan and Zhou (2018)	Compustat
Financial leverage	Total liability / total assets	Pagell *et al*. (2019)	Compustat
Financial slack	(Current assets-inventory) / current liability	Wiengarten *et al*. (2017)	Compustat
Industrial competition	Herfindahl-Hirschman Index (HHI): the sum of squares of market shares in an industry (two-digit SIC code)	Tirole (1988)	Compustat
Industrial labor intensity	Number of employees / total assets in an industry (two-digit SIC code)	Lo *et al*., 2014	Compustat
Board diversity	The percentage of female in board of directors	Wowak *et al*. (2021)	Thomson Reuters ESG
Training	The total training hours / number of employees	/	Thomson Reuters ESG

Source: Authors own work

Table 3: Descriptive statistics and correlations ($N = 2{,}069$)

	Variables	Mean	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	*Workplace accidents*	2.823	4.209	1													
2	*Gender diversity*	0.365	0.105	0.009	1												
3	*Income stream variability*	0.036	0.049	0.012	−0.195	1											
4	*Labor turnover*	0.123	0.065	0.216	0.122	0.063	1										
5	*Firm profitability*	0.376	0.220	−0.119	0.261	−0.014	−0.039	1									
6	*Firm size*	9.704	1.393	−0.096	0.166	−0.490	−0.136	0.035	1								
7	*Operating slack*	1.680	1.792	−0.043	−0.318	0.155	−0.098	−0.053	−0.056	1							
8	*Financial slack*	1.208	0.828	−0.061	−0.128	0.217	−0.043	0.226	−0.222	0.084	1						
9	*Financial leverage*	0.585	0.192	0.048	0.224	−0.144	0.037	−0.176	0.139	−0.204	−0.419	1					
10	*Training*	3.744	7.825	−0.027	−0.050	0.121	−0.076	−0.068	−0.247	0.096	0.042	−0.088	1				
11	*Board gender diversity*	0.200	0.118	−0.013	0.328	−0.173	0.127	0.11	0.134	−0.089	−0.159	0.142	−0.069	1			
12	*OHSAS18001*	0.755	0.430	−0.166	−0.091	−0.054	−0.035	−0.042	0.117	0.020	0.025	−0.081	−0.009	−0.051	1		
13	*Industrial competition*	0.178	0.174	0.168	−0.039	−0.008	0.148	−0.142	−0.001	−0.166	−0.065	−0.020	−0.092	−0.055	−0.054	1	
14	*Industrial labor intensity*	0.214	0.231	0.223	0.181	−0.033	0.268	−0.069	−0.095	−0.291	−0.025	0.080	−0.067	0.141	−0.122	0.389	1
15	*IMR*	0.807	0.287	0.068	0.185	−0.116	0.036	0.040	−0.016	−0.344	−0.074	0.159	−0.109	−0.063	−0.082	0.269	0.167

Source: Authors own work

Table 4: Two-way fixed effect regression analysis

VARIABLES	Dependent variable = *Workplace accidents*			
	(1)	(2)	(3)	(4)
Gender diversity	−5.653***	−4.229**	−2.671	−0.860
	(1.590)	(1.668)	(1.810)	(1.893)
Income stream variability		14.673***		14.963***
		(4.108)		(4.093)
Gender diversity Income stream variability*		−29.757**		−28.146**
		(12.055)		(12.005)
Labor turnover			6.465**	8.018**
			(3.207)	(3.207)
*Gender diversity*Labor turnover*			−26.655***	−30.634***
			(8.074)	(8.073)
Firm profitability	−0.177	−0.073	−0.190	−0.081
	(0.382)	(0.382)	(0.379)	(0.378)
Firm size	0.0467	0.199	0.066	0.238
	(0.169)	(0.173)	(0.168)	(0.171)
Operating slack	0.065	0.061	0.079	0.070
	(0.061)	(0.062)	(0.061)	(0.061)
Financial slack	−0.292***	−0.350***	−0.292***	−0.352***
	(0.082)	(0.083)	(0.081)	(0.082)
Financial leverage	−0.758	−0.920*	−0.849	−1.014*
	(0.533)	(0.533)	(0.529)	(0.528)
Training	0.003	0.005	0.003	0.005
	(0.010)	(0.010)	(0.010)	(0.010)
Board gender diversity	−1.083	−0.970	−1.217*	−1.107*
	(0.663)	(0.660)	(0.658)	(0.654)
OHSAS18001	−0.514***	−0.530***	−0.474***	−0.486***
	(0.165)	(0.165)	(0.164)	(0.163)
Industrial competition	0.967	0.911	0.816	0.750
	(0.646)	(0.643)	(0.641)	(0.638)
Industrial labor intensity	0.923	0.929	0.857	0.850
	(0.577)	(0.575)	(0.572)	(0.569)
IMR	0.668*	0.581	0.850**	0.778**
	(0.359)	(0.360)	(0.358)	(0.358)
Constant	4.926**	3.128	3.792*	1.603
	(2.119)	(2.154)	(2.140)	(2.182)
Firm fixed effect	Included	Included	Included	Included
Year fixed effect	Included	Included	Included	Included
R-squared (within)	0.154	0.163	0.169	0.180
F	10.83***	10.79***	11.29***	11.37***
N	2,069	2,069	2,069	2,069

Note: Standard errors in parentheses; *** p <0.01, ** p < 0.05, * p < 0.1. Source: Authors own work

Table 5: Robustness checks on alternative measurements

VARIABLES	DV=*Non-time-lost injuries*	DV=*Total injuries*	DV=*Occupational diseases*	DV=*Fatalities*
	(5)	(6)	(7)	(8)
Gender diversity	−18.100***	−18.229***	−10.341***	−8.458***
	(4.281)	(4.600)	(2.617)	(1.533)
Firm profitability	−3.031***	−1.091	−0.138	0.236
	(1.025)	(0.979)	(0.624)	(0.280)
Firm size	−2.072***	−1.454***	0.440	0.734***
	(0.471)	(0.473)	(0.304)	(0.158)
Operating slack	−0.741***	−0.536***	−0.070	0.047
	(0.160)	(0.169)	(0.110)	(0.054)
Financial slack	0.638***	0.694***	−0.263*	−0.125
	(0.219)	(0.252)	(0.150)	(0.081)
Financial leverage	−4.377***	−0.697	−1.314	0.369
	(1.562)	(1.573)	(0.901)	(0.487)
Training	−0.005	−0.005	−0.026	−0.004
	(0.026)	(0.030)	(0.020)	(0.010)
Board gender diversity	−6.549***	−2.576	1.863*	0.393
	(1.861)	(1.898)	(1.067)	(0.576)
OHSAS18001	1.481***	1.120**	−0.496	0.024
	(0.460)	(0.453)	(0.319)	(0.141)
Industrial competition	1.514	1.471	−0.901	0.199
	(1.947)	(1.834)	(1.039)	(0.570)
Industrial labor intensity	−7.038***	−7.142***	−2.164	0.088
	(2.588)	(2.112)	(1.545)	(0.789)
IMR	2.648**	3.939***	0.985*	0.679**
	(1.029)	(0.991)	(0.554)	(0.296)
Constant	32.91***	17.23***	1.112	−2.877
	(6.033)	(6.391)	(3.389)	(2.116)
Firm fixed effect	Included	Included	Included	Included
Year fixed effect	Included	Included	Included	Included
R-squared (within)	0.168	0.121	0.157	0.0717
F	9.038***	8.561***	3.467***	5.495***
N	1,597	2,318	721	2,618

Note: Standard errors in parentheses; *** p <0.01, **p < 0.05, *p < 0.1. Source: Authors own work

Table 6: GMM regression analysis

VARIABLES	Dependent variable = *Workplace accidents*		
	(9)	(10)	(11)
Lag dependent variable	0.631***	0.678***	0.687***
	(0.055)	(0.052)	(0.060)
Gender diversity	−7.956**	2.736	0.168
	(3.689)	(1.762)	(2.563)
Income stream variability		12.163**	
		(6.033)	
Gender diversity Income stream variability*		−33.936*	
		(18.049)	
Labor turnover			15.691**
			(6.772)
*Gender diversity*Labor turnover*			−32.320**
			(15.349)
Firm profitability	0.611	0.050	−0.948
	(2.131)	(0.809)	(0.844)
Firm size	−0.525**	0.029	−0.043
	(0.256)	(0.071)	(0.142)
Operating slack	−0.517**	−0.190*	−0.241
	(0.225)	(0.103)	(0.185)
Financial slack	−1.425***	−0.316	−0.482
	(0.460)	(0.214)	(0.345)
Financial leverage	−1.570	−0.358	−0.473
	(2.710)	(0.925)	(1.256)
Training	−0.039	−0.000	−0.022
	(0.050)	(0.014)	(0.027)
Board gender diversity	−2.447	−2.444*	−1.949
	(3.076)	(1.443)	(2.085)
OHSAS18001	−0.179	−0.535	0.413
	(0.717)	(0.328)	(0.406)
Industrial competition	−1.474	−0.249	−1.001
	(1.988)	(1.107)	(1.286)
Industrial labor intensity	3.193	1.220	1.516
	(2.281)	(1.030)	(1.124)
IMR	−0.794	0.019	−0.112
	(1.333)	(0.787)	(0.753)
Constant	13.921***	0.765	2.215
	(4.282)	(1.807)	(2.817)
Firm fixed effect	Included	Included	Included
Year fixed effect	Included	Included	Included
N	1,882	1,877	1,882

Note: Standard errors in parentheses; *** p <0.01, ** p < 0.05, * p < 0.1. Source: Authors own work

Table 7 Quantile regression analysis

VARIABLES	Dependent variable = *Workplace accidents*								
	Q10	Q20	Q30	Q40	Q50	Q60	Q70	Q80	Q90
Gender diversity	−7.798**	−7.675***	−7.596***	−7.503*	−7.388	−7.264	−7.158	−7.064	−6.908
	(3.787)	(2.271)	(2.699)	(4.239)	(6.576)	(9.253)	(11.568)	(13.658)	(17.127)
Firm profitability	−0.547	−0.590	−0.617	−0.650	−0.690	−0.733	−0.770	−0.803	−0.858
	(0.841)	(0.505)	(0.600)	(0.942)	(1.461)	(2.055)	(2.570)	(3.034)	(3.805)
Firm size	−0.278	−0.321*	−0.348	−0.381	−0.421	−0.465	−0.502	−0.535	−0.589
	(0.310)	(0.186)	(0.221)	(0.347)	(0.539)	(0.758)	(0.947)	(1.118)	(1.402)
Operating slack	−0.087	−0.093	−0.096	−0.100	−0.104	−0.110	−0.114	−0.118	−0.124
	(0.125)	(0.075)	(0.089)	(0.140)	(0.217)	(0.306)	(0.382)	(0.451)	(0.566)
Financial slack	−0.107	−0.099	−0.094	−0.088	−0.080	−0.072	−0.065	−0.059	−0.049
	(0.227)	(0.136)	(0.162)	(0.254)	(0.394)	(0.554)	(0.693)	(0.818)	(1.026)
Financial leverage	−1.145	−1.294*	−1.390	−1.504	−1.644	−1.795	−1.923	−2.038	−2.227
	(1.210)	(0.726)	(0.862)	(1.354)	(2.101)	(2.955)	(3.695)	(4.362)	(5.470)
Training	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004
	(0.013)	(0.008)	(0.009)	(0.014)	(0.022)	(0.031)	(0.039)	(0.046)	(0.058)
Board gender diversity	−2.397*	−2.563***	−2.670***	−2.798*	−2.954	−3.123	−3.267	−3.395	−3.607
	(1.329)	(0.797)	(0.947)	(1.487)	(2.307)	(3.246)	(4.058)	(4.791)	(6.007)
OHSAS18001	−0.596*	−0.546***	−0.515**	−0.477	−0.431	−0.381	−0.339	−0.301	−0.238
	(0.350)	(0.210)	(0.249)	(0.391)	(0.607)	(0.854)	(1.068)	(1.261)	(1.581)
Industrial competition	0.551	0.866	1.068	1.307	1.602	1.921	2.191	2.433	2.833
	(1.216)	(0.729)	(0.866)	(1.360)	(2.110)	(2.969)	(3.712)	(4.382)	(5.495)
Industrial labor intensity	1.360	1.147*	1.010	0.847	0.648	0.431	0.248	0.0840	−0.187
	(1.011)	(0.606)	(0.721)	(1.132)	(1.755)	(2.470)	(3.088)	(3.645)	(4.571)
IMR	0.279	0.451	0.562	0.694	0.856	1.031	1.180	1.313	1.532
	(0.519)	(0.311)	(0.370)	(0.581)	(0.901)	(1.267)	(1.584)	(1.870)	(2.345)
N	2,600	2,600	2,600	2,600	2,600	2,600	2,600	2,600	2,600

Note: Standard errors in parentheses; *** p <0.01, **p < 0.05, *p < 0.1. Source: Authors own work

Table 8 Subsample regression analysis

VARIABLES	Dependent variable = *Workplace accidents*	
	(12) Male-dominated	(13) Female-dominated
Gender diversity	−5.684***	−34.11
	(1.456)	(92.794)
Firm profitability	−0.136	14.88
	(0.350)	(24.371)
Firm size	0.0690	−5.398**
	(0.156)	(2.229)
Operating slack	0.0677	0.937
	(0.056)	(7.349)
Financial slack	−0.279***	0.589
	(0.075)	(1.928)
Financial leverage	−0.433	−10.17
	(0.490)	(7.972)
Training	0.00383	1.007
	(0.009)	(0.920)
Board gender diversity	−1.737***	21.52***
	(0.618)	(6.308)
OHSAS18001	−0.231	−1.713
	(0.155)	(1.887)
Industrial competition	0.668	0.302
	(0.631)	(3.671)
Industrial labor intensity	0.446	−0.822
	(0.918)	(1.096)
IMR	1.523***	−40.12***
	(0.335)	(7.391)
Constant	3.062	128.9***
	(1.950)	(44.126)
Firm fixed effect	Included	Included
Year fixed effect	Included	Included
R-squared (within)	0.168	0.885
F	11.64***	8.65***
N	2,001	73

Note: Standard errors in parentheses; ****p* <0.01, ***p* < 0.05. Source: Authors own work

Table 9: Two-way fixed effect regression analysis at the industry level

VARIABLES	Dependent variable = *Ind workplace accidents*
	(14)
Ind gender diversity	−5.173*
	(2.804)
Ind profitability	−0.015
	(0.121)
Ind size	−0.425**
	(0.197)
Ind operating slack	0.165
	(0.165)
Ind financial slack	−0.669***
	(0.227)
Ind financial leverage	−4.995***
	(1.216)
Ind training	−0.0001
	(0.002)
Ind board gender diversity	3.947**
	(1.601)
Ind OHSAS18001	0.073
	(0.378)
Ind competition	1.027
	(1.096)
Ind labor intensity	1.052
	(0.916)
Ind IMR	0.232
	(0.579)
Constant	13.050***
	(2.570)
Industry fixed effect	Included
Year fixed effect	Included
R-squared (within)	0.109
F	4.643***
N	1,144

Note: Standard errors in parentheses; ****p* <0.01, ***p* < 0.05, **p* < 0.1. Source: Authors own work

Appendix A: Heckman selection model

First, we create a dependent variable of *workplace accident reporting* by coding the observations that reported injury data as "1" and "0" otherwise. For independent variables, we incorporate each company's number of workers (logarithmically transformed), given that larger firms typically have more resources to facilitate external communication and report their Corporate Social Responsibility (CSR) activities (Baumann-Pauly *et al*., 2013). Additionally, we include ROS to account for firm performance because profitable firms may have more abundant financial resources to improve safety practices. The number of inspections by the We included each firm's number of inspections from OSHA because such scrutiny may motivate firms to become more transparent. Moreover, it is required to include at least one exogenous variable related to injury data reporting in the Heckman selection model (Leung and Yu, 1996). To meet the exclusion restriction requirement of the model, we consider two industry−level variables that are exogenous to firms. We incorporate the number of firm *i*'s direct competitors who reported injury data in the same industry *j* as the exogenous variable. This selection is based on the premise that increased reporting by industry competitors may exert mimetic pressure, prompting additional firms to disclose injuries. (Martínez-Ferrero and García-Sánchez, 2017). We also include the number of firms within each industry to control the industry size. Finally, we consider the fixed effects of year and headquarter location of a given firm to control environmental impacts.

Appendix Table A shows the results of the Probit regression analysis, suggesting that this model is promising to estimate a firm's likelihood to report injury data (Chi^2 test $p < 0.01$, Pseudo $R^2 = 16\%$). The analysis indicates that firms with more workers, higher profitability, and a greater number of government inspections are more likely to report injuries. Additionally, firms with a higher proportion of competitors reporting injuries and those in smaller industries also have a higher tendency to disclose their own injuries. After conducting the Probit analysis, we calculate the IMR variable as the ratio of the probability density function to the standard normal cumulative distribution function.

Table A: Probit analysis of the Heckman selection model

VARIABLES	*Workplace accident reporting*
Number of workers	0.078***
	(0.010)
ROS	0.106**
	(0.044)
Number of inspections	0.070***
	(0.027)
Industry workplace accident reporting	0.057***
	(0.002)
Industry size	–0.016***

	(0.001)
Constant	–1.051***
	(0.320)
Year fixed effect	Included
State fixed effect	Included
Chi2	1765.93***
R2 (Pseudo)	0.16
N	8,349

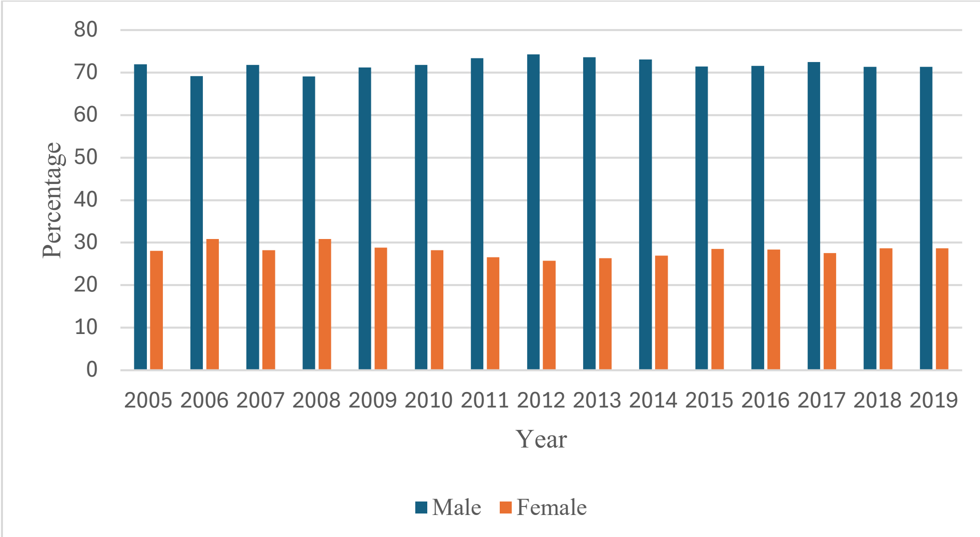
Note: Standard errors in parentheses; *** $p < 0.01$, ** $p < 0.05$. Source: Authors own work

Appendix Table B: Average percentage of workplace accidents ((per million work hours) by industry

Two-digit SIC	Average workplace accidents	Two-digit SIC	Average workplace accidents	Two-digit SIC	Average workplace accidents
10	2.74	31	1.80	49	4.50
13	0.73	32	2.39	50	4.50
14	1.39	33	1.27	51	6.72
16	0.70	34	3.19	52	5.05
20	4.12	35	2.05	53	16.53
21	2.56	36	0.94	54	5.02
23	5.89	37	2.37	55	0.02
24	3.91	38	1.64	58	8.20
25	3.12	39	2.57	59	0.11
26	5.37	40	6.51	73	0.70
27	0.39	42	10.68	79	13.16
28	1.63	44	5.76	80	2.35
29	0.66	45	18.10	87	2.65
30	2.03	48	2.81	99	2.10

Source: Authors own work

Appendix C: Distributions of gender data



Source: Authors own work

Figure C1 The gender distribution of workers across years in our sample

Table C2 Average gender diversity by industry

Two-digit SIC	Gender diversity	Two-digit SIC	Gender diversity	Two-digit SIC	Gender diversity
10	0.23	31	0.50	49	0.35
13	0.37	32	0.27	50	0.43
14	0.22	33	0.20	51	0.46
16	0.37	34	0.33	52	0.47
20	0.42	35	0.38	53	0.47
21	0.44	36	0.39	54	0.49
23	0.39	37	0.32	55	0.43
24	0.37	38	0.44	58	0.48
25	0.43	39	0.50	59	0.48
26	0.33	40	0.14	73	0.43
27	0.49	42	0.32	79	0.50
28	0.42	44	0.34	80	0.42
29	0.38	45	0.45	87	0.37
30	0.39	48	0.45	99	0.33

Source: Authors own work

Appendix D: Other robustness checks

We first collect all the U.S. listed firms (2005–2019) from Compustat database. We then develop a variable female worker reporting coding the firm−year observations with available female workers data as "1", otherwise "0". We include the independent variables from the selection model, except removing number of inspection and replacing Industry workplace accident reporting as Industry female workers reporting. Those two variables are more related to workplace accidents but not gender composition reporting. The re-ran analysis results are shown in Table D1. We then generate the inverse Mills ratio (IMR_gender reporting). We use this variable to replace the inverse Mills ratio in Table 4 and re-run the analysis (Table D2). The results show that all hypotheses remained supportive.

We note the significant coefficient of IMRs in Table 4 and Table D2, indicating that the tendency of reporting injury data and the tendency of reporting female workers data affects workplace accidents. We remove the IMRs and re-run the analysis, finding that the coefficient of gender diversity remained negatively significant (–5.588, $p < 0.01$). The coefficients (–5.653 in Table 4 vs. –5.588; –5.119 in Table D2 vs. –5.588) do not have a significant difference ($p > 0.1$), indicating that the selection bias concern regarding absent accident data does not significantly affect our conclusion.

Table D1: Probit regression analysis

VARIABLES	*Female workers reporting*
Number of workers	0.347***
	(0.005)
ROS	–0.000
	(0.000)
Industry female workers reporting	0.007***
	(0.000)
Industry size	–0.000***
	(0.000)
Constant	–0.507***
	(0.044)
Year fixed effect	Included
State fixed effect	Included
Observations	108,731
Chi2	15323.94***
R2 (Pseudo)	0.34
N	108,731

Note: Standard errors in parentheses; *** $p < 0.01$. Source: Authors own work

Table D2: Two-way fixed effect regression analysis

VARIABLES	Dependent variable = *Workplace accidents*		
	(1)	(2)	(3)
Gender diversity	−5.119***	−3.614**	−2.504
	(1.590)	(1.666)	(1.808)
Income stream variability		15.20***	
		(4.078)	
Gender diversity Income stream variability*		−32.41***	
		(11.957)	
Labor turnover			5.381*
			−3.205
*Gender diversity*Labor turnover*			−23.45***
			−8.062
Firm profitability	−0.233	−0.116	−0.262
	(0.380)	(0.379)	(0.377)
Firm size	−0.177	−0.0197	−0.152
	(0.177)	(0.182)	(0.176)
Operating slack	0.0316	0.0342	0.0408
	(0.060)	(0.061)	(0.060)
Financial slack	−0.290***	−0.349***	−0.290***
	(0.081)	(0.082)	(0.081)
Financial leverage	−1.008*	−1.166**	−1.087**
	(0.535)	(0.535)	(0.531)
Training	0.00363	0.00521	0.00349
	(0.010)	(0.010)	(0.010)
Board gender diversity	−0.941	−0.830	−1.080
	(0.662)	(0.660)	(0.658)
OHSAS18001	−0.554***	−0.568***	−0.512***
	(0.165)	(0.165)	(0.164)
Industrial competition	0.986	0.922	0.856
	(0.644)	(0.641)	(0.640)
Industrial labor intensity	0.919	0.932	0.856
	(0.575)	(0.573)	(0.571)
IMR_female workers	−1.036***	−0.997***	−0.974***
	(0.285)	(0.284)	(0.284)
Constant	10.07***	7.974***	9.227***
	(2.219)	(2.267)	(2.246)
Firm fixed effect	Included	Included	Included
Year fixed effect	Included	Included	Included
R-squared	0.159	0.168	0.173
F	11.25***	11.19***	11.55***
N	2,069	2,069	2,069

Note: Standard errors in parentheses; *** p <0.01, **p < 0.05, *p < 0.1. Source: Authors own work