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Does Whistleblowing Protection Save Lives? International Evidence from Workplace Safety Outcomes

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Abstract

Whistleblowing protection is typically examined as a governance mechanism for detecting organisational misconduct, financial fraud, and regulatory violations. Its broader ethical function in enabling employee voice and preventing operational harm remains less fully theorised. Drawing on institutional theory, this study conceptualises whistleblowing protection as an ethical infrastructure through which regulative, normative, and cultural-cognitive institutions shape employees' willingness to raise concerns about organisational risk. We argue that effective whistleblowing protection converts ethical awareness into organisational action by reducing the personal costs of speaking up, strengthening the credibility of internal escalation, and enabling firms to identify and correct unsafe practices before harm materialises. Using a global panel of 18,303 firm-year observations from 60 countries between 2003 and 2023, we examine the association between whistleblowing protection and workplace safety outcomes. The analysis combines firm fixed-effects models with Lewbel instrumental-variable estimation, entropy balancing, coefficient stability tests, and a difference-in-differences design exploiting the regulatory shock of the U.S. Dodd-Frank Act. The results show that stronger whistleblowing protection is associated with significantly lower workplace injury rates, equivalent to an approximately 23% reduction relative to the sample mean. This relationship is strengthened by board-level oversight of ethics and workplace safety and by higher-quality public governance institutions, but weakened in high power distance cultures. By linking whistleblowing protection to employee welfare, this study advances business ethics research by showing that protecting whistleblowers is not merely a compliance mechanism, but a core element of moral governance grounded in stakeholder care, employee dignity, and the prevention of foreseeable harm.

Keywords Whistleblowing protection · Workplace safety · Ethical governance · Institutional theory · ESG disclosure · Dodd-Frank Act

Introduction

Workplace safety remains one of the most pressing ethical challenges confronting contemporary organisations. Despite sustained advances in occupational regulation, safety technologies, and corporate governance, work-related accidents and illnesses continue to impose profound human, social, and economic costs worldwide (Qian et al., 2024). More than 2.7 million workers lose their lives annually because of occupational incidents, while hundreds of millions more experience non-fatal injuries that compromise their health, livelihoods, and long-term well-being (Hämäläinen et al., 2017). Although workplace safety has traditionally been viewed as an operational or regulatory concern, growing evidence suggests that safety outcomes are equally shaped

by organisational governance, leadership decisions, and corporate culture (Gong et al., 2023; Haga et al., 2024; Son et al., 2025). Workplace accidents, therefore, represent more than isolated operational failures; they often reveal deeper ethical shortcomings in the way organisations exercise their responsibility to protect those who are exposed to the risks created by corporate activity.

This ethical dimension is firmly rooted in stakeholder theory and the normative foundations of business ethics. Organisations owe employees a fundamental duty of care because workers are primary stakeholders whose welfare is directly affected by managerial decisions (Freeman, 1984). Beyond complying with legal obligations, firms bear a moral responsibility to anticipate and prevent foreseeable harm arising from their operations (De George, 2005). When organisations tolerate unsafe working conditions, they fail not only as regulated entities but also as moral actors entrusted with

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protecting human well-being. This responsibility extends beyond providing physical safeguards to creating institutional conditions that enable employees to raise concerns about risks before harm occurs. Frontline employees frequently possess the earliest knowledge of unsafe procedures, operational failures, and emerging hazards. Yet, expecting individuals to exercise moral courage while leaving them vulnerable to retaliation, exclusion, or career disadvantage creates a profound ethical asymmetry. Employees should not be forced to choose between protecting others and protecting themselves. Whistleblowing protection, therefore, represents more than an instrument for improving organisational information flows; it institutionalises the ethical principle that individuals who act to prevent harm deserve protection rather than punishment.

A growing body of business ethics research similarly recognises that ethical outcomes depend not only on the moral reasoning of individuals but also on the institutional environments within which ethical decisions are made (Kaptein, 2011a; Treviño et al., 2014). Governance structures, leadership practices, reporting mechanisms, and organisational norms influence whether employees feel psychologically and practically able to raise concerns about wrongdoing or emerging risks (Detert & Edmondson, 2011; Gong et al., 2023; Morrison, 2014). This issue is especially salient in the context of workplace safety, where frontline employees routinely observe near misses, hazardous practices, and operational deficiencies before they escalate into serious accidents. Their willingness to communicate such concerns is, therefore, essential for organisational learning, effective risk management, and accident prevention (Detert & Edmondson, 2011; Miceli & Near, 1985; Morrison, 2014). Consistent with this view, recent studies demonstrate that governance quality, organisational culture, and information systems significantly influence workplace safety by shaping how safety-related information is generated, transmitted, and acted upon within organisations (Gong et al., 2023; Haga et al., 2024; Hope et al., 2022).

Nevertheless, employees frequently remain silent even when they recognise serious ethical or safety concerns. Fear of retaliation, damaged career prospects, social exclusion, and managerial reprisal often discourage individuals from reporting organisational problems (Mesmer-Magnus & Viswesvaran, 2005; Miceli et al., 2008; Near & Miceli, 1995). These barriers become even more pronounced in hierarchical organisations and high power distance societies, where challenging authority may be perceived as inappropriate or disloyal (Kwon & Farndale, 2020; Park & Blenkinsopp, 2009). Cultural norms governing authority, loyalty, and obedience, hence, influence whether whistleblowing is interpreted as responsible ethical conduct or as socially disruptive dissent (Świątek-Barylska & Braila,

2024). Such silence creates a fundamental ethical dilemma. Employees may recognise both the existence of preventable harm and their moral obligation to act, yet lack sufficient institutional protection to do so safely (Detert & Edmondson, 2011; Morrison, 2014).

Whistleblowing protection offers one important mechanism for addressing this dilemma. By shielding employees who report wrongdoing from retaliation, whistleblowing systems reduce the personal costs of speaking up while signalling that an ethical voice is both legitimate and valued within the organisation (Miceli et al., 2008; Near & Miceli, 1995; Schmolke & Utikal, 2025). Existing research has demonstrated the importance of whistleblowing for uncovering financial misconduct, corporate fraud, and regulatory violations (Dyck et al., 2010; Call et al., 2018; Stubben & Welch, 2020). Comparatively little attention, however, has been devoted to whether whistleblowing protection also functions as a preventive governance mechanism capable of reducing operational harm before accidents occur. This gap in the literature is particularly important because recent evidence increasingly links governance quality and board oversight to workplace safety performance (Hashemi Joo & Parhizgari, 2023; Gong et al., 2023; Haidar & Hossain, 2025; Son et al., 2025). Consequently, an important but largely unanswered question remains: can institutional mechanisms designed to protect ethical voice also improve workplace safety?

We address this question by conceptualising whistleblowing protection as a core component of an organisation's ethical infrastructure, embedded within broader organisational and national governance systems. Our argument builds upon, but extends, existing scholarship on ethical climate, employee voice, and whistleblowing behaviour. Prior research has established that ethical culture, institutional context, and voice climates shape employees' willingness to report wrongdoing (Kaptein, 2011a, 2011b; Kwon & Farndale, 2020; Latan et al., 2023; Morrison, 2014; Treviño et al., 2014). Nevertheless, this literature has concentrated predominantly on reporting intentions, perceived ethical climates, or the antecedents of whistleblowing behaviour, offering comparatively limited insight into whether protected employee voice translates into tangible organisational outcomes. We argue that whistleblowing protection constitutes the institutional mechanism through which employees' moral recognition of unsafe practices is transformed into information escalation, managerial intervention, organisational learning, and ultimately the prevention of workplace harm (Detert & Edmondson, 2011; Miceli et al., 2008; Morrison, 2014; Near & Miceli, 1995; Rest, 1986).

Institutional theory provides the broader theoretical architecture for explaining this process. Organisational behaviour is shaped by regulative, normative, and

cultural-cognitive institutions that jointly determine which behaviours are formally protected, socially valued, and culturally legitimate (DiMaggio & Powell, 1983; Scott, 2014). We argue that these institutional pillars intervene at different stages of the pathway linking ethical concern to organisational outcomes. The regulative pillar lowers the formal costs of reporting by establishing enforceable anti-retaliation protections and disclosure procedures (Brown et al., 2014; Miceli et al., 2008; Near & Miceli, 1995; Vandekerckhove & Lewis, 2012). The normative pillar shapes whether raising concerns is viewed as an ethical responsibility deserving managerial attention, particularly where ethical cultures and effective board oversight reinforce organisational accountability (Kaptein, 2011a, 2011b; Lornudd et al., 2021; Treviño et al., 2014; von Thiele Schwarz & Lornudd, 2021). Finally, the cultural-cognitive pillar influences whether employees perceive reporting workplace hazards as an appropriate expression of care or as an illegitimate challenge to established authority, particularly within high power distance or collectivist contexts (Hofstede, 2001; Kwon & Farndale, 2020; Park & Blenkinsopp, 2009; Park et al., 2008; Świątek-Barylska & Braila, 2024).

This multi-level perspective is both explanatory and normative. Institutions do not simply determine whether whistleblowing protection is effective; they shape whether employees can exercise moral agency without fear and whether organisations are capable of fulfilling their ethical obligation to prevent foreseeable harm. At the organisational level, ethical governance requires more than establishing formal reporting channels. Boards and senior managers must ensure that employee concerns are acknowledged, protected from retaliation, investigated rigorously, and translated into meaningful corrective action. At the societal level, ethical infrastructure depends on legal and regulatory institutions that render rights to voice and protection enforceable rather than merely symbolic. This layered perspective helps explain why organisations operating under apparently similar whistleblowing arrangements often experience markedly different safety outcomes. It also highlights how formal governance structures may become decoupled from organisational practice when legal protections exist in principle but fail to shape everyday organisational behaviour (MacLean & Behnam, 2010; Meyer & Rowan, 1977).

Although research on whistleblowing and organisational ethics has expanded considerably over the past two decades, important questions remain unanswered. Existing studies have overwhelmingly conceptualised whistleblowing as an *ex post* governance mechanism that exposes fraud, corruption, financial misconduct, or regulatory violations after wrongdoing has already occurred (Dyck et al., 2010; Call et al., 2018; Stubben & Welch, 2020). Considerably less attention has been devoted to whether whistleblowing

protection can operate *ex ante* by enabling organisations to identify operational hazards before they result in injury or loss. Consequently, our understanding of whistleblowing remains heavily weighted towards its investigative and enforcement functions, with comparatively limited knowledge of its preventive role in protecting employee welfare.

A second limitation concerns the process through which ethical awareness is translated into organisational action. Previous studies have convincingly demonstrated that institutional environments, ethical climates, and employee voice influence individuals' willingness to report concerns (Rest, 1986; Treviño, 1986; Kaptein, 2011a; Treviño et al., 2014; Latan et al., 2019, 2023). Yet, comparatively little attention has been devoted to explaining how employees' moral recognition of organisational hazards translates into managerial intervention, organisational learning, and tangible improvements in stakeholder welfare. As a result, although existing scholarship establishes that institutional context matters, it provides only limited insight into the mechanisms through which ethical voice generates measurable organisational outcomes.

A third limitation relates to the institutional conditions under which whistleblowing protection is most likely to succeed. Institutional theory distinguishes between regulative, normative, and cultural-cognitive systems (Scott, 2014, 2017), yet prior research has rarely examined how these institutional pillars interact to shape the effectiveness of whistleblowing protection. Whether legal safeguards reinforce supportive ethical cultures, compensate for weak governance, or become ineffective in environments characterised by hierarchical authority, limited institutional trust, or high power distance remains insufficiently understood (Kwon & Farndale, 2020; Park et al., 2008). Addressing these issues enables us to move beyond the broad proposition that institutions matter towards a more nuanced explanation of how different institutional arrangements influence the translation of ethical voice into workplace safety.

To address these gaps, we examine whether whistleblowing protection functions as a preventive governance mechanism that enhances workplace safety across diverse institutional environments. Our empirical analysis combines firm-level data from LSEG Workplace (formerly Refinitiv Eikon) with cross-national measures of institutional quality and national culture. The final sample comprises 18,303 firm-year observations from 60 countries spanning the period 2003–2023. To strengthen causal inference and mitigate concerns relating to endogeneity, reverse causality, and sample selection, we employ a comprehensive empirical strategy incorporating high-dimensional fixed-effects estimation, Lewbel instrumental-variable analysis, entropy balancing, coefficient stability tests, and

a difference-in-differences design exploiting the regulatory shock created by the U.S. Dodd-Frank Act.

Our findings provide consistent support for the proposed theoretical framework. Firms exhibiting stronger whistleblowing protection experience significantly lower workplace injury rates. Economically, stronger whistleblowing protection is associated with an average reduction of approximately 23% in reported workplace injuries relative to the sample mean. However, this relationship is neither automatic nor universal. The beneficial association becomes significantly stronger where boards devote greater attention to employee health, safety, and well-being, suggesting that formal reporting protections generate greater value when complemented by governance mechanisms capable of recognising, escalating, and acting upon employee concerns. Conversely, the effectiveness of whistleblowing protection is weakened in countries characterised by stronger hierarchical cultural norms, where employees may remain reluctant to challenge authority despite formal legal safeguards. In contrast, stronger public governance institutions reinforce the effectiveness of whistleblowing protection by enhancing regulatory enforcement, procedural fairness, and the institutional legitimacy of speaking up.

This study contributes to the business ethics literature in four important ways. First, it reconceptualises whistleblowing protection as a preventive governance mechanism that extends beyond its traditional role in detecting fraud and misconduct to include the prevention of operational harm and the protection of employee welfare. Second, it advances research on ethical infrastructure by demonstrating how formal reporting protections enable individual moral awareness to evolve into organisational learning and corrective action rather than remaining symbolic expressions of ethical commitment (Kaptein, 2011b; Treviño et al., 2014). Third, it extends institutional theory by showing that the regulative, normative, and cultural-cognitive pillars perform distinct yet complementary governance functions whose effectiveness depends upon their alignment. Formal legal protections may exist without behavioural activation, supportive ethical norms may lack credible enforcement, and both may be weakened where cultural beliefs discourage upward voice. More fundamentally, our findings extend institutional theory by showing that cultural-cognitive institutions do more than moderate the effectiveness of governance mechanisms. In high power distance contexts, hierarchical norms may constrain employees' ability to exercise moral agency even when they recognise preventable harm and wish to act upon their ethical judgments. This introduces the concept of moral vulnerability, whereby individuals remain ethically responsible for preventing harm but lack a practically viable means of doing so without incurring disproportionate

personal or social costs. The contribution therefore shifts the theoretical focus from cultural differences in reporting behaviour to the ethical implications of institutional contexts that restrict employees' capacity to fulfil their moral responsibilities. Finally, the study contributes to corporate governance and comparative whistleblowing research by integrating board oversight, employee voice, and cross-national institutional variation within a unified theoretical framework. In doing so, it moves beyond the predominantly single-country focus of previous research, particularly the concentration on U.S. settings (Pittroff, 2014; Stubben & Welch, 2020), and demonstrates that the effectiveness of whistleblowing protection cannot be assumed to transfer uniformly across institutional contexts. Instead, its ethical value depends on whether institutional environments enable employees to exercise moral agency in practice, highlighting that protecting whistleblowers requires attention not only to legal safeguards but also to the cultural conditions that make ethical voice genuinely possible.

The remainder of the paper is organised as follows. The next section develops the theoretical framework and hypotheses. Section 3 describes the data, variables, and empirical methodology. Section 4 presents the main empirical findings and a series of robustness analyses. The final section discusses the theoretical, practical, and policy implications of the findings before concluding.

Theory and Hypotheses

Ethical Voice, Whistleblowing, and Institutional Context

Workplace safety is often treated as a technical, operational, or regulatory matter, governed through procedures, compliance systems, and risk controls. From a business ethics perspective, however, preventing workplace harm is also a question of ethical governance. Safe working conditions depend not only on formal safety systems, but also on organisational environments in which employees are able and willing to raise concerns when risks emerge. Within the business ethics literature, this capacity to report wrongdoing, unsafe conduct, or potential harm is commonly understood through the concepts of ethical voice and whistleblowing (Miceli & Near, 1985; Miceli et al., 2008). Ethical voice refers to discretionary communication through which employees raise concerns about practices that threaten organisational integrity, stakeholder welfare, or the moral quality of organisational conduct (Detert & Edmondson, 2011; Morrison, 2014). In safety-critical contexts, such voice is particularly important because frontline employees often observe

hazards, near misses, procedural failures, and unsafe routines before these conditions escalate into serious harm.

Understanding how whistleblowing contributes to workplace safety requires attention to both individual ethical decision-making and the organisational conditions that shape whether ethical concerns are acted upon. Rest's (1986) four-stage model provides a useful starting point by suggesting that ethical action develops through moral awareness, moral judgment, moral intention, and moral behaviour. This logic is consistent with person–situation approaches to ethical decision-making, which emphasise that moral conduct depends on the interaction between individual recognition and organisational context (Treviño, 1986; Jones, 1991; Treviño et al., 2014). Applied to workplace safety, employees must first recognise that a hazard, unsafe routine, procedural shortcut, or near miss may expose others to harm. They then judge whether silence would be ethically problematic, form an intention to act, and decide whether to report the concern. However, for whistleblowing to improve safety, the process cannot stop with disclosure. The report must be received, believed, escalated, investigated, and translated into corrective action. The theoretical challenge, therefore, is not simply to explain why employees intend to report, but to explain how organisational and institutional conditions enable ethical concern to become an organisational response (Miceli & Near, 1985; Miceli et al., 2008; Detert & Edmondson, 2011; Morrison, 2014).

Normative business ethics provides the moral foundation for this process. Stakeholder theory and related ethical frameworks maintain that organisations have responsibilities towards those affected by their activities and should create conditions that allow foreseeable harm to be prevented (Donaldson & Preston, 1995; Freeman, 1984). When employees observe unsafe practices or dangerous working conditions, reporting such risks may represent a morally justified effort to protect colleagues, contractors, customers, communities, and other stakeholders from avoidable harm (De George, 2005). Whistleblowing protection gives organisational form to this responsibility by enabling employees to act on moral concerns without facing disproportionate personal, relational, or career-related costs.

However, ethical action rarely occurs independently of organisational context. Even when employees recognise a safety issue and believe that reporting is morally appropriate, they must still assess the likely consequences of speaking up. These assessments include whether their identity will be exposed, whether supervisors or colleagues may retaliate, whether the matter will be investigated, and whether reporting will damage their standing within the organisation. Prior research identifies fear of retaliation, career harm, social exclusion, and perceived futility as central barriers to whistleblowing and employee voice (Mesmer-Magnus

& Viswesvaran, 2005; Miceli et al., 2008; Morrison, 2014; Morrison & Milliken, 2000; Near & Miceli, 1995). Such barriers are especially salient in safety contexts because hazards are often embedded in everyday routines and may implicate line managers, co-workers, production pressures, or established work practices. Employees may, as such, remain silent not because they fail to recognise the ethical significance of a safety risk, but because they anticipate that the costs of reporting will outweigh the likelihood of meaningful organisational action (Detert & Edmondson, 2011; Kenny et al., 2019; Mannion et al., 2018).

To explain how organisations can narrow the gap between moral awareness and ethical action, scholars have increasingly emphasised ethical infrastructure, highlighting the formal and informal systems that enable ethical conduct in practice (Kaptein, 2011a; Tenbrunsel et al., 2003; Treviño et al., 2014). Building on this literature, we conceptualise whistleblowing protection as a specific component of ethical infrastructure that links employee-level moral recognition to organisation-level safety outcomes. This approach extends prior work that has focused primarily on ethical climate, reporting intentions, or general voice norms. Our concern is with the mechanism through which ethical infrastructure produces a concrete stakeholder outcome, such as fewer workplace injuries. Whistleblowing protection lowers the threshold for voice, strengthens the credibility of escalation, and increases the likelihood that safety-relevant information reaches organisational actors with the authority to intervene. It is, therefore, not merely a symbolic signal of ethical commitment, but an organisational mechanism through which moral concern can travel far enough within the firm to support prevention (Gong et al., 2023; Haga et al., 2024; Kaptein, 2011b; Miceli et al., 2008; Near & Miceli, 1995; Treviño et al., 2014).

Whistleblowing protection performs three interrelated functions in this process. First, it enhances transparency by making hidden hazards, near misses, unsafe practices, and operational shortcuts more likely to surface. Anti-retaliation rules, confidential channels, and anonymous reporting mechanisms reduce the immediate risks of disclosure by lowering fear of exposure and punishment (Lee & Fargher, 2013; Miceli et al., 2008; Near & Miceli, 1995; Vandekerckhove & Lewis, 2012). Second, whistleblowing protection strengthens accountability by increasing the likelihood that reported concerns will trigger investigation, documentation, escalation, and managerial response rather than suppression or symbolic handling. Structures such as board oversight, ethics committees, compliance functions, and health and safety governance are crucial because they determine whether concerns are taken seriously and acted upon (Kaptein, 2011a; Lornudd et al., 2021; Son et al., 2025; Treviño et al., 2014; von Thiele Schwarz & Lornudd, 2021). Third, whistleblowing protection builds legitimacy around

an ethical voice. When employees observe that reports are handled fairly and addressed meaningfully, reporting becomes normalised as a responsible form of organisational participation rather than viewed as deviance or disloyalty (Deephouse & Carter, 2005; Pittroff, 2014; Smaili, 2023; Suchman, 1995). Therefore, transparency, accountability, and legitimacy connect employees' ethical awareness to organisational safety outcomes.

Institutional theory provides the broader architecture for understanding when these processes are likely to be effective. It suggests that organisational behaviour is shaped by regulative, normative, and cultural-cognitive pillars that define what conduct is possible, appropriate, and intelligible within a given context (DiMaggio & Powell, 1983; Scott, 2014, 2017). In our framework, these pillars intervene at different points in the conversion of ethical concern into organisational outcome. The regulative pillar determines whether reporting is formally protected through laws, policies, and enforceable safeguards (Brown et al., 2014; North, 1990; OECD, 2023). The normative pillar determines whether reporting is organisationally valued and acted upon through ethical culture, leadership, governance attention, and managerial responsiveness (Kaptein, 2011a, 2011b; Treviño et al., 2014). The cultural-cognitive pillar determines whether reporting is socially thinkable and psychologically legitimate, particularly in contexts where hierarchy, loyalty, and deference shape the meaning of voice (Hofstede, 2001; Kwon & Farndale, 2020; Park & Blenkinsopp, 2009; Park et al., 2008).

These pillars also map onto different forms of reporting infrastructure. Anti-retaliation protections strengthen the regulative pillar by reducing the personal cost of Stage 4 moral behaviour in Rest's (1986) framework. Confidential reporting mechanisms engage the normative pillar by allowing investigation and corrective action while protecting the reporter's organisational standing. Anonymous reporting systems address cultural-cognitive barriers by decoupling reporting from social identity, which may be especially important in high power distance or collectivist contexts where identity disclosure carries relational risk (Park et al., 2008; Zhang et al., 2009). Employees, therefore, do not use reporting systems simply because they exist. They use them when reporting is legally safe, normatively supported, and culturally intelligible.

This institutional logic clarifies why whistleblowing protection may not always produce safety benefits. Where the regulative pillar is present, but the normative pillar is weak, employees may be formally protected yet still expect indifference, defensiveness, or symbolic handling of reports. Where the normative pillar is supportive, but the regulative pillar is weak, employees may perceive moral encouragement from leaders but still fear dismissal, stalled promotion, legal exposure, or retaliation if their report

implicates powerful actors. Even when both regulative and normative supports are present, cultural-cognitive resistance may suppress voice. In high power distance settings, for instance, employees may view upward reporting as inappropriate or socially risky despite formal rules and organisational encouragement (Hofstede, 2001; Kwon & Farndale, 2020; Park et al., 2008). Each institutional pillar thus addresses a different bottleneck in the transition from ethical recognition to harm prevention.

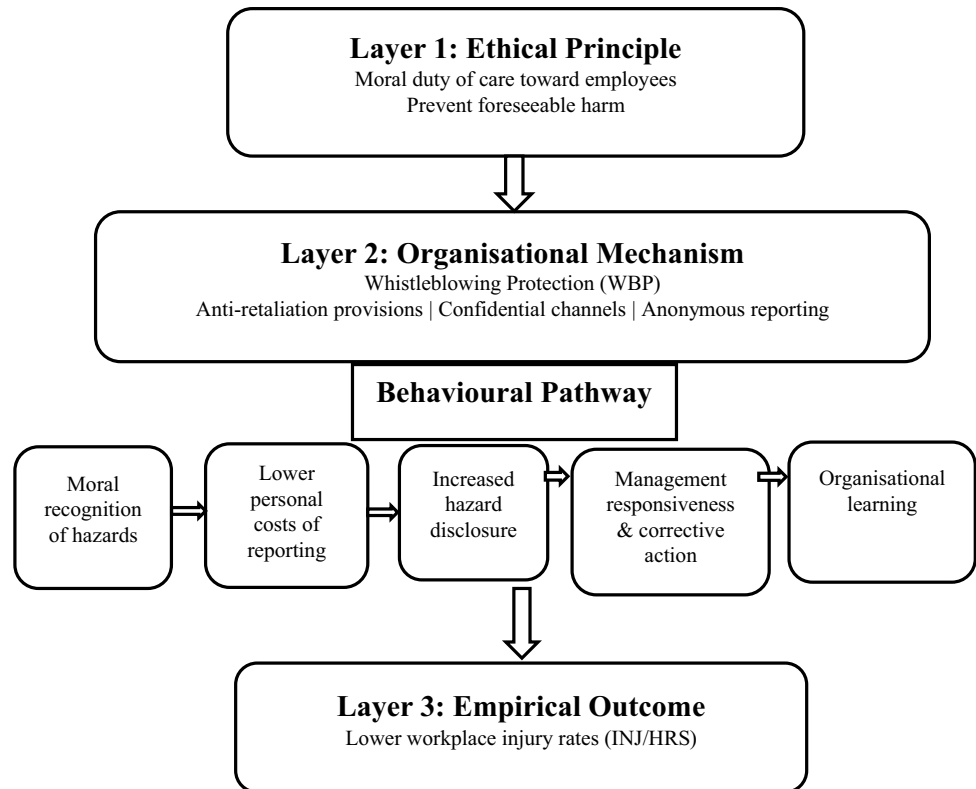
When these institutional elements align, whistleblowing systems enable organisations to capture critical information about operational risks and convert it into organisational learning. Frontline employees may report near misses, unsafe routines, equipment failures, procedural violations, or managerial shortcuts. Internal governance structures then determine whether this information is escalated, investigated, and acted upon. Repeated corrective responses strengthen the legitimacy of future voice, creating a cycle in which reporting becomes more credible and prevention more effective (Detert & Edmondson, 2011; Morrison, 2014). The outcome is not simply more speaking up, but more effective risk mitigation before harm occurs. This is where our framework differs from prior research linking institutions to ethical climate or voice intentions. We theorise a full chain from employee-level ethical awareness to firm-level stakeholder welfare outcomes and argue that this chain depends on the alignment of institutional pillars rather than on any single pillar in isolation (Miceli & Near, 1985; Miceli et al., 2008; Gong et al., 2023; Haga et al., 2024).

Figure 1 captures this logic as a staged process rather than a simple direct association. Employees first recognise a safety-related ethical issue, then evaluate whether reporting is feasible and legitimate, and only then decide whether to speak up. Whistleblowing protection lowers the expected cost of reporting, while board oversight and public governance increase the perceived likelihood that reports will be acted upon. Cultural-cognitive conditions, particularly power distance, shape whether upward reporting is interpreted as acceptable and meaningful. Workplace safety improves when these stages align sufficiently for hazard-related information to move from frontline employees to organisational decision-makers with the authority to intervene (Kaptein, 2011a; Kwon & Farndale, 2020; Miceli et al., 2008; Morrison, 2014; Near & Miceli, 1995; Rest, 1986; Scott, 2014, 2017; Treviño et al., 2014).

Hypotheses Development

Whistleblowing Protection and Workplace Safety

Workplace accidents rarely result from isolated failures; they often emerge from accumulated near misses, procedural deviations, equipment problems, and operational pressures

Fig. 1 Three-layer conceptual framework

that remain unresolved over time (Gong et al., 2023; Haga et al., 2024; Miceli & Near, 1985; Miceli et al., 2008). Frontline employees are particularly important in this process because they are closest to daily operations and are, therefore, more likely to observe early-warning signals that senior managers or external regulators may not immediately detect (Detert & Edmondson, 2011; Morrison, 2014). For organisations to prevent minor failures from escalating into serious accidents, they must be able to capture and act upon this bottom-up safety information (Gong et al., 2023; Haga et al., 2024; Miceli & Near, 1985; Miceli et al., 2008). Nevertheless, employees do not always report the risks they observe. Fear of retaliation, career damage, and social exclusion can discourage individuals from speaking up about unsafe practices or organisational wrongdoing (Mesmer-Magnus & Viswesvaran, 2005; Miceli et al., 2008). When employees remain silent, organisations lose access to information that could reveal unsafe routines, procedural weaknesses, or emerging hazards before they become accidents (Miceli et al., 2008; Morrison, 2014).

Whistleblowing protection addresses this problem by reducing the personal costs of reporting. Anti-retaliation provisions, confidential reporting channels, and anonymity safeguards signal that employees can raise concerns without being exposed to adverse consequences (Miceli et al., 2008; Near & Miceli, 1995). When such systems are perceived as credible, employees are more likely to disclose information

about wrongdoing, hazards, and safety violations that would otherwise remain hidden (Miceli et al., 2008; Near & Miceli, 1995). Recent studies similarly suggest that governance mechanisms that improve internal information flows can affect workplace safety outcomes by enabling organisations to detect and respond to operational risks earlier (Gong et al., 2023; Haga et al., 2024; Hope et al., 2022).

From an institutional perspective, whistleblowing protection also has a normative function. Lowering the personal cost of ethical voice strengthens the regulative pillar of governance while reinforcing organisational norms of transparency, accountability, and stakeholder care (Scott, 2014, 2017). This is ethically important because employees who report safety concerns exercise moral agency in the service of preventing harm, and organisations have a duty to protect those who bear the risk of providing such information (Miceli et al., 2008; Scott, 2014, 2017). Therefore, credible whistleblowing protection should improve workplace safety by encouraging hazard reporting and enabling organisational learning from employee voice. As illustrated in Fig. 1, whistleblowing protection constitutes the core behavioural mechanism linking employees' ethical decision-making to organisational safety outcomes. By reducing the perceived risks of reporting and increasing confidence in reporting systems, whistleblowing protection facilitates employees' progression through all four stages of Rest's ethical decision-making process, including recognising safety hazards (Stage

1), forming an ethical obligation to report (Stage 2), deciding to act despite potential personal costs (Stage 3), and engaging in protected reporting that enables organisational learning and accident prevention (Stage 4). Accordingly, stronger whistleblowing protection should improve workplace safety by supporting the complete behavioural pathway depicted in Fig. 1.

H1 Firms with stronger whistleblowing protection exhibit better workplace safety outcomes, operationalised as lower workplace injury rates.

Organisational Moderation: Ethical Governance

Although whistleblowing protection reduces formal barriers to reporting, its effectiveness depends on the organisational context in which reporting systems operate. Ethical decision-making research shows that employees do not rely solely on formal rules when deciding whether to speak up; they also consider whether the organisation treats voice as legitimate, safe, and consequential (Kaptein, 2011b; Treviño et al., 2014). Board-level oversight of ethics and workplace safety is therefore central to the effectiveness of whistleblowing protection. Such oversight strengthens the normative pillar of governance by ensuring that employee voice is not merely permitted but acted upon (Scott, 2014, 2017; Wajda et al., 2026). Casually, board attention can influence whether reports are reviewed impartially, escalated beyond line management when necessary, and linked to corrective action. Ethically, it reflects the organisation's duty of care, since a reporting system that invites employees to disclose safety concerns but fails to act on them exposes employees to risk without respecting their moral agency. Prior research shows that employees are more willing to report concerns when organisational systems are perceived as fair, responsive, and supportive of ethical conduct (Kaptein, 2011a, 2011b; Treviño et al., 2014). Research on occupational health and safety governance also indicates that boards shape safety priorities, allocate attention to employee well-being, and influence how safety information is handled within organisations (Lornudd et al., 2021; von Thiele Schwarz & Lornudd, 2021; Hashemi Joo & Parhizgari, 2023; Son et al., 2025).

By contrast, where boards remain distant from ethics and safety issues, employees may perceive whistleblowing channels as symbolic compliance mechanisms rather than credible routes for prevention. In such settings, formal protections may be decoupled from actual practice, consistent with institutional accounts of organisations adopting formal structures for legitimacy without fully implementing them (MacLean & Behnam, 2010; Meyer & Rowan, 1977). Employees may therefore doubt whether reporting will lead to meaningful action, particularly when

the perceived effectiveness of voice depends on whether speaking up is taken seriously and does not impose excessive personal costs (Morrison & Milliken, 2000; Near & Miceli, 1995). These concerns are likely to be stronger where organisational or cultural norms already discourage dissent upward (Kwon & Farndale, 2020; Park & Blenkinsopp, 2009).

Figure 1 further indicates that board-level ethical oversight primarily strengthens Stage 4 of the behavioural pathway by determining whether reported concerns receive credible organisational attention and corrective action. Although whistleblowing protection encourages employees to report hazards, effective board oversight ensures that the ethical voice is translated into meaningful organisational responses, thereby increasing the safety benefits of whistleblowing protection. Accordingly, board oversight should strengthen the pathway by which a protected voice translates into a safety improvement.

H2 The negative association between whistleblowing protection and workplace injury rates is stronger in organisations with greater board-level oversight of ethical and safety issues.

Institutional Moderation: Cultural Context

The effectiveness of whistleblowing protection is also shaped by the wider cultural environment in which employees interpret reporting systems. Institutional theory suggests that organisational practices derive legitimacy from broader cultural and regulatory contexts, meaning that the same governance mechanism may not operate uniformly across countries (Scott, 2014, 2017). Ethical decision-making research similarly shows that employees' actions are influenced not only by formal rules but also by social expectations regarding whether dissent, challenge, and voice are considered appropriate (Treviño, 1986; Treviño et al., 2014). Thus, even where formal whistleblowing protections exist, employees may hesitate to report safety concerns if doing so conflicts with prevailing norms of authority, loyalty, or social harmony.

National culture is central to this process because cultural value systems shape how employees perceive authority relationships, organisational loyalty, and the legitimacy of challenging existing practices (Hofstede, 2001; Hofstede et al., 2010; Świątek-Barylska & Braila, 2024). Hofstede's cultural dimensions therefore provide a useful framework for explaining why employees may interpret identical whistleblowing systems differently across societies (Hofstede, 2001; Hofstede et al., 2010). Among these dimensions, power distance is particularly important because it directly influences the perceived legitimacy of upward reporting. In high power distance contexts,

employees may regard reporting a supervisor's unsafe decision not as responsible participation but as a violation of hierarchical norms and deference to authority (Bochner & Hesketh, 1994; Hofstede, 2001; Kwon & Farndale, 2020; Park & Blenkinsopp, 2009; Park et al., 2008; Puni & Anlesinya, 2017; Taylor & Curtis, 2013). Importantly, this does not imply that employees fail to recognise unsafe conditions. Rather, they may recognise ethical problems while simultaneously perceiving that acting upon them would violate powerful social expectations.

This distinction has important normative implications. High power distance cultures do not merely reduce the probability of whistleblowing; they can restrict employees' ability to exercise moral agency by preventing them from acting on ethical judgments that they have already formed. Employees may recognise preventable harm and understand that reporting is ethically appropriate, yet remain constrained by cultural expectations of obedience, loyalty, or respect for authority. Such constraints create a form of moral vulnerability, whereby individuals are exposed to ethical conflict without possessing a practically viable means of fulfilling their moral responsibility to prevent harm. In these circumstances, the ethical burden shifts more heavily onto organisations. Rather than assuming that formal whistleblowing protections alone are sufficient, organisations operating in high power distance environments have a heightened duty of care to design reporting mechanisms that actively reduce these cultural barriers while preserving employees' fundamental rights to voice, dignity, and protection against retaliation.

Conversely, in lower power distance contexts, reporting safety concerns is more likely to be viewed as a legitimate expression of accountability, organisational responsibility, and harm prevention (Hofstede et al., 2010). This reasoning is consistent with the illustrative examples in our analysis. South Korea and Malaysia, characterised by relatively high power distance, exhibit weaker associations between whistleblowing protection and workplace safety, whereas the Netherlands and Denmark, characterised by lower power distance, display stronger and more consistent relationships (Hofstede et al., 2010; Park et al., 2008).

Other cultural dimensions may also influence whistleblowing through distinct behavioural mechanisms. Individualism may encourage employees to act on personal ethical judgement, whereas collectivist norms may heighten concerns about group loyalty and relational disruption (Hofstede, 2001; Hofstede et al., 2010; Park et al., 2008; Vadera et al., 2009). Masculinity may discourage voice where reporting is perceived as undermining competitiveness or organisational success (Hofstede, 2001; Mesmer-Magnus & Viswesvaran, 2005). Uncertainty avoidance may increase the psychological cost of speaking up when the consequences of reporting remain ambiguous

(Hofstede, 2001; Kaptein, 2011a). Long-term orientation may discourage immediate reporting where preserving future relationships is prioritised over confronting present misconduct (Hofstede et al., 2010; Vadera et al., 2009). Collectively, these cultural dimensions influence whether formal whistleblowing protections become behaviourally accessible and ethically credible.

Overall, cultural values condition not only whether employees use whistleblowing systems but also whether they are genuinely able to exercise moral agency in fulfilling their ethical responsibility to prevent workplace harm. Where cultural norms legitimise upward voice, whistleblowing protection strengthens both organisational learning and employees' capacity to act ethically. Where cultural norms discourage dissent, formal protections remain necessary but are insufficient on their own. Organisations operating in such environments bear a heightened ethical obligation to ensure that reporting systems are culturally workable while simultaneously safeguarding employees' non-negotiable rights to speak up against preventable harm.

As illustrated in Fig. 1, national culture primarily influences Stage 3 of Rest's ethical decision-making process by shaping employees' willingness and perceived ability to translate ethical intentions into reporting behaviour. Cultural norms governing authority, loyalty, and dissent, therefore, determine whether employees who have recognised a safety hazard (Stage 1) and formed an ethical judgement (Stage 2) are able to act upon that judgement. In high power distance settings, moral vulnerability arises precisely because employees may complete the earlier stages of ethical reasoning yet be unable to translate ethical intention into action. Consequently, national culture conditions the effectiveness of whistleblowing protection by influencing whether the behavioural pathway depicted in Fig. 1 ultimately leads to organisational learning and improved workplace safety.

H3 The negative association between whistleblowing protection and workplace injury rates varies across national cultural contexts.

Moderating Role of Public Governance Quality

The quality of public governance further shapes whether whistleblowing protections are perceived as credible and enforceable. In countries with strong regulatory institutions, reliable legal enforcement, and capable public administration, employees are more likely to view whistleblowing protections as meaningful safeguards rather than symbolic commitments (Brown et al., 2014; OECD, 2016). In such environments, employees can more reasonably expect that reported concerns will be investigated, retaliation will carry consequences, and safety-related voice will receive

institutional support (Brown et al., 2014; Kaufmann et al., 2011; La Porta et al., 1999; OECD, 2016).

Where governance institutions are weak, however, formal protections may exist in name but lack practical force. Employees may doubt whether reporting wrongdoing will produce meaningful organisational responses or whether legal safeguards will protect them from retaliation (Culiberg & Mihelič, 2017; Miceli et al., 2008). Even well-designed internal reporting systems may therefore remain underused when the broader institutional environment does not support enforcement, accountability, or trust in formal rules (Culiberg & Mihelič, 2017; Loyens & Vandekerckhove, 2018; Miceli et al., 2008).

Institutional theory helps explain this moderating role because public governance strengthens the external credibility of the regulative pillar (Scott, 2014, 2017). Strong regulatory quality, rule of law, and government effectiveness make anti-retaliation rules more believable and enforcement more plausible (Brown et al., 2014; Kaufmann et al., 2011; La Porta et al., 1999; OECD, 2016). This matters at the employee level because credible institutions reduce the perceived futility of speaking up and increase trust that hazard disclosures will be translated into investigation and remediation. It is also ethically important because public governance determines whether rights to voice, fair treatment, and non-retaliation are practically meaningful rather than merely formal (Culiberg & Mihelič, 2017; Loyens & Vandekerckhove, 2018; Miceli et al., 2008).

Accordingly, strong public governance should amplify the safety benefits of whistleblowing protection by reinforcing organisational accountability and increasing the likelihood that ethical voice mechanisms produce tangible safety improvements (Culiberg & Mihelič, 2017; Miceli et al., 2008). Figure 1 also shows that public governance provides the broader institutional context within which each stage of the behavioural pathway operates. Strong regulatory quality, effective government, and the rule of law enhance the credibility of whistleblowing protection from hazard recognition through reporting and organisational response by reinforcing employees' confidence that disclosures will be fairly protected, investigated, and acted upon. Public governance, therefore, strengthens the effectiveness of the entire pathway rather than a single behavioural stage.

H4a The negative relationship between whistleblowing protection and workplace injury rates is stronger in countries with higher regulatory quality.

H4b The negative relationship between whistleblowing protection and workplace injury rates is stronger in countries with stricter rule-of-law regimes.

H4c The negative relationship between whistleblowing protection and workplace injury rates is stronger in countries with higher government effectiveness.

Collectively, the hypotheses operationalise the behavioural framework presented in Fig. 1. H1 examines the overall ethical decision-making pathway linking whistleblowing protection to workplace safety. H2 focuses on the organisational implementation stage through board oversight (Stage 4), H3 examines how national culture shapes employees' reporting decisions (primarily Stage 3), and H4 evaluates how public governance reinforces the credibility of the entire process across all stages. This mapping provides a coherent micro-to-macro-explanation of how whistleblowing protection ultimately contributes to safer workplaces.

Research Design

Data and Sample

We obtain firm-level financial data from Refinitiv Eikon (currently known as LSEG Workplace), covering the period from 2003 to 2023 across 60 countries. The key variables, including the presence of a Whistleblowing Protection (WBP) and workplace injuries data, are extracted from Refinitiv Eikon. Country-level institutional factors are obtained from the Global Economy database. Country-level variables representing formal institutions and national culture are obtained from The Global Economy,¹ and Hofstede (2001). The initial dataset comprises 54,871 firm-year observations for which data on WBP are available. To ensure data completeness for empirical estimation, we exclude 31,902 missing observations for INJ/HRS and 4666 missing observations for control variables. After applying these exclusion criteria, the final sample consists of 18,303 firm-year observations from firms in the Refinitiv Global index that meet the analysis criteria. To reduce the influence of outliers and enhance the robustness of results, all continuous variables are winsorised at the 1st and 99th percentiles. Sampling criteria are presented in Table S1.

Variables Measurement

Table S2 summarises the operational definitions of all variables used in the study. In selecting the measures, we prioritise indicators that have been widely used in prior research and that closely align with the theoretical constructs

¹ Country level data were obtained from [Economic indicators data for over 200 countries | TheGlobalEconomy.com](https://www.theglobaleconomy.com/).

underlying our conceptual framework. The variables are designed to capture three core elements of the model: workplace safety outcomes, whistleblowing protection mechanisms, and the institutional and cultural environments that shape the credibility of ethical voice systems.

Workplace Safety

Our primary measure of workplace safety is obtained from the social pillar of the Refinitiv Eikon ESG database, which provides internationally comparable indicators of employee welfare and safety performance. Specifically, workplace safety is measured as the total number of injuries and fatalities, including incidents that do not result in lost work time, per one million hours worked (INJ/HRS). This metric is widely used in occupational safety research because it standardises injury incidence relative to labour input, allowing meaningful comparisons across firms and industries with different workforce sizes and operational scales (Bradley et al., 2022; Chen et al., 2023; Hope et al., 2022). Lower values, therefore, indicate stronger safety performance.

To ensure that the results are not sensitive to the specific operationalisation of workplace safety, we also employ an alternative proxy: the Total Injury Rate (JIR), calculated as the number of recorded workplace injuries divided by total hours worked and multiplied by one million. This alternative measure captures a similar underlying construct while relying on a slightly different reporting specification, thereby strengthening the robustness of our empirical analysis.

Whistleblowing Protection

The presence of Whistleblowing Protection (WBP) is measured using a percentage score ranging from 0 to 100. This score captures the extent to which a firm reports having adopted internal whistleblowing mechanisms or complies with relevant whistleblower protection regulations. To normalise the scale, the score is divided by 100, yielding a continuous variable that ranges from 0 to 1. We interpret this measure as capturing the formal presence and scope of whistleblowing protection mechanisms rather than employees' lived experience of protection or their perceived confidence in using reporting channels. This distinction is important because formal policy adoption does not necessarily imply meaningful implementation (MacLean & Behnam, 2010; Meyer & Rowan, 1977). Whistleblowing arrangements may be present in corporate disclosures while remaining weakly embedded in organisational routines if employees distrust confidentiality, fear retaliation, or believe that reported concerns will not receive meaningful follow-up (Mesmer-Magnus & Viswesvaran, 2005; Miceli et al., 2008; Morrison, 2014; Morrison & Milliken, 2000;

Near & Miceli, 1995). Accordingly, our empirical analysis examines whether formally institutionalised whistleblowing protections are associated with reported workplace safety outcomes, while recognising that the measure cannot directly capture employees' perceived protection effectiveness.

To ensure robustness, we also construct an alternative proxy (WBP_Alt) that equals 1 when formal whistleblower protection laws and reporting mechanisms are present and 0 otherwise. For further robustness, we employed a country-level composite Whistleblower Protection Score (WBP_CS) that captures the strength and scope of national whistleblowing protection regimes. This index reflects the broader institutional infrastructure that enables employees to report misconduct or safety risks without fear of retaliation. The index incorporates three institutional components that are widely recognised as essential features of effective whistleblowing systems: anti-retaliation protections, confidential reporting mechanisms, and anonymous reporting systems. Anti-retaliation provisions evaluate the extent to which national laws protect whistleblowers from adverse employment consequences such as dismissal, demotion, or harassment. Confidential reporting mechanisms capture whether organisations are legally required to maintain internal reporting channels or dedicated reporting structures. Anonymous reporting provisions assess whether individuals can report concerns without disclosing their identity. Detailed scoring criteria and coding procedures are reported in Online Appendix Table S3a.

The overall whistleblowing protection score is calculated as the sum of these three components, producing a maximum possible score of 280 points (see Online Appendix Table S3b). Higher scores indicate stronger and more comprehensive whistleblowing protection regimes. For descriptive purposes, countries are also grouped into five tiers of whistleblowing protection systems, ranging from jurisdictions with world-leading protection frameworks to those with limited or fragmented legal safeguards (see Online Appendix Table S3c). This classification provides additional context for interpreting cross-country variation in whistleblowing institutions.

A key advantage of the WBP_CS index is that it captures the multidimensional nature of whistleblowing protection, reflecting not only the existence of legal safeguards but also the institutional infrastructure that supports reporting behaviour (Brown et al., 2014; Miceli et al., 2008; Near & Miceli, 1995; OECD, 2023). Many prior studies rely on binary proxies indicating the presence of whistleblower legislation; however, such measures do not capture differences in legal scope, reporting mechanisms, confidentiality provisions, or anonymity protections (Brown et al., 2014; Vandekerckhove & Lewis, 2012). By incorporating anti-retaliation protections, confidential reporting mechanisms, and anonymous reporting

systems, the WBP_CS index captures the depth of formal whistleblowing infrastructure more effectively than a simple policy-present/policy-absent indicator (Miceli et al., 2008; Near & Miceli, 1995; Vandekerckhove & Lewis, 2012). Countries scoring higher on this composite have adopted multiple reinforcing institutional elements, which makes purely symbolic adoption less likely (Scott, 2014, 2017). Nevertheless, this measure remains a formal institutional proxy. It does not directly capture whether employees trust the reporting system, whether managers respond constructively to reports, whether retaliation occurs informally, or whether reported concerns are substantively investigated (MacLean & Behnam, 2010; Meyer & Rowan, 1977; Miceli et al., 2008; Morrison, 2014). We therefore treat WBP_CS as an indicator of formal protection infrastructure rather than as direct evidence of employees' experienced protection.

Moderating Variables

National Culture: To capture cross-national differences in cultural norms that may influence ethical voice behaviour, we employ Hofstede's multidimensional framework of national culture (Hofstede, 2001; Hofstede et al., 2010). This framework conceptualises culture as a system of shared societal values that shape attitudes towards authority, responsibility, and communication within organisations. Because whistleblowing involves challenging existing practices or authority structures, these cultural values can influence whether employees perceive reporting concerns as legitimate or socially risky (Kwon & Farndale, 2020; Park et al., 2008).

We operationalise national culture using Hofstede's six cultural dimensions: power distance, individualism, masculinity, uncertainty avoidance, long-term orientation, and indulgence. These dimensions capture different societal value orientations related to hierarchy, autonomy, competitiveness, risk tolerance, and emotional expression. The indices are measured at the country level and have been widely validated in cross-national research on organisational behaviour and ethical decision-making (Oelrich & Erlebach, 2021; Taras et al., 2010). Incorporating these measures allows us to capture the broader cultural context in which whistleblowing systems operate.

Board-Level Oversight of Ethical and Safety Issues: To capture the organisational ethical context, we measure board-level oversight of ethical and safety issues using indicators from Bloomberg and Refinitiv Eikon that identify whether boards are formally responsible for ethics, compliance, risk management, and occupational health and safety. Active board oversight signals that ethical conduct and employee welfare are monitored at the highest level of corporate governance. Prior research suggests that

such oversight strengthens organisational accountability, reinforces ethical norms, and enhances the credibility of internal reporting mechanisms (Brown et al., 2014). Higher values, therefore, indicate firms where ethical and safety concerns are embedded within governance structures rather than treated as peripheral compliance matters.

Public Governance Quality: Finally, we capture the broader institutional environment using three indicators from the World Bank's Worldwide Governance Indicators (WGI): Regulatory Quality, Rule of Law, and Government Effectiveness (Kaufmann et al., 2011). These measures capture the strength of public institutions, the effectiveness of legal enforcement, and the credibility of regulatory frameworks. Prior research shows that stronger governance institutions enhance law enforcement and increase confidence that reported violations will be investigated and addressed (La Porta et al., 1999).

All governance indicators are measured at the country level and lagged by one year to mitigate simultaneity and reverse-causality concerns. By interacting these indicators with whistleblowing protection, the empirical model allows the effectiveness of whistleblowing systems to vary with the institutional quality of the national governance environment.

Control Variables

Following prior studies by Chen et al. (2023), Bradley et al. (2022), and Hope et al. (2022), we incorporated several firm-level control variables in our analysis. Return on Assets (ROA), which is calculated as net income before extraordinary items divided by total assets, was included to capture the firm's profitability. Firm size (SIZE) was measured as the natural logarithm of total assets. At the same time, leverage (LEV) was defined as the ratio of total debt to total assets to control for the firm's financial structure. The Market-to-Book Ratio (MTB), which reflects growth opportunities, was measured as market capitalisation plus total debt, divided by total assets. We also included cash holdings (CASH HD), calculated as total cash and short-term investments divided by total assets, to account for liquidity. Capital Expenditure (CAPX), representing the firm's investment in assets, was measured as capital expenditure scaled by total assets. Dividends (DIV) were calculated as cash dividends per common share, scaled by total assets, reflecting the firm's dividend policy. Tangible assets (TANG) were measured as the ratio of property, plant, and equipment to total assets. Asset turnover (TURNOVER) was calculated as total sales scaled by total assets, capturing the firm's operational efficiency. Prior studies show that corporate governance indicators can either help improve or constrain workplace safety (Gong et al., 2023; Haidar & Hossain, 2025; Joo et al., 2025; Son et al., 2025), hence we

include the corporate governance board committee (CORP GOV BCM) and board size (BOARD SIZE).

At the country level, GDP growth (GDP GROWTH) was included to capture the annual growth rate of the country's gross domestic product. The log of GDP (LNGDP) was also used as a measure of economic size. To control for macroeconomic stability, we included inflation (INFLATION). Lastly, we controlled for the country's governance environment using a composite country-level governance index (WGI), which reflects the principal components of regulatory quality, rule of law, and control of corruption, based on the Worldwide Governance Indicators.

Regression Model

To test our hypothesis, we employed a standard OLS regression model that accounts for heterogeneity across industries, firms, and countries, thereby mitigating potential omitted-variable bias (Baltagi, 2008). The model is specified as follows:

$$INJ/HRS_{it} + \beta_0 + \beta_1 WBP + \beta_2 FirmLevelControls + \beta_3 CountryLevelControl + IndustryFixedEffect + YearFixedEffect + \varepsilon \quad (1)$$

In this specification, INJ/HRS denotes workplace safety for firm i at time t , measured as the number of injuries per total hours worked. The variable WBP represents the degree to which a firm has adopted internal whistleblowing mechanisms or complies with externally mandated whistleblower protection regulations. The model further incorporates a comprehensive set of firm-level and country-level control variables as previously defined, ensuring that both organisational characteristics and institutional environments are appropriately accounted for. To mitigate potential omitted-variable bias, industry fixed effects are included to capture unobserved, time-invariant industry attributes. In contrast, year fixed-effects control for temporal shocks and macroeconomic fluctuations that may otherwise confound the estimated relationships. This model allows us to examine the relationship between WBP and workplace safety outcomes, while controlling for a range of firm and country characteristics.

Results and Discussion

Descriptive Statistics and Correlations

The sample spans 18,303 firm-years from 2003–2023, with coverage growing notably after 2016 (e.g. 1219 in 2018; 1480 in 2019; 2477 in 2022; 2707 in 2023), underscoring the breadth of the panel (Table 1, Panel A). Sectorally, Industrials (18.11%), Basic Materials (16.36%), Technology

(11.40%), and Consumer Cyclical (11.06%) dominate the observations (Table 1, Panel B). Country coverage is diverse; for instance, the United States accounts for 5445 firm-years (mean INJ/HRS = 6.746, WBP = 0.624), while the United Kingdom contributes 1023 (mean INJ/HRS = 10.110, WBP = 0.487) (Table 1, Panel C). These distributions highlight meaningful institutional and cultural variety in both injury rates and whistleblowing protection.

Turning to summary statistics, the mean injury rate (INJ/HRS) is 6.487 (SD = 10.618), and the mean whistleblowing protection score (WBP) is 0.552 (SD = 0.231) (Table 2, Panel A). The pairwise correlation between injury rates and WBP is negative and significant (-0.056 , $p < 0.01$), offering a first indication that stronger whistleblowing protection co-moves with lower injury rates (Table 2, Panel C). At the same time, the simple univariate split shows firms in the high-WBP group recording an average INJ/HRS of 7.138 versus 5.832 for low-WBP firms (difference reported as -1.305 , $t = -8.333$) (Table 2, Panel B). This mixed bivariate picture, negative correlations but higher

raw means in the high-WBP group, signals the need for multivariate controls (firm, industry, country, time) to net out composition effects, which we address next.

Finally, the broader correlation structure aligns with expectations, as firms with stronger growth opportunities (lower injuries with higher MTB) and governance (e.g. CORP GOV BCM) tend to report better safety outcomes (see the significant coefficients in Table 2, Panel C). Multicollinearity diagnostics are benign (all correlations modest in magnitude), supporting the chosen covariate set.

Baseline Regression Results: Whistleblowing Protection and Workplace Safety

The baseline regressions in Table 3 show a consistently negative and statistically significant association between WBP and INJ/HRS across nested specifications: -2.045^* (Model 1), -1.492^* (Model 2), and -1.531^* (Model 3), all at $p < 0.01$. Economically, the fully specified coefficient (-1.531) implies that moving from weaker to stronger whistleblowing protection is associated with an injury reduction of about 23% relative to the sample mean ($1.531 / 6.487 \approx 0.236$) (Table 3). This is a significant effect and directly supports H1.

These multivariate results reconcile the bivariate patterns observed in Table 2, which indicate that once we control for firm fundamentals (e.g. SIZE, LEV, MTB, TANG, TURNOVER), governance features (e.g. CORP GOV BCM, BOARD SIZE), and the macro-institutional environment

Table 1 Sample distribution

Panel A: Distribution by year

Year	Freq	Percent
2003	43	0.23
2004	72	0.39
2005	116	0.63
2006	189	1.03
2007	234	1.28
2008	273	1.49
2009	336	1.84
2010	386	2.11
2011	461	2.52
2012	517	2.82
2013	611	3.34
2014	694	3.79
2015	786	4.29
2016	893	4.88
2017	1037	5.67
2018	1219	6.66
2019	1480	8.09
2020	1737	9.49
2021	2035	11.12
2022	2477	13.53
2023	2707	14.79
Total	18,303	100.00

Panel B: Distribution by economic sector

Economic sector name	Freq	Percent
Academic and Educational Services	7	0.04
Basic Materials	2995	16.36
Consumer Cyclicals	2025	11.06
Consumer Non-Cyclicals	1575	8.61
Energy	1997	10.91
Financials	499	2.73
Healthcare	1408	7.69
Industrials	3315	18.11
Real Estate	944	5.16
Technology	2087	11.40
Utilities	1451	7.93
Total	18,303	100.00

Panel C: Distribution by country

Country	<i>N</i>	INJ/HRS	WBP
[1] Australia	993	8.670	0.599
[2] Austria	73	7.532	0.529
[3] Bahrain	6	3.252	0.607
[4] Belgium	136	5.778	0.505
[5] Bermuda	36	3.478	0.532
[6] Brazil	470	6.243	0.531
[7] British Virgin Island	11	17.312	0.288
[8] Canada	1145	8.567	0.599

Table 1 (continued)

Panel C: Distribution by country

Country		<i>N</i>	INJ/HRS	WBP
[9]	Cayman Islands	146	2.725	0.516
[10]	Chile	112	7.669	0.478
[11]	China	146	0.506	0.301
[12]	Curacao	16	1.831	0.597
[13]	Cyprus	3	4.195	0.568
[14]	Czech Republic	8	5.366	0.000
[15]	Denmark	97	9.711	0.446
[16]	Egypt	2	14.533	0.656
[17]	Finland	227	9.227	0.432
[18]	France	511	7.484	0.454
[19]	Germany	379	8.573	0.427
[20]	Greece	65	4.677	0.480
[21]	Guernsey	4	0.975	0.667
[22]	Hong Kong	22	0.901	0.640
[23]	Hungary	31	2.138	0.586
[24]	India	969	1.965	0.601
[25]	Indonesia	226	1.770	0.550
[26]	Ireland	190	5.045	0.617
[27]	Isle of Man	6	3.186	0.000
[28]	Israel	36	4.618	0.547
[29]	Italy	377	6.595	0.559
[30]	Japan	1308	1.813	0.476
[31]	Jersey	39	2.567	0.516
[32]	Kuwait	12	0.640	0.617
[33]	Luxembourg	69	6.071	0.489
[34]	Malaysia	302	4.445	0.635
[35]	Marshall Islands	9	1.258	0.612
[36]	Mauritius	1	2.422	0.674
[37]	Mexico	140	8.576	0.501
[38]	Morocco	13	2.246	0.344
[39]	Netherlands	290	3.211	0.574
[40]	New Zealand	151	14.889	0.574
[41]	Norway	277	5.432	0.465
[42]	Pakistan	7	0.515	0.576
[43]	Panama	3	18.325	0.635
[44]	Philippines	84	5.292	0.582
[45]	Poland	105	4.539	0.347
[46]	Portugal	60	19.441	0.499
[47]	Qatar	12	1.093	0.615
[48]	Russia	114	1.025	0.346
[49]	Saudi Arabia	42	1.903	0.518
[50]	Singapore	262	4.817	0.549
[51]	South Africa	337	8.602	0.491
[52]	Spain	277	11.641	0.458
[53]	Sweden	526	10.448	0.445
[54]	Switzerland	364	6.905	0.507
[55]	Thailand	374	2.560	0.580
[56]	Turkey	183	9.585	0.500

Table 1 (continued)

Panel C: Distribution by country

Country		<i>N</i>	INJ/HRS	WBP
[57]	United Arab Emirates	23	4.748	0.496
[58]	United Kingdom	1023	10.11	0.487
[59]	United States	5445	6.746	0.624
[60]	Vietnam	8	0.411	0.595

Table 1 reports the distribution of our sample across three panels. Panel A shows the sample distribution for 18,303 firm-years for the period of 2003–2023. Panel B reports the distribution by economic sector, while Panel C presents the distribution by country for 60 countries, including country means for whistleblowing protection and workplace safety

(GDP GROWTH, LNGDP, INFLATION, WGI), WBP robustly predicts fewer injuries. The signs on key controls are in line with prior evidence. For example, LEV is positively related to injuries (financial pressure), MTB is negatively associated (forward-looking investment capacity), and CORP GOV BCM is negatively related to injuries (board-level oversight) (Table 3).

At the same time, interpreting this result requires caution because our WBP variable captures formal whistleblowing protections rather than employees' direct experience of those protections. The negative association between WBP and injury rates should therefore not be read as evidence that all reported policies are substantively implemented in the same way across firms. Rather, the result indicates that firms reporting stronger formal whistleblowing protection tend to exhibit lower reported injury rates after accounting for firm characteristics, governance features, and country-level institutional conditions. This interpretation is consistent with institutional theory's concern with decoupling, where formal structures may be adopted for legitimacy while remaining weakly connected to practice (MacLean & Behnam, 2010; Meyer & Rowan, 1977). Accordingly, the subsequent moderation and additional split-sample analyses examine whether WBP effects are concentrated in governance environments where formal policies are more likely to be credibly implemented.

Substantively, the findings do more than confirm that protected voice matters. They help explain how protected voice becomes a safety outcome. When workers trust that reporting is safe and worthwhile, near misses, hazardous routines, unsafe managerial decisions, and procedural deviations are more likely to surface. Once surfaced, these concerns can be escalated through governance structures that can investigate and take corrective action. This interpretation is consistent with our theoretical claim that whistleblowing protection operates through a multi-stage process: it reduces the personal cost of disclosure, strengthens the credibility of internal escalation, and supports organisational learning from frontline information (Detert & Edmondson, 2011; Kaptein, 2011b; Miceli et al., 2008; Morrison, 2014; Near & Miceli,

1995; Treviño et al., 2014). In that sense, the results move beyond prior studies linking institutional context to voice climate or ethical perception by showing how institutionalised voice mechanisms are associated with a concrete employee welfare outcome (Gong et al., 2023; Haga et al., 2024; Qian et al., 2024; Son et al., 2025).

Moderating Role of Board Oversight on Health and Safety

Table 4 examines whether board oversight on health and safety moderates the relationship between whistleblowing protection and workplace safety outcomes (H2). The results indicate that whistleblowing protection is effective when complemented by active board-level oversight on health and safety. Across both the observed and imputed samples, the interaction between whistleblowing protection and board oversight of health and safety is negative and statistically significant ($\beta = -3.713$, $t = -2.024$; $\beta = -3.759$, $t = -2.904$). This indicates that stronger whistleblowing arrangements are associated with lower injury rates in firms where boards actively monitor health and safety risks, providing empirical support to H2.

Importantly, the negative interaction term indicates that when whistleblowing protection mechanisms are more developed, board oversight shifts from a reporting function towards prevention (Kaptein, 2011a, 2011b; Lornudd et al., 2021; Son et al., 2025; Treviño et al., 2014). This finding is consistent with the multi-level logic of the framework: protected voice is more likely to reduce injury rates when internal governance structures ensure that reported concerns are not ignored, suppressed, or treated as isolated complaints (Detert & Edmondson, 2011; Miceli et al., 2008; Morrison, 2014; Near & Miceli, 1995). The result is also ethically significant. Board oversight helps convert employee voice into organisational responsibility by ensuring that workers who raise safety concerns are treated as moral agents contributing to harm prevention, rather than as disruptive actors or sources of reputational risk (De George, 2005; Freeman, 1984; Scott, 2014, 2017). Overall, the findings support a

Table 2 Descriptive statistics

Panel A: Summary statistics									
Variable	N	Mean	Std. Dev	p25	P50	p75			
INJ/HR\$	18,303	6.487	10.618	1.240	3.350	7.750			
WBP	18,303	0.552	0.231	0.585	0.627	0.668			
ROA	18,303	0.051	0.076	0.020	0.048	0.085			
SIZE	18,303	22.648	1.533	21.645	22.612	23.608			
LEV	18,303	0.270	0.164	0.153	0.259	0.374			
MTB	18,303	1.451	2.257	0.459	0.824	1.573			
CASH HD	18,303	0.023	0.049	0.000	0.000	0.023			
CAPX	18,303	0.044	0.040	0.015	0.033	0.061			
DIV	18,303	− 0.024	0.030	− 0.032	− 0.016	− 0.005			
TANG	18,303	0.311	0.240	0.112	0.253	0.467			
TURNOVER	18,303	0.740	0.537	0.370	0.644	0.957			
CORP. GOV BCOM	18,303	0.533	0.499	0.000	1.000	1.000			
BOARD SIZE	18,303	10.366	3.049	8.000	10.000	12.000			
GDP GROWTH	18,303	1.607	3.023	0.647	1.735	2.561			
LN GDP	18,303	10.435	0.973	10.435	10.792	11.054			
INFLATION	18,303	3.401	4.676	1.262	2.443	4.698			
WGI	18,303	0.441	1.634	0.056	1.100	1.554			
Panel B: Univariate analysis									
Variable	High WBP	Low WBP	Diff				t-value		
INJ/HR\$	7.138	5.832	− 1.305				− 8.333		
Total	9175	9128							
Panel C: Pairwise correlation									
Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
(1) INJ/HR\$	1.000								
(2) WBP	− 0.056***	1.000							
(3) ROA	− 0.006	− 0.025***	1.000						
(4) SIZE	− 0.077***	0.009	− 0.071***	1.000					
(5) LEV	0.045***	0.022***	− 0.248***	0.201***	1.000				
(6) MTB	− 0.048***	0.030***	0.305***	− 0.286***	− 0.192***	1.000			
(7) CASH_HD	− 0.013*	− 0.017**	0.061***	− 0.211***	− 0.129***	0.120***	1.000		
(8) CAPX	0.016**	0.023***	0.040***	− 0.005	0.028***	0.003	− 0.012*	1.000	
(9) DIV	0.015**	0.008	− 0.455***	0.090***	0.129***	− 0.276***	− 0.105***	− 0.031***	1.000
(10) TANG	0.054***	0.006	− 0.068***	0.010	0.110***	− 0.078***	− 0.051***	0.522***	0.011

Table 2 (continued)

Panel C: Pairwise correlation																
Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)							
(11) <i>TURNOVER</i>	0.098***	− 0.008	0.246***	− 0.177***	− 0.214***	0.130***	0.044***	− 0.038***	− 0.149***							
(12) <i>CORP GOV BCM</i>	− 0.005	0.206***	− 0.027***	0.195***	0.133***	− 0.030***	− 0.161***	0.055***	0.075***							
(13) <i>BOARD SIZE</i>	− 0.030***	− 0.067***	− 0.033***	0.482***	0.110***	− 0.124***	− 0.118***	− 0.012	0.039***							
(14) <i>GDP GROWTH</i>	− 0.077***	0.010	0.132***	− 0.089***	− 0.045***	0.120***	0.037***	− 0.008	− 0.022***							
(15) <i>LNGDP</i>	0.108***	0.052***	− 0.093***	0.192***	0.037***	− 0.143***	− 0.147***	− 0.039***	0.081***							
(16) <i>INFLATION</i>	0.005	0.033***	0.077***	− 0.103***	0.005	0.078***	0.027***	− 0.018**	0.002							
(17) <i>WGI</i>	0.125***	0.006	− 0.077***	0.100***	− 0.063***	− 0.102***	− 0.142***	− 0.018**	0.058***							
Variables	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)								
(10) <i>TANG</i>	1.000															
(11) <i>TURNOVER</i>	− 0.081***	1.000														
(12) <i>CORP GOV BCM</i>	0.072***	− 0.015**	1.000													
(13) <i>BOARD SIZE</i>	− 0.031***	− 0.031***	0.087***	1.000												
(14) <i>GDP GROWTH</i>	− 0.027***	0.035***	− 0.028***	− 0.047***	1.000											
(15) <i>LNGDP</i>	− 0.056***	− 0.030***	0.254***	− 0.069***	− 0.259***	1.000										
(16) <i>INFLATION</i>	− 0.006	0.037***	0.060***	− 0.078***	0.206***	− 0.204***	1.000									
(17) <i>WGI</i>	− 0.032***	0.000	0.059***	− 0.113***	− 0.252***	0.827***	− 0.320***	1.000								

Table 2 displays the descriptive statistics. Panel A shows the summary statistics for all variables used in the baseline analysis. Panel B reports a univariate analysis of the relationship between whistleblowing protection and workplace safety. Panel C reports the Pearson correlation coefficients for the variables used in our main analysis. For detailed variable definitions, refer to Table S2

Superscripts ***, **, and * depict significance at the 1%, 5%, and 10% levels, respectively

Table 3 Whistleblowing protection and workplace safety (H1)

VARIABLES	INJ/HRS		
	(1)	(2)	(3)
<i>WBP</i>	− 2.045*** (− 4.644)	− 1.492*** (− 3.486)	− 1.531*** (− 3.556)
<i>ROA</i>		0.740 (0.679)	0.807 (0.736)
<i>SIZE</i>		− 0.607*** (− 8.344)	− 0.605*** (− 8.264)
<i>LEV</i>		2.295*** (4.835)	2.329*** (4.908)
<i>MTB</i>		− 0.153*** (− 5.943)	− 0.155*** (− 5.944)
<i>CASH HD</i>		− 1.585 (− 0.853)	− 1.647 (− 0.888)
<i>CAPX</i>		3.003 (1.298)	3.184 (1.373)
<i>DIV</i>		14.145*** (4.629)	13.860*** (4.542)
<i>TANG</i>		3.753*** (7.215)	3.708*** (7.119)
<i>TURNOVER</i>		1.417*** (8.067)	1.416*** (8.049)
<i>CORP GOV BCM</i>		− 1.059*** (− 4.366)	− 1.021*** (− 4.212)
<i>BOARD SIZE</i>		− 0.079*** (− 2.646)	− 0.078*** (− 2.603)
<i>GDP GROWTH</i>			− 0.064 (− 1.472)
<i>LNGDP</i>			2.129*** (3.095)
<i>INFLATION</i>			0.066** (2.020)
<i>WGI</i>			1.362*** (3.242)
Constant	7.616*** (28.587)	20.052*** (12.131)	− 2.967 (− 0.397)
Year fixed effect	Yes	Yes	Yes
Industry fixed effect	Yes	Yes	Yes
Country fixed effect	Yes	Yes	Yes
Observations	18,303	18,303	18,303
Adjusted R^2	0.131	0.151	0.152

Table 3 presents the regression results for the impact of whistleblowing protections on workplace safety. We present t-statistics in parentheses with standard errors adjusted for clustering by firm

Superscripts ***, **, and * depict significance at the 1%, 5%, and 10% levels, respectively. See Table S2 for variable definitions

complementary governance interpretation in which internal whistleblowing infrastructures reduce workplace injuries when embedded within active board oversight of health

Table 4 The moderating role of board oversight on health and safety (H2)

VARIABLES	INJ/HRS	
	(1)	(2)
<i>WBP</i> × <i>BOARD OVSIG H&S</i>	− 3.713** (− 2.024)	− 3.759*** (− 2.904)
<i>WBP</i>	− 1.260 (− 0.869)	− 0.064 (− 0.143)
<i>BOARD OVSIG H&S</i>	2.896*** (2.675)	2.768*** (2.710)
<i>ROA</i>	1.226 (0.719)	− 1.629 (− 1.571)
<i>SIZE</i>	− 0.160 (− 0.310)	− 0.479** (− 2.124)
<i>LEV</i>	− 5.103** (− 2.104)	− 0.413 (− 0.510)
<i>MTB</i>	− 0.022 (− 0.387)	− 0.091 (− 1.557)
<i>CASH HD</i>	− 4.660* (− 1.737)	− 3.800* (− 1.751)
<i>CAPX</i>	5.328 (0.999)	2.363 (1.013)
<i>DIV</i>	2.501 (0.602)	− 1.723 (− 0.509)
<i>TANG</i>	0.620 (0.285)	− 0.556 (− 0.550)
<i>TURNOVER</i>	0.206 (0.253)	− 0.278 (− 0.745)
<i>CORP GOV BCM</i>	− 1.422 (− 1.351)	− 1.508*** (− 4.208)
<i>BOARD SIZE</i>	0.170** (2.255)	− 0.115*** (− 2.937)
<i>GDP GROWTH</i>	− 0.077* (− 1.658)	− 0.053 (− 1.486)
<i>LNGDP</i>	− 0.501 (− 0.242)	2.830*** (4.584)
<i>INFLATION</i>	0.001 (0.016)	0.044** (2.013)
<i>WGI</i>	− 1.133 (− 1.234)	1.856*** (5.394)
Constant	14.972 (0.662)	− 10.605 (− 1.418)
Year fixed effect	Yes	Yes
Industry fixed effect	Yes	Yes
Country fixed effect	Yes	Yes
Observations	1918	18,303
Adjusted R^2	0.869	0.651

Table 4 presents the regression results for the moderating effect of board oversight on health and health (BOARD OVSIG H&S) on the relationship between whistleblowing protection and workplace safety. Column (1) presents the observed (non-imputed) data for BOARD OVSIG H&S. Column (2) presents the results after missing values were imputed. We present t-statistics in parentheses with standard errors adjusted for clustering by firm

Superscripts ***, **, and * depict significance at the 1%, 5%, and 10% levels, respectively. See Table S2 for variable definitions

Table 5 The moderating national culture (H3)

VARIABLES	INJ/HRS					
	Power distance	Individualism	Masculinity	Uncertainty avoidance	Long-term orientation	Indulgence
	(1)	(2)	(3)	(4)	(5)	(6)
<i>WBP×PDI</i>	0.072** (2.250)					
<i>WBP×IDV</i>		− 0.136*** (− 6.302)				
<i>WBP×MAS</i>			0.074*** (4.272)			
<i>WBP×UAI</i>				0.108*** (4.992)		
<i>WBP×LTO</i>					0.093*** (5.906)	
<i>WBP×IND</i>						− 0.116*** (− 4.020)
<i>WBP</i>	− 5.608*** (− 3.150)	6.557*** (5.449)	− 5.618*** (− 4.551)	− 9.052*** (− 5.531)	− 7.173*** (− 6.640)	4.549*** (3.070)
<i>PDI</i>	− 0.142*** (− 6.851)					
<i>IDV</i>		0.155*** (10.014)				
<i>MAS</i>			− 0.085*** (− 7.967)			
<i>UAI</i>				− 0.122*** (− 9.088)		
<i>LTO</i>					− 0.122*** (− 12.894)	
<i>IND</i>						0.168*** (10.092)
<i>ROA</i>	0.679 (0.652)	0.466 (0.446)	0.627 (0.597)	0.237 (0.226)	0.379 (0.362)	0.294 (0.281)
<i>SIZE</i>	− 0.581*** (− 7.525)	− 0.637*** (− 8.022)	− 0.594*** (− 7.457)	− 0.578*** (− 7.368)	− 0.551*** (− 7.168)	− 0.573*** (− 7.417)
<i>LEV</i>	2.981*** (5.930)	3.051*** (5.999)	2.731*** (5.397)	2.677*** (5.307)	2.527*** (4.949)	2.550*** (5.082)
<i>MTB</i>	− 0.161*** (− 5.445)	− 0.203*** (− 6.615)	− 0.144*** (− 4.819)	− 0.190*** (− 6.212)	− 0.161*** (− 5.375)	− 0.139*** (− 4.643)
<i>CASH HD</i>	11.356*** (5.092)	10.848*** (4.877)	7.886*** (3.535)	11.632*** (5.208)	11.543*** (5.236)	11.782*** (5.331)
<i>CAPX</i>	7.964*** (3.109)	6.383** (2.480)	6.388** (2.493)	7.165*** (2.799)	7.023*** (2.764)	6.826*** (2.691)
<i>DIV</i>	10.183*** (2.844)	8.164** (2.293)	12.764*** (3.463)	10.797*** (3.039)	11.516*** (3.265)	11.150*** (3.095)
<i>TANG</i>	3.145*** (7.432)	3.513*** (8.445)	3.660*** (8.784)	3.488*** (8.352)	3.038*** (7.333)	3.150*** (7.573)
<i>TURNOVER</i>	1.272*** (6.400)	1.264*** (6.309)	1.306*** (6.536)	1.263*** (6.296)	1.269*** (6.352)	1.307*** (6.546)
<i>CORP GOV BCM</i>	0.079 (0.410)	− 0.595*** (− 2.757)	0.201 (1.116)	− 0.512** (− 2.435)	− 1.158*** (− 4.810)	− 0.325 (− 1.624)
<i>BOARD SIZE</i>	− 0.146***	− 0.143***	− 0.151***	− 0.125***	− 0.106***	− 0.133***

Table 5 (continued)

VARIABLES	INJ/HRS					
	Power distance	Individualism	Masculinity	Uncertainty avoidance	Long-term orientation	Indulgence
	(1)	(2)	(3)	(4)	(5)	(6)
<i>GDP GROWTH</i>	(− 4.265) − 0.131***	(− 4.007) − 0.335***	(− 4.138) − 0.088*	(− 3.550) − 0.246***	(− 2.987) − 0.185***	(− 3.761) − 0.018
<i>LN GD</i>	(− 2.691) 0.382**	(− 6.101) 0.105	(− 1.798) 1.177***	(− 4.859) 1.446***	(− 3.755) 0.611***	(− 0.377) 0.219
<i>INFLATION</i>	(2.087) 0.143***	(0.620) 0.169***	(8.086) 0.136***	(9.611) 0.160***	(4.116) 0.164***	(1.321) 0.135***
<i>WGI</i>	(5.519) − 0.200*	(6.599) 0.028	(5.243) 0.192**	(6.241) − 0.203**	(6.359) 0.508***	(5.239) 0.228**
Constant	(− 1.951) 22.016***	(0.300) 9.363***	(2.114) 11.485***	(− 2.102) 11.740***	(5.454) 18.277***	(2.491) 6.861**
	(6.868)	(3.561)	(4.650)	(4.707)	(7.117)	(2.475)
Year fixed effect	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effect	Yes	Yes	Yes	Yes	Yes	Yes
Observations	13,979	13,979	13,979	13,979	14,023	13,987
Adjusted R^2	0.121	0.127	0.123	0.128	0.127	0.130

Table 5 presents the regression results for the moderating effect of national culture on the relationship between whistleblowing protection and workplace safety. We present t-statistics in parentheses with standard errors adjusted for clustering by firm

Superscripts ***, **, and * depict significance at the 1%, 5%, and 10% levels, respectively. See Table S2 for variable definitions

and safety (Brown et al., 2014; Lornudd et al., 2021; von Thiele Schwarz & Lornudd, 2021; Hashemi Joo & Parhizgari, 2023).

Moderating Role of National Culture

The moderation results in Table 5 (H3) show that national culture significantly shapes the extent to which whistleblowing protection improves workplace safety. Most notably, power distance weakens the safety benefits of whistleblowing protection. The interaction term WBP $\times$ PDI is positive and significant (0.072, $p < 0.05$), while the main effect of whistleblowing protection remains negative and significant (− 5.608*). Because the dependent variable (INJ/HRS) measures injury rates—lower values indicating better safety outcomes—the positive interaction indicates that the injury-reducing effect of whistleblowing protection diminishes as power distance increases, supporting H3. Although power distance itself has a negative coefficient (− 0.142*), suggesting lower baseline injury rates in hierarchical contexts, the interaction term shows that hierarchical norms weaken the behavioural effectiveness of whistleblowing systems.

From an institutional perspective, this finding reflects the cultural-cognitive pillar particularly sharply. The positive WBP $\times$ PDI interaction indicates that legal or organisational protections do not automatically produce behavioural activation. In hierarchical settings, employees may still refrain from reporting because the act itself remains culturally

difficult to justify, especially when it challenges supervisors or disrupts established lines of authority. This interpretation is consistent with prior research showing that power distance, deference to authority, and loyalty norms can discourage whistleblowing and upward voice even when formal reporting channels are available (Hofstede, 2001; Kwon & Farndale, 2020; Park & Blenkinsopp, 2009; Park et al., 2008; Świątek-Barylska & Braila, 2024; Taylor & Curtis, 2013). Ethically, this matters because high power distance norms may prevent employees from exercising moral agency in precisely the situations where voice is needed to prevent harm. The issue is therefore not only that hierarchy weakens the practical effectiveness of reporting systems; it may also undermine employees' rights to voice, protection, and fair treatment by making silence appear safer or more socially acceptable than reporting. This pattern illustrates one of the key boundary conditions of our framework: whistleblowing protection may remain formally present yet ethically and practically muted when cultural expectations discourage upward challenge. The contribution here is not simply that culture moderates the effect, but that cultural-cognitive beliefs can interrupt the transition from ethical concern to reporting behaviour, thereby weakening the organisation's duty of care.

The analysis further shows that other cultural dimensions influence the effectiveness of whistleblowing through distinct behavioural and ethical mechanisms. The interaction between whistleblowing protection and individualism

Table 6 The role of country-level governance (H4)

VARIABLES	INJ/HRS					
	(1)	(2)	(3)	(4)	(5)	(6)
<i>WBP</i> × <i>GOV EFF</i>	− 1.891*** (− 4.006)					
<i>WBP</i> × <i>CON CORR</i>		− 1.493*** (− 3.864)				
<i>WBP</i> × <i>POL STAB</i>			− 0.451 (− 0.821)			
<i>WBP</i> × <i>RULE LAW</i>				− 1.774*** (− 3.906)		
<i>WBP</i> × <i>REQ QTY</i>					− 2.164*** (− 4.121)	
<i>WBP</i> × <i>VOC ACC</i>						− 2.028*** (− 4.303)
<i>WBP</i>	0.706 (1.202)	0.173 (0.353)	− 1.299*** (− 2.870)	0.487 (0.924)	1.003* (1.737)	0.277 (0.606)
<i>GOV EFF</i>	− 0.811 (− 0.658)					
<i>CON CORR</i>		2.178* (1.830)				
<i>POL STAB</i>			− 1.205* (− 1.901)			
<i>RULE LAW</i>				2.903** (2.200)		
<i>REQ QTY</i>					3.758*** (4.652)	
<i>VOC ACC</i>						1.269 (1.007)
<i>Baseline Controls</i>	Yes	Yes	Yes	Yes	Yes	Yes
Constant	− 3.537 (− 0.471)	− 2.839 (− 0.379)	0.764 (0.102)	− 3.821 (− 0.491)	− 0.757 (− 0.102)	− 0.866 (− 0.110)
Year fixed effect	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effect	Yes	Yes	Yes	Yes	Yes	Yes
Country fixed effect	Yes	Yes	Yes	Yes	Yes	Yes
Observations	18,303	18,303	18,303	18,303	18,303	18,303
Adjusted R^2	0.152	0.152	0.152	0.152	0.153	0.152

Table 6 reports the results of interaction effect of country-level governance on the relationship between whistleblowing protection and workplace safety. Column (1) reports the results of the interaction of Government Effectiveness (GOV EFF). Column (2) reports the results of the interaction of Control of Corruption (CON CORR). Column (3) reports the results of the interaction of Political Stability (POL STAB). Column (4) reports the results of the interaction of Rule of Law (RULE LAW). Column (5) reports the results of the interaction of Regulatory Quality (REQ QTY). Column (6) reports the results of the interaction of Voice and Accountability (VOC ACC). We present t-statistics in parentheses with standard errors adjusted for clustering by firm

Superscripts ***, **, and * depict significance at the 1%, 5%, and 10% levels, respectively. See Table S2 for variable definitions

($WBP \times IDV$) is negative and significant, indicating that whistleblowing protections are more effective in societies that emphasise individual autonomy (Hofstede, 2001; Near & Miceli, 2016). This is consistent with the view that employees may be more willing to act on personal ethical

judgement when reporting is understood as a legitimate expression of responsibility. In contrast, masculinity ($WBP \times MAS$) and uncertainty avoidance ($WBP \times UAI$) weaken the safety benefits of whistleblowing systems by discouraging discretionary reporting behaviour (Hofstede, 2001;

Kaptein, 2011a; Mesmer-Magnus & Viswesvaran, 2005). Similarly, long-term orientation (WBP $\times$ LTO) dampens reporting where loyalty and relational stability are prioritised (Vadera et al., 2009). By contrast, indulgence (WBP $\times$ IND) strengthens the effectiveness of whistleblowing by lowering social barriers to speaking up (Hofstede et al., 2010). These patterns reinforce the argument that cultural values are not only contextual moderators but ethical conditions that influence whether employees can report preventable harm without excessive fear, stigma, or social penalty.

Overall, these results demonstrate that the safety impact of whistleblowing protection depends critically on its alignment with national cultural norms. They also show why such alignment matters ethically: where cultural norms suppress voice, organisations have a greater responsibility to design whistleblowing systems that protect employees' rights, safeguard moral agency, and prevent hierarchy from becoming a barrier to preventing harm.

The Moderating Role of Country-Level Governance Quality

Table 6 examines whether country-level governance quality conditions the relationship between whistleblowing protection and workplace safety outcomes (H4). Across most governance dimensions, the interaction terms are negative and statistically significant, indicating that whistleblowing protection is more effective in reducing injury rates in stronger institutional governance environments. Specifically, the interaction between whistleblowing protection and government effectiveness is negative and highly significant ($\beta = -1.891$, $t = -4.006$), as is the interaction with control of corruption ($\beta = -1.493$, $t = -3.864$). Similar patterns emerge for rule of law ($\beta = -1.774$, $t = -3.906$), regulatory quality ($\beta = -2.164$, $t = -4.121$), and voice and accountability ($\beta = -2.028$, $t = -4.303$). These results indicate that whistleblowing mechanisms are more strongly associated with lower injury rates in countries with greater enforcement capacity, stronger regulatory oversight, and greater institutional accountability, lending statistical credibility to H4. This pattern is theoretically important because it shows that internal ethical infrastructure draws credibility from its external institutional environment. It is also normatively important because national governance systems help determine whether employee rights to voice and non-retaliation are protected in practice. Stronger public governance reinforces the regulative pillar and makes the normative commitment to voice more believable. Where legal enforcement is weak or selective, employees may reasonably doubt whether they can report unsafe practices without personal harm, weakening both organisational accountability and the ethical legitimacy of whistleblowing protection.

Table 7 Mechanism test: stakeholder engagement and ethical climate

Variables	Stakeholder engagement (1)	Business ethics (2)
WBP	0.105*** (7.009)	0.287*** (25.359)
ROA	-0.101** (-1.967)	0.028 (1.195)
SIZE	0.103*** (40.310)	0.022*** (15.057)
LEV	-0.006 (-0.293)	-0.001 (-0.047)
MTB	0.006*** (3.796)	-0.001 (-0.532)
CASH HD	0.240*** (3.617)	0.015 (0.371)
CAPX	0.257*** (2.715)	-0.010 (-0.184)
DIV	-1.111*** (-9.817)	-0.220*** (-3.319)
TANG	0.032* (1.879)	0.000 (0.019)
TURNOVER	-0.020*** (-2.994)	0.011*** (3.010)
CORP GOV BCM	-0.002 (-0.276)	0.044*** (7.834)
BOARD SIZE	0.009*** (6.577)	-0.000 (-0.546)
GDP GROWTH	0.000 (0.125)	-0.000 (-0.242)
LNGD	-0.203*** (-6.435)	-0.020 (-1.015)
INFLATION	-0.001 (-0.700)	-0.000 (-0.589)
WGI	0.065*** (3.882)	-0.040*** (-3.559)
Constant	0.257 (0.766)	0.065 (0.310)
Year fixed effect	Yes	Yes
Industry fixed effect	Yes	Yes
Country fixed effect	Yes	Yes
Observations	18,275	18,303
Adjusted R^2	0.261	0.290

Table 7 reports results for the plausible mechanism tests for the relationship between whistleblowing protection and workplace safety, which is conditional on stakeholder engagement (column (1), and Business Ethics (2). We present t-statistics in parentheses with standard errors adjusted for clustering by firm

Superscripts ***, **, and * depict significance at the 1%, 5%, and 10% levels, respectively. See Table S2 for variable definitions

In contrast, the interaction between whistleblowing protection and political stability is not statistically significant ($\beta = -0.451$, $t = -0.821$), suggesting that macro-level stability alone does not enhance the effectiveness of whistleblowing protections. Rather, it is the quality of governance and enforcement that determines whether whistleblowing systems translate into improved safety outcomes.

Robustness, Endogeneity and Further Institutional Analyses

To consolidate the validity and theoretical depth of our core findings, this section integrates both robustness diagnostics and extended institutional analyses. The structure of these tests follows the conceptual progression of institutional theory from the normative and cultural-cognitive foundations of ethical behaviour to the regulative reinforcement provided by formal institutions.

Institutional Complementarity and Ethical Infrastructure

Table 7 presents the results of an examination of the association between whistleblowing protection (WBP) and broader indicators of ethical infrastructure. Firms with stronger whistleblowing mechanisms exhibit significantly higher stakeholder engagement ($\beta = 0.105$, $t = 7.009$, $p < 0.01$; Table 7, Panel A) and more developed ethical climates ($\beta = 0.287$, $t = 25.359$, $p < 0.01$; Table 7, Panel B). These patterns reveal that WBP operates not as a stand-alone

compliance device but as part of a broader governance ecosystem that cultivates moral awareness and dialogue. Within the normative pillar of institutional theory, this signifies that formal protections gain traction when embedded within organisational cultures that value transparency and shared responsibility (Kaptein, 2011a; Treviño et al., 2014). Whistleblowing protection thus becomes a conduit through which ethical norms translate into concrete governance practices.

Structural Moderation

The analyses in Table 8 test whether institutional and structural factors condition the efficacy of WBP and help assess whether formal whistleblowing policies are more consequential in governance environments where implementation is more likely to be credible (MacLean & Behnam, 2010; Meyer & Rowan, 1977; Scott, 2014, 2017). As shown in Panel A, the negative association between WBP and workplace injuries is stronger in the absence of CEO duality ($\beta = -3.494$, $t = -2.822$, $p < 0.01$), highlighting the importance of internal checks on managerial power (Kaptein, 2011a, 2011b; Treviño et al., 2014). Panel B reveals that the relationship remains stronger in countries with mandatory ESG disclosure requirements ($\beta = -2.255$, $t = -3.651$, $p < 0.01$), implying that external transparency reinforces internal accountability (Brown et al., 2014; Treviño et al., 2014). Finally, Panel C shows that firms in jurisdictions with stricter Employment Protection Legislation (EPL = 1)

Table 8 Cross-sectional analysis

Variables	INJ/HRS					
	CEO power		ESG disclosure		Employment protection legislation	
	Duality =1	Duality =0	Mandatory ESG	Non-mandatory ESG	High EPL=1	Low EPL=0
<i>WBP</i>	(1)	(2)	(3)	(4)	(5)	(6)
	− 3.494***	− 1.087**	− 2.255***	− 0.304	− 3.241***	− 0.362
	(− 2.822)	(− 2.539)	(− 3.651)	(− 0.658)	(− 4.640)	(− 0.376)
<i>Baseline controls</i>	Yes	Yes	Yes	Yes	Yes	Yes
<i>Constant</i>	− 8.624	6.172	− 19.889	0.011	− 40.961	− 22.145
	(− 0.403)	(0.729)	(− 1.470)	(0.001)	(− 1.635)	(− 0.472)
<i>Year fixed effect</i>	Yes	Yes	Yes	Yes	Yes	Yes
<i>Industry fixed effect</i>	Yes	Yes	Yes	Yes	Yes	Yes
<i>Country fixed effect</i>	Yes	Yes	Yes	Yes	Yes	Yes
<i>Observations</i>	4493	13,806	9575	8643	4081	4149
<i>Adjusted R²</i>	0.166	0.153	0.149	0.180	0.219	0.140

Table 8 reports the results of various cross-sectional tests for the relationship between whistleblowing protection and workplace safety, which is conditional on CEO duality (column (1)–(2)), ESG disclosure mandate (column (3)–(4)), and Employment Protection Legislation (column (5) and (6)). We present t-statistics in parentheses with standard errors adjusted for clustering by firm

Superscripts ***, **, and * depict significance at the 1%, 5%, and 10% levels, respectively. See Table S2 for variable definitions

maintain a significant effect ($\beta = -3.241$, $t = -4.640$, $p < 0.01$), indicating complementarity between labour protection and whistleblowing systems (Brown et al., 2014; Miceli et al., 2008; OECD, 2023). These results highlight the interaction between the regulative and normative pillars, as legal and organisational safeguards mutually strengthen voice and accountability (Kaptein, 2011a, 2011b; Scott, 2014, 2017). They also speak to the policy-practice gap: formal whistleblowing protection is more strongly associated with improved safety outcomes when managerial discretion is constrained, disclosure expectations are higher, and labour institutions provide complementary employee safeguards (MacLean & Behnam, 2010; Meyer & Rowan, 1977). In this sense, the empirical pattern is consistent with a moral governance interpretation in which organisational and national institutions jointly support the credible implementation of employee voice mechanisms (Freeman, 1984; Scott, 2014, 2017; Treviño et al., 2014).

Implementation Environment and Policy-Practice Decoupling

To further address the possibility that formal whistleblowing policies may be decoupled from actual organisational practice, we conduct additional split-sample analyses based on firms' broader ESG governance environments (MacLean & Behnam, 2010; Meyer & Rowan, 1977). The underlying logic is that whistleblowing protection is more likely to be substantively implemented where firms operate in stronger transparency and accountability environments (Kaptein, 2011a, 2011b; Treviño et al., 2014). We therefore partition the sample using median splits based on ESG Disclosure Quality and ESG Performance.

The results, reported in Online Appendix Table OA[I], show that the negative association between WBP and workplace injury rates is concentrated among firms with stronger ESG environments. In the high-ESG-disclosure-quality subsample, WBP is significantly and negatively associated with workplace injuries ($\beta = -1.967$, $t = -3.665$), whereas the effect is not statistically significant among firms with low disclosure quality. Similarly, WBP remains significantly negatively associated with injury rates in the high ESG performance subsample ($\beta = -1.738$, $t = -3.129$) but becomes insignificant in the low ESG performance subsample.

These findings are consistent with the concern that formal whistleblowing mechanisms may be ineffective when weakly embedded in organisational practice (MacLean & Behnam, 2010; Meyer & Rowan, 1977). They suggest that formal protection is more likely to translate into improved safety outcomes when supported by broader ESG governance, transparency, and accountability systems (Brown et al., 2014; Kaptein, 2011a; Treviño et al., 2014).

Put differently, whistleblowing protection appears to function less as a stand-alone policy and more as part of a wider ethical infrastructure (Kaptein, 2011a; Tenbrunsel et al., 2003; Treviño et al., 2014). This evidence provides additional support for the interpretation that the WBP–safety association is strongest where formal policies are more likely to be credibly implemented (Miceli et al., 2008; Morrison, 2014; Near & Miceli, 1995).

Addressing Endogeneity: Lewbel IV Estimation

To mitigate simultaneity bias, we estimate Lewbel's (2012) heteroskedasticity-based instrumental-variable (IV) model, which constructs internal instruments from data heteroskedasticity. As reported in Table 9, Panel A, the coefficient on WBP remains negative and statistically significant ($\beta = -2.300$, $t = -2.776$, $p < 0.01$). The Cragg–Donald Wald F (430.925) and Kleibergen–Paap rk F (121.176) values comfortably exceed conventional thresholds, confirming instrument strength. These results parallel the baseline model (Table 3) and reinforce the causal interpretation that whistleblowing protection improves workplace safety by institutionalising early detection and reporting of hazards, an operational manifestation of the regulative pillar.

Balancing and Temporal Causality: Entropy Balancing

To correct for self-selection bias, we implement Entropy Balancing (Hainmueller, 2012), reweighting control firms to match treated firms on observable characteristics. Table 9, Panel B1, shows that pre-reweighting discrepancies in firm size, leverage, and market-to-book ratio are eliminated post-reweighting, with all differences below 1%. The post-weighted regression in Panel B2 retains a significant coefficient ($\beta = -1.560$, $t = -3.552$, $p < 0.01$), mirroring baseline magnitudes.

Testing for Omitted-Variable Bias: Oster Coefficient Stability Analysis

To evaluate the possibility of unobserved heterogeneity, we apply Oster's (2019) coefficient stability test. Table 9, Panel C, shows that across nested specifications—ranging from the baseline ($\beta = -2.045$, $p < 0.01$) to full controls ($\beta = -1.531$, $p < 0.01$)—the coefficient remains stable, while the adjusted R^2 rises slightly (from 0.131 to 0.152). The calculated δ -values (4.337–12.264) far exceed the benchmark of 1, implying that omitted factors would need to be several times as influential as the included covariates to nullify the observed relationship. This stability strongly supports the robustness of the WBP–safety association.

Table 9 Endogeneity checks

Panel A: Lewel instrumental variable analysis

VARIABLES	INJ/HRS
<i>WBP</i>	− 2.300*** (− 2.776)
<i>Baseline Controls</i>	Yes
Year fixed effect	Yes
Industry fixed effect	Yes
Country fixed effect	Yes
Cragg-Donald Wald F statistic	430.925
Kleibergen-Paap rk Wald F statistic	121.176
10% maximal IV size	50.39
Observations	18,303
Adjusted R^2	0.020

Panel B1: Entropy balancing

Variable	Treat			Control		
	Mean	Variance	Skewness	Mean	Variance	Skewness
<i>Before weighing</i>						
<i>ROA</i>	0.049	0.005	− 1.259	0.053	0.007	− 1.301
<i>SIZE</i>	22.780	2.165	0.116	22.510	2.501	0.034
<i>LEV</i>	0.275	0.026	0.481	0.264	0.028	0.493
<i>MTB</i>	1.297	3.735	6.784	1.605	6.413	5.367
<i>CASH HD</i>	0.022	0.002	3.198	0.024	0.003	3.228
<i>CAPX</i>	0.043	0.002	1.517	0.044	0.002	1.507
<i>DIV</i>	− 0.024	0.001	− 2.589	− 0.024	0.001	− 2.591
<i>TANG</i>	0.303	0.054	0.762	0.318	0.061	0.732
<i>TURNOVER</i>	0.753	0.295	1.674	0.728	0.281	1.787
<i>CORP GOV COM</i>	0.581	0.244	− 0.329	0.485	0.250	0.058
<i>BOARD SIZE</i>	10.500	8.872	0.669	10.230	9.689	0.934
<i>GDP GROWTH</i>	1.432	9.021	− 0.302	1.783	9.201	− 0.242
<i>LNGDP</i>	10.470	0.833	− 1.723	10.400	1.057	− 1.480
<i>INFLATION</i>	3.031	20.590	9.669	3.773	22.880	8.776
<i>WGI</i>	0.493	2.612	− 1.192	0.389	2.726	− 1.011
<i>After weighing</i>						
<i>ROA</i>	0.049	0.005	− 1.259	0.049	0.006	− 1.513
<i>SIZE</i>	22.780	2.165	0.116	22.780	2.363	0.071
<i>LEV</i>	0.275	0.0257	0.481	0.275	0.027	0.439
<i>MTB</i>	1.297	3.735	6.784	1.298	2.757	5.229
<i>CASH HD</i>	0.022	0.002	3.198	0.0216	0.002	3.386
<i>CAPX</i>	0.043	0.002	1.517	0.043	0.002	1.516
<i>DIV</i>	− 0.024	0.001	− 2.589	− 0.024	0.001	− 2.576
<i>TANG</i>	0.303	0.054	0.762	0.303	0.058	0.804
<i>TURNOVER</i>	0.753	0.295	1.674	0.753	0.321	1.840
<i>CORP GOV COM</i>	0.581	0.244	− 0.329	0.581	0.243	− 0.328
<i>BOARD SIZE</i>	10.500	8.872	0.669	10.500	9.666	0.891
<i>GDP GROWTH</i>	1.432	9.021	− 0.302	1.433	9.237	− 0.350
<i>LNGDP</i>	10.470	0.833	− 1.723	10.470	0.895	− 1.652
<i>INFLATION</i>	3.031	20.590	9.669	3.033	6.315	2.104
<i>WGI</i>	0.493	2.612	− 1.192	0.493	2.477	− 1.157

Table 9 (continued)

Panel B2: Regression estimate after entropy balancing

VARIABLES	INJ/HRS		
<i>WBP</i>	– 1.560*** (– 3.552)		
<i>Baseline Controls</i>	Yes		
Constant	– 3.012 (– 0.402)		
Year Fixed Effect	Yes		
Industry Fixed Effect	Yes		
Country Fixed Effect	Yes		
Observations	18,303		
Adjusted R^2	0.152		
Panel C: Oster test of coefficient stability			
VARIABLES	INJ/HRS		
	(1)	(2)	(3)
<i>WBP</i>	– 2.045*** (– 4.644)	– 1.492*** (– 3.486)	– 1.531*** (– 3.556)
<i>Firm Controls</i>	No	Yes	Yes
<i>Country Controls</i>	No	No	Yes
Constant	7.616*** (28.587)	20.052*** (12.131)	– 2.967 (– 0.397)
Year fixed effect	Yes	Yes	Yes
Industry fixed effect	Yes	Yes	Yes
Country fixed effect	Yes	Yes	Yes
Observations	18,303	18,303	18,303
Adjusted R^2	0.131	0.151	0.152
Delta	12.264	4.337	4.473

Table 9 reports the results for addressing endogeneity concerns. Panel A addresses endogeneity concerns using instrumental-variable estimation. Panel B report the results for entropy regression. Panel C presents the results of the Oster test of coefficient stability, which assesses the sensitivity of coefficients to omitted-variable bias. We present t-statistics in parentheses with standard errors adjusted for clustering by firm. Superscripts ***, **, and * depict significance at the 1%, 5%, and 10% levels, respectively. See Table S2 for variable definitions.

Model Robustness and Placebo Validation

We further assess model sensitivity using alternative specifications and placebo testing. Table 10, Panel A replaces the continuous WBP variable with a binary alternative (*WBP_Alt*) and confirms a consistent negative coefficient ($\beta = -1.111$, $t = -3.080$, $p < 0.01$). In Panel B, sequential exclusion of large-sample countries (U.S., Japan, Canada, U.K.) yields coefficients ranging from -1.187 to -1.810 ($p < 0.01$), showing that no single national context drives the results. Table 10, Panel C shows that whistleblowing protection is negatively and significantly associated with injury rates at one-, two-, and three-year lags. The effect remains stable and highly significant at $t-1$ ($\beta = -1.494$, $t = -3.902$), $t-2$ ($\beta = -1.288$, $t = -3.523$), and $t-3$ ($\beta = -1.208$, $t = -3.374$). These results indicate that

whistleblowing protection contributes to sustained improvements in workplace safety rather than short-term reporting effects. The persistence of lagged effects also mitigates concerns about reverse causality, supporting a directional interpretation in which whistleblowing protection precedes reductions in injury rates. Panel D, which clusters standard errors simultaneously by Country $\times$ Year and Industry $\times$ Year, again returns stable estimates ($\beta = -1.531$, $t = -3.2$).

Finally, Panel E presents a placebo test based on 1000 pseudo-WBP iterations. The median simulated coefficient ($\beta = -0.008$, $t = -0.049$) is indistinguishable from zero, while the observed WBP coefficient ($\beta = -1.531$, $t = -3.556$) falls outside the 99% confidence range of the simulated distribution. Together, Panels A–E confirm that the WBP effect is not a modelling artefact or random outcome but

Table 10 Robustness check

Panel A: Alternative variable measurement

VARIABLES	INJ/HRS	Total INJ RATE
	(1)	(2)
<i>WBP Alt</i>	– 1.111*** (– 3.080)	
<i>WBP</i>		– 1.083** (– 2.413)
<i>Baseline Controls</i>	Yes	Yes
Constant	– 5.471 (– 0.710)	– 2.405 (– 0.276)
Year fixed effect	Yes	Yes
Industry fixed effect	Yes	Yes
Country fixed effect	Yes	Yes
Observations	17,335	15,567
Adjusted R^2	0.156	0.154

Panel B: Excluding countries with larger observations

	Non-USA	Non-Japan	Non-Canada	No-UK
VARIABLES	(1)	(2)	(3)	(4)
<i>WBP</i>	– 1.469*** (– 3.119)	– 1.810*** (– 3.739)	– 1.355*** (– 3.320)	– 1.187*** (– 2.733)
<i>Baseline Controls</i>	Yes	Yes	Yes	Yes
Constant	15.385* (1.746)	– 24.396*** (– 2.793)	– 0.674 (– 0.091)	– 6.016 (– 0.788)
Year fixed effect	Yes	Yes	Yes	Yes
Industry fixed effect	Yes	Yes	Yes	Yes
Country fixed effect	Yes	Yes	Yes	Yes
Observations	12,748	16,995	17,182	17,255
Adjusted R^2	0.149	0.147	0.157	0.150

Panel C: Lagged effect: whistleblowing protection system

VARIABLES	INJ/HRS		
	(1)	(2)	(3)
WBP_{t-1}	– 1.494*** (– 3.902)		
WBP_{t-2}		– 1.288*** (– 3.523)	
WBP_{t-3}			– 1.208*** (– 3.374)
<i>Baseline Controls</i>	Yes	Yes	Yes
Constant	– 11.155 (– 1.450)	– 14.715* (– 1.746)	– 14.679* (– 1.655)
Year fixed effect	Yes	Yes	Yes
Industry fixed effect	Yes	Yes	Yes
Country fixed effect	Yes	Yes	Yes
Observations	16,974	15,570	14,325
Adjusted R^2	0.162	0.161	0.160

Table 10 (continued)

Panel D: Standard error clustering

VARIABLES	INJ/HRS	
	<i>Country×Year</i>	<i>Industry×Year</i>
	(1)	(2)
<i>WBP</i>	− 1.531*** (− 3.163)	− 1.531*** (− 3.324)
<i>Baseline Controls</i>	Yes	Yes
Constant	− 2.967 (− 0.312)	− 2.967 (− 0.355)
Year fixed effect	Yes	Yes
Industry fixed effect	Yes	Yes
Country fixed effect	Yes	Yes
Observations	18,303	18,303
Adjusted R^2	0.152	0.152

Panel E: Placebo test (1000 iterations)

Pseudo-WBP		
Percentile	Coef	t-stat
Minimum	− 0.822	− 5.521
1%	− 0.627	− 4.138
5%	− 0.452	− 2.977
50% (Median)	− 0.008	− 0.049
95%	0.437	2.643
99%	0.650	3.892
100% (maximum)	0.936	5.539
Coefficient in main model (Table 3, Column 3)	− 1.531	(− 3.556)

Table 10 presents the robustness checks for the main findings. Panel A reports the results that address measurement-error concerns by using alternative measures. Panel B presents results after excluding countries with extensive observations. Panel C provides results of the lagged effect of whistleblowing system. Panel D provides results with alternative standard error estimations. Panel E shows the results for the placebo test. We present t-statistics in parentheses

Superscripts ***, **, and * depict significance at the 1%, 5%, and 10% levels, respectively. See Table S2 for variable definition

a consistent pattern robust to alternative formulations and clustering schemes.

Disaggregating Whistleblowing Protection

Table 11, Panel A, demonstrates that different forms of whistleblowing protection exert distinct effects on workplace safety. We disaggregate national whistleblowing protection into three institutional pillars: anti-retaliation protections, confidential reporting mechanisms, and anonymous complaint systems² (Vandekerckhove, 2006; Worth, 2013). Our composite Whistleblower Protection Score (WBP_CS, range 0–280) aggregates these dimensions to capture the overall strength of protection. Column (1) establishes that

WBP_CS significantly reduces injury rates ($\beta = -0.012$, $t = -3.878$, $p < 0.01$). Columns (2) – (4) reveal meaningful variations across protection types. Confidential reporting mechanisms exhibit the strongest effect ($\beta = -0.060$, $t = -6.074$)—approximately 2.4 times larger than anti-retaliation protections, suggesting that systems preserving whistleblower identity while enabling organisational accountability are particularly effective in translating ethical concerns into corrective action (Miceli et al., 2008; Near & Miceli, 1995).

Confidential reporting balances protection and credibility, facilitating thorough hazard investigation while mitigating fears of retaliation. This aligns with institutional theory's emphasis on procedural legitimacy, as employees report more willingly when they trust concerns will be addressed without exposure (Latan et al., 2023). Likewise, anti-retaliation protections significantly reduce injuries ($\beta = -0.025$, $t = -2.790$), demonstrating that credible legal enforcement

² See Table S3a, S3b and S3c for detailed variable construction and definitions.

Table 11 Whistleblowing protection under country laws

Panel A: Whistleblowing protection component analysis

VARIABLES	INJ/HRS			
	(1)	(2)	(3)	(4)
<i>WBP_CS</i>	– 0.012*** (– 3.878)			
<i>ANTI-RETALIATIONS</i>		– 0.025*** (– 2.790)		
<i>CONFIDENTIAL REPORTINGS</i>			– 0.060*** (– 6.074)	
<i>ANONYMOUS SYSTEMS</i>				– 0.026*** (– 2.848)
<i>Baseline Controls</i>	Yes	Yes	Yes	Yes
Constant	25.430*** (7.198)	24.482*** (7.010)	27.493*** (7.725)	24.395*** (6.902)
Year fixed effect	Yes	Yes	Yes	Yes
Industry fixed effect	Yes	Yes	Yes	Yes
Country fixed effect	Yes	Yes	Yes	Yes
Observations	15,668	15,668	15,668	15,668
Adjusted R^2	0.104	0.103	0.105	0.103

Panel B1: National whistleblowing protection strength based on european countries^a

Country	Assessment
France	Strong protection
United Kingdom	Strong protection
Ireland	Strong protection
Italy	Strong protection
Netherlands	Strong protection
Hungary	Medium protection
Sweden	Medium protection
Austria	Weak protection
Belgium	Weak protection
Cyprus	Weak protection
Czech Republic	Weak protection
Germany	Weak protection
Denmark	Weak protection
Spain	Weak protection
Finland	Weak protection
Greece	Weak protection
Luxembourg	Weak protection
Poland	Weak protection
Portugal	Weak protection

Panel B2: Analysis based on national whistleblowing protection strength

VARIABLES	INJ/HRS		
	Strong protection (1)	Medium protection (2)	Weak protection (3)
<i>WBP</i>	– 3.984*** (– 3.008)	– 4.829* (– 1.720)	– 0.536 (– 0.571)
<i>Baseline Controls</i>	Yes	Yes	Yes

Table 11 (continued)

Panel B2: Analysis based on national whistleblowing protection strength

VARIABLES	INJ/HRS		
Constant	1.797 (0.069)	– 51.828 (– 0.632)	– 195.535** (– 2.019)
Year fixed effect	Yes	Yes	Yes
Industry fixed effect	Yes	Yes	Yes
Country fixed effect	Yes	Yes	Yes
Observations	2377	557	1488
Adjusted R^2	0.156	0.175	0.216

Table 11 presents additional results of the effect of whistleblowing protection systems on workplace safety based on scores created from country laws. Panel A: Column (1) reports the results for the total whistleblowing protection system score at the country level. Column (2) shows the effect of anti-retaliation provisions, Column (3) presents the effect of confidential reporting systems, and Column (4) reports the effect of anonymous reporting systems on workplace safety. Panel B: Reports results based on European countries' laws. Panel B1 shows the distribution and level of effectiveness of whistleblowing protection laws by country, while Panel B2 presents the effect of the strength of whistleblowing protection on workplace safety. We present t-statistics in parentheses.

^aSee: Mapping the EU on Legal Whistleblower Protection Assessment before the Implementation of the EU Whistleblowing Directive at <https://www.transparency.nl/wp-content/uploads/2020/06/Mapping-the-EU-on-Whistleblower-Protection-TI-NL.pdf>

Superscripts ***, **, and * depict significance at the 1%, 5%, and 10% levels, respectively. See Table S2 for variable definition

encourages reporting of safety violations that require personal attribution (Callahan & Dworkin, 1992; Lewis, 2011). These protections lower perceived costs of speaking up and strengthen the regulative pillar of whistleblowing systems (Vandekerckhove & Lewis, 2012).

Similarly, anonymous reporting systems show comparable effects ($\beta = -0.026$, $t = -2.848$), suggesting anonymity lowers reporting thresholds, particularly in hierarchical or high power distance contexts (Park et al., 2008; Zhang et al., 2009), but proves less effective than confidential mechanisms for sustained organisational learning (Kaptein, 2011b). The similar magnitude to anti-retaliation protections indicates that anonymity addresses social costs while legal safeguards reduce formal career risks. Collectively, these findings demonstrate that legal distinctions in whistleblowing infrastructure produce tangible consequences for worker well-being (Near & Miceli, 2016).

Next, we examine the impact of country-level whistleblowing protection laws on workplace safety. In doing so, we use a sample of European countries and classify these countries into strong, medium, and weak protection regimes based on the scope, enforcement, and institutionalisation of whistleblowing laws (Transparency International Netherlands, 2020). Panel B1 of Table 11 shows five countries (France, UK, Ireland, Italy, Netherlands) with strong protection, two (Hungary, Sweden) with medium protection, and twelve with weak frameworks.

Panel B2 reveals striking heterogeneity across legal regimes. In strong protection countries, whistleblowing protection substantially reduces injury rates ($\beta = -3.984$, $t = -3.008$), suggesting robust legal frameworks strengthen safety benefits through credible enforcement

and institutional legitimacy (Brown et al., 2014; Loyens & Vandekerckhove, 2018). Medium-protection countries show comparable effects ($\beta = -4.829$, $t = -1.720$), indicating that moderately developed frameworks can facilitate safety improvements (Culiberg & Mihelic, 2017). Critically, countries with weak protection show no significant association ($\beta = -0.536$, $p > 0.10$), despite being the largest subsample. This demonstrates that formal whistleblowing systems without credible legal backing fail to translate ethical voice into organisational action (Mannion et al., 2018; Rehg et al., 2008).

These findings support institutional theory's prediction that formal structures require legitimacy and enforcement to shape behaviour (Mesmer-Magnus & Viswesvaran, 2005). Whistleblowing protection is associated with improved workplace safety only when embedded in credible legal regimes, suggesting threshold effects: marginal improvements to weak frameworks yield minimal benefits until critical institutional elements are established (Dworkin & Baucus, 1998).

The disaggregated results should also be interpreted with the policy-practice distinction in mind (MacLean & Behnam, 2010; Meyer & Rowan, 1977). Anti-retaliation protections, confidential reporting mechanisms, and anonymous complaint systems represent formal institutional conditions that can make reporting safer and more credible, but their presence does not guarantee that employees trust or use them (Miceli et al., 2008; Near & Miceli, 1995; Vandekerckhove & Lewis, 2012). For example, an anonymous system may exist but be distrusted if employees believe that their identity can still be inferred, while anti-retaliation rules may be weakened by informal career penalties or social exclusion

Table 12 Further analysis

Panel A: The role of whistleblowing system on health and safety training, policy adoption and corporate governance

VARIABLES	Health and safety training	Health and safety policy	Corporate governance
	(1)	(2)	(3)
<i>WBP</i>	0.047*** (4.107)	0.042*** (5.562)	0.060*** (8.573)
<i>Baseline Controls</i>	Yes	Yes	Yes
Constant	− 0.082 (− 0.362)	0.459*** (3.412)	− 0.431*** (− 2.777)
Year Fixed Effect	Yes	Yes	Yes
Industry Fixed Effect	Yes	Yes	Yes
Country Fixed Effect	Yes	Yes	Yes
Observations	18,283	18,303	18,303
Adjusted R^2	0.122	0.092	0.148

Panel B: The Dodd-Frank Act (DFA)– 2010 on Workplace Safety – DiD Approach

VARIABLES	INJM_HRS
<i>TREAT</i> × <i>POST</i>	− 0.054** (− 2.241)
<i>POST</i>	0.015 (0.840)
<i>TREAT</i>	− 0.007 (− 0.216)
<i>ROA</i>	− 0.150 (− 1.586)
<i>SIZE</i>	0.031*** (3.373)
<i>LEV</i>	− 0.118* (− 1.738)
<i>MTB</i>	0.010** (2.354)
<i>CASH HD</i>	− 0.134 (− 0.433)
<i>CAPX</i>	− 0.265 (− 1.123)
<i>DIV</i>	0.025 (0.082)
<i>TANG</i>	0.052 (1.024)
<i>TURNOVER</i>	− 0.013 (− 0.657)
<i>CORP GOV BCM</i>	0.050* (1.935)
<i>BOARD SIZE</i>	− 0.004 (− 1.157)
<i>GDP GROWTH</i>	0.003 (1.618)
<i>LNGDP</i>	0.036 (0.562)
<i>INFLATION</i>	0.012*** (3.376)

Table 12 (continued)

Panel B: The Dodd-Frank Act (DFA)–2010 on Workplace Safety – DiD Approach

VARIABLES	INJM_HRS
<i>WGI</i>	– 0.029 (– 1.410)
Constant	– 0.581 (– 0.910)
Observations	2965
Adjusted R^2	0.057

Table 12, Panel B, reports Difference-in-Differences (DiD) estimates examining the impact of the Dodd-Frank Act on workplace safety. The treatment group consists of U.S. firms, while the control group comprises firms headquartered in European countries. POST equals one for fiscal years 2011 and later and zero otherwise. TREAT equals one for U.S. firms and zero for European firms. The coefficient on TREAT $\times$ POST represents the DiD estimator and captures the differential change in workplace injury hours among U.S. firms relative to European firms following the enactment of the Dodd-Frank Act. All variables are defined in Online Appendix A. Robust t-statistics clustered at the firm level are reported in parentheses

*, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively

(Mesmer-Magnus & Viswesvaran, 2005; Miceli et al., 2008; Morrison, 2014; Morrison & Milliken, 2000). The stronger effects of confidential reporting mechanisms are therefore best understood as evidence that more developed formal infrastructures are associated with better reported safety outcomes, rather than as definitive evidence that implementation is uniformly effective across organisations (Kaptein, 2011a; Scott, 2014, 2017; Treviño et al., 2014).

Institutional Validation Through Regulatory Reform: The Role of the Dodd-Frank Act

To further anchor our firm-level analyses within a broader institutional framework, Table 12 investigates *how* national-level regulatory shifts shape corporate behaviour and safety outcomes. Specifically, Panel A examines whether the presence of whistleblowing protections influences complementary internal mechanisms, namely, (1) health and safety training intensity, (2) adoption of health and safety policies, and (3) overall corporate governance quality.

As reported in Table 12, Panel A, firms with stronger whistleblowing protections demonstrate significantly higher engagement in employee training on occupational health and safety ($\beta = 0.219$, $t = 3.642$, $p < 0.01$) and a greater likelihood of adopting formal health and safety policies ($\beta = 0.157$, $t = 2.971$, $p < 0.01$). Moreover, the association between WBP and corporate governance quality is both positive and robust ($\beta = 0.261$, $t = 4.412$, $p < 0.01$). These findings suggest that whistleblowing systems operate as catalysts for broader governance maturity, with organisations that legitimise employee voice also tending to institutionalise preventive training and formal health policies. Within the institutional theory framework, these results reinforce the normative and regulative pillars; ethical norms of care and

accountability are operationalised through formal structures that codify safe conduct and managerial responsibility.

To further assess the robustness of our findings and mitigate potential endogeneity concerns, we exploit the enactment of the Dodd-Frank Act as an exogenous regulatory shock and estimate a conventional Difference-in-Differences (DiD) model. The treatment group comprises U.S. firms, which were directly affected by the legislation, while firms headquartered in European countries serve as the control group. The post-treatment period began in 2011, following the implementation of the Dodd-Frank Act. The results are reported in Table 12, Panel B. The coefficient on the interaction term (Treat $\times$ Post) is negative and statistically significant ($\beta = -0.054$, $p < 0.05$), indicating that workplace injury rates declined more among U.S. firms than among comparable European firms after the Dodd-Frank Act's introduction. The estimated effect is also economically meaningful, suggesting that the governance reforms introduced under the Act were associated with a substantive improvement in employee safety among affected firms.

Notably, neither the Treat nor the Post coefficient is statistically significant. This finding indicates that the estimated effect is unlikely to reflect pre-existing differences between U.S. and European firms or common time trends affecting both groups after 2010. Instead, the significant interaction term isolates the incremental improvement in workplace safety experienced by U.S. firms following the regulatory reform, thus strengthening the causal interpretation of our results.

These findings are consistent with the argument that the Dodd-Frank Act enhanced corporate governance by strengthening disclosure requirements, board oversight, and organisational accountability. In turn, these governance improvements appear to have encouraged more effective

risk identification and management, yielding benefits that extend beyond financial reporting to include safer working environments and improved employee welfare. Overall, the DiD analysis reinforces our main findings by providing additional evidence that governance-related regulatory reforms can generate meaningful improvements in workplace safety.

In theoretical terms, Panel A captures how internal governance mechanisms evolve in response to firm-level adoption of whistleblowing systems, while Panel B demonstrates how external regulatory interventions extend and legitimise these mechanisms across the wider institutional field (DiMaggio & Powell, 1983; Scott, 2014, 2017). Together, they provide evidence that formal legal reforms, such as the Dodd-Frank Act, translate normative commitments into enforceable governance structures, thereby enhancing organisational learning and employee well-being (Detert & Edmondson, 2011; Miceli et al., 2008; Morrison, 2014; Near & Miceli, 1995). The ethical significance of this finding lies in showing that national regulation can support moral governance inside organisations (De George, 2005; Freeman, 1984; Treviño et al., 2014). When legal reforms strengthen anti-retaliation protection and formalise reporting rights, they do not merely increase compliance pressure; they help create the institutional conditions under which employees can speak up without bearing disproportionate personal risk (Brown et al., 2014; Miceli et al., 2008; Near & Miceli, 1995; OECD, 2016). These results therefore affirm that robust whistleblowing protection not only deters misconduct but also nurtures a culture of prevention, accountability, and safety at the intersection of organisational ethics and national regulation (Gong et al., 2023; Haga et al., 2024; Kaptein, 2011a, 2011b; Scott, 2014, 2017).

Conclusion

Revisiting the Ethical Role of Whistleblowing Protection

This study set out to examine a fundamental yet underexplored question in business ethics: can whistleblowing protection save lives by improving workplace safety? While whistleblowing systems are widely recognised as tools for exposing fraud and financial misconduct, their potential role in preventing operational harm and protecting employee welfare has received far less scholarly attention. Using a large international panel of 18,303 firm-year observations from 60 countries between 2003 and 2023, this study provides systematic evidence that whistleblowing protection is an important component of ethical governance that can improve workplace safety outcomes.

Across multiple empirical specifications and robustness checks, the results consistently show that stronger whistleblowing protections are associated with significantly lower workplace injury rates. Economically, the findings suggest that improvements in whistleblowing protection correspond to approximately a 23 per cent reduction in workplace injuries relative to the sample mean. This relationship persists after accounting for firm characteristics, governance structures, and country-level institutional environments, as well as after addressing endogeneity through instrumental variables, entropy balancing, and difference-in-differences analyses. Collectively, these findings indicate that whistleblowing protection is not merely a symbolic governance mechanism adopted for legitimacy; rather, it serves as an operational safeguard that enables organisations to identify and address safety risks before they escalate into accidents.

At the same time, the study demonstrates that the effectiveness of whistleblowing protection is context-dependent rather than universal. The safety-enhancing effects of whistleblowing systems are strengthened in firms where boards actively oversee health and safety issues, highlighting the importance of internal governance support. Likewise, whistleblowing protection is more effective in countries characterised by strong regulatory quality, rule of law, and government effectiveness. Conversely, hierarchical cultural environments characterised by high power distance weaken the relationship between whistleblowing protection and workplace safety, suggesting that employees may remain reluctant to challenge authority even when formal protections exist. These patterns reveal that whistleblowing protection operates within a broader institutional ecosystem in which legal safeguards, organisational governance, and cultural norms jointly shape ethical behaviour.

These contextual differences are ethically consequential. Our findings further suggest that organisations operating in high power distance environments face a heightened ethical responsibility. The challenge is not merely that employees may be less likely to report wrongdoing, but that cultural norms may restrict their practical ability to exercise moral agency by acting on ethical judgments they have already formed. In such settings, formal whistleblowing protections are necessary but insufficient. Organisations have a stronger duty of care to design reporting systems that actively reduce cultural barriers to speaking up while safeguarding employees' fundamental rights to voice, dignity, and protection from retaliation. Ethical governance therefore requires more than encouraging employee voice; it requires ensuring that employees are genuinely able to fulfil their moral responsibility to prevent foreseeable harm.

Theoretical Contributions

This study contributes to business ethics, whistleblowing, and institutional theory in several ways. First, it extends the whistleblowing literature beyond its dominant concern with fraud detection, corruption, and ex post exposure of misconduct. Prior research has shown that whistleblowers play an important role in uncovering financial misreporting, fraud, and regulatory violations (Dyck et al., 2010; Call et al., 2018; Stubben & Welch, 2020). The present study broadens this perspective by showing that whistleblowing protection can also operate ex ante, as a preventive governance mechanism that reduces operational harm. This matters because it expands the moral and organisational significance of whistleblowing: protected voice is not only relevant to shareholder protection, regulatory compliance, or anti-corruption efforts, but also to employee welfare and the prevention of physical harm.

Second, the study offers a more explicit account of the micro-level process through which ethical awareness becomes an organisational outcome. Prior research has shown that ethical climate, organisational culture, institutional context, and voice environments influence employees' willingness to report concerns (Kaptein, 2011a, 2011b; Latan et al., 2019, 2023; Morrison, 2014; Treviño et al., 2014). Our contribution is to theorise the next steps in that chain. Employees first recognise a safety-related ethical issue, then assess the personal and social costs of speaking up, decide whether reporting is feasible and legitimate, and only then can their concerns enter organisational channels capable of escalation, investigation, and corrective action. By specifying this sequence, the paper connects individual ethical judgement to firm-level safety outcomes more directly than studies that stop at intentions, perceptions, or general ethical climate (Rest, 1986; Treviño, 1986; Jones, 1991; Detert & Edmondson, 2011; Morrison, 2014).

The study also strengthens the normative foundation of ethical infrastructure research by showing that whistleblowing protection is not merely useful for improving information flows, but morally important because it protects employees' capacity to act as ethical agents. Employees who report unsafe practices often do so to prevent harm to colleagues and other stakeholders. Without protection, organisations place these employees in an ethically untenable position: they depend on employees' moral awareness while exposing them to retaliation for acting on that awareness. By theorising whistleblowing protection as a mechanism that safeguards moral agency, the study connects institutional theory to broader principles of stakeholder care, duty of care, and ethical governance.

Third, the paper advances institutional theory in business ethics by clarifying how the three institutional pillars interact rather than merely co-exist. The regulative pillar reduces

the formal cost of reporting through anti-retaliation rules and protected disclosure mechanisms; the normative pillar determines whether reporting is encouraged and acted upon inside the organisation; and the cultural-cognitive pillar shapes whether speaking up is interpreted as responsible participation or improper dissent (Hofstede, 2001; Kaptein, 2011a; Kwon & Farndale, 2020; North, 1990; Park et al., 2008; Scott, 2014, 2017). Our results suggest that these pillars are complementary but not substitutable. Formal protection without normative support may produce symbolic compliance; normative support without credible legal protection may leave employees too exposed to act; and even when both are present, cultural-cognitive resistance can still suppress voice. This conditional and non-additive understanding moves the theoretical contribution beyond the more incremental proposition that "institutional context matters" (MacLean & Behnam, 2010; Meyer & Rowan, 1977; Scott, 2014, 2017).

The study also contributes to understanding moral governance by showing how causal mechanisms at different institutional levels are connected to ethical principles. At the organisational level, board oversight, ethical culture, and responsive reporting systems matter because they determine whether employees' moral concerns are respected, protected, and acted upon. At the national level, the rule of law, regulatory quality, and government effectiveness matter because they make the rights to voice and non-retaliation credible beyond the firm's boundaries. The multi-level framework, therefore, does not treat institutions merely as empirical moderators. It shows how ethical infrastructure is jointly produced by organisational and national conditions that support employee voice, protect moral agency, and enable the prevention of foreseeable harm.

The study also clarifies why cultural and multi-level institutions are ethically significant rather than merely practically influential. Cultural-cognitive norms such as power distance affect more than employees' willingness to report; they shape whether employees can exercise moral agency without violating expectations of deference, loyalty, or social harmony. By showing that hierarchical cultural conditions weaken the safety benefits of whistleblowing protection, the study highlights an important ethical problem: employees may recognise preventable harm but lack a socially legitimate route for raising concerns. This extends institutional theory in business ethics by linking cultural-cognitive constraints to organisational duties of care, employee rights to voice and protection, and the broader ethical requirement to prevent foreseeable harm.

Fourth, the study contributes to ethical infrastructure research by showing that whistleblowing protection should be understood not merely as one element in a broader ethics system, but as a transmission mechanism through which ethical commitments are converted into concrete

organisational outcomes. Ethical infrastructure scholarship has long argued that codes, leadership systems, ethical cultures, and reporting arrangements shape conduct inside organisations (Kaptein, 2011a; Tenbrunsel et al., 2003; Treviño et al., 2014). We extend this literature by showing how one component of that infrastructure—whistleblowing protection—supports the movement of safety-relevant information from employees to organisational decision-makers, thereby enabling organisational learning and risk prevention. This distinction also differentiates our study from the growing archival literature linking governance mechanisms to workplace safety outcomes (e.g. Gong et al., 2023; Haga et al., 2024; Son et al., 2025). Those studies demonstrate that governance characteristics such as board oversight, audit quality, and broader governance systems are associated with improved workplace safety, but they largely treat governance as an organisational attribute that influences safety performance. Our study complements and extends this literature by identifying whistleblowing protection as a distinct behavioural governance mechanism operating within the broader governance-safety nexus. Rather than asking whether governance matters for safety, we explain *how* governance improves safety, highlighting the notion that whistleblowing protection enables employees to communicate otherwise hidden safety risks, allowing organisations to detect hazards earlier, learn from employee voice, and intervene before operational failures escalate into workplace injuries. By theorising whistleblowing protection as the mechanism through which safety-relevant information is transmitted from frontline employees to organisational decision-makers, our study provides a behavioural explanation that complements the structural governance perspective developed in prior archival research.

At the same time, the study clarifies an important distinction within ethical infrastructure research between formal adoption and substantive implementation. Whistleblowing policies, reporting channels, and anti-retaliation rules may signal ethical commitment, but their moral and practical value depends on whether employees experience them as credible, safe, and responsive. By showing that formal WBP is more strongly associated with safety outcomes under supportive board oversight, stronger disclosure environments, and higher ESG governance quality, the study highlights the conditions under which formal infrastructure is more likely to become substantively meaningful. This contributes to business ethics research by foregrounding the policy practice gap as a central challenge in translating ethical infrastructure into employee protection.

Finally, the study strengthens the comparative literature on whistleblowing by showing that the effectiveness of whistleblowing protection does not travel uniformly across jurisdictions. Existing cross-national research has shown that legal systems, culture, and institutional arrangements

affect whistleblowing behaviour and reporting preferences (Latan et al., 2023; Oelrich & Erlebach, 2021; Park et al., 2008; Pittroff, 2016; Sims & Keenan, 1999; Świątek-Barylska & Braila, 2024). Our findings extend this work by showing that institutional variation also conditions whether whistleblowing protection produces tangible safety benefits. Thus, the paper offers a more globally relevant and institutionally grounded account of how ethical voice functions across organisational and national contexts.

Managerial and Policy Implications

The findings carry important implications for organisational leaders seeking to strengthen ethical governance and workplace safety. First, whistleblowing protection should be viewed not merely as a regulatory compliance requirement or a strategic governance mechanism, but as part of an organisation's ethical responsibility towards employees. Organisations often invest heavily in safety management systems, audits, and technical controls. Yet these systems depend critically on employees' ability to raise concerns when they observe unsafe practices. Frontline employees frequently possess early knowledge of operational hazards, equipment failures, or unsafe procedures. When they feel unable to report such issues, organisations lose access to crucial safety intelligence. More importantly, employees are placed in a morally unfair position: they may recognise preventable harm but lack protection to act without personal risk. Effective whistleblowing systems therefore function both as internal early-warning mechanisms and as expressions of stakeholder care, because they protect employees who help organisations fulfil their duty to prevent harm.

Second, the results highlight that whistleblowing systems are only as effective as the organisational processes that sit behind them. Reporting channels create value when firms can convert disclosure into investigation, escalation, and corrective action. This means that managers should not treat whistleblowing protection as a stand-alone hotline, policy document, or compliance symbol. They should connect it to board oversight, formal case handling, clear response protocols, health and safety governance, and feedback loops that signal to employees that reporting leads to action. Prior research on ethical culture and occupational health and safety governance similarly emphasises that formal systems become effective only when embedded within visible leadership commitment, organisational accountability, and responsive governance structures (Kaptein, 2011a, 2011b; Lornudd et al., 2021; Son et al., 2025; Treviño et al., 2014; von Thiele Schwarz & Lornudd, 2021). In practical terms, the findings imply that organisations need to manage the full chain from voice to prevention, not merely the existence of voice mechanisms. Third, multinational firms

should recognise that whistleblowing systems may operate differently across cultural contexts because the barriers are not only legal but also social and cognitive. In hierarchical settings, the main obstacle may not be the absence of a formal channel but the perception that using it is disloyal, inappropriate, or career-damaging. Prior studies show that power distance, collectivist norms, and authority relations can discourage employees from challenging superiors or reporting wrongdoing, even where reporting procedures exist (Hofstede, 2001; Kwon & Farndale, 2020; Park & Blenkinsopp, 2009; Park et al., 2008; Taylor & Curtis, 2013; Zhang et al., 2009). Firms operating across such environments may therefore need different implementation strategies, including independent reporting routes, stronger anonymity protections, explicit non-retaliation signals from senior leadership, and training that frames speaking up as a collective safety responsibility rather than an adversarial act. The managerial implication is clear: standardised whistleblowing policies may travel across borders more easily than the legitimacy of using them.

This cultural sensitivity should not be interpreted as moral relativism. Organisations should adapt whistleblowing systems to local norms, but they should not allow hierarchy, loyalty, or deference to authority to silence employees who raise well-founded concerns about preventable harm. In high power distance contexts, managers have a heightened responsibility to design reporting systems that protect employee dignity and reduce the personal costs of voice. This may require independent reporting routes, anonymous channels, explicit anti-retaliation commitments, board-level monitoring of reported cases, and training that frames speaking up as an act of care for colleagues rather than as disloyal dissent. For multinational firms, the ethical challenge is therefore to adapt implementation to cultural context while preserving a non-negotiable commitment to employee rights, stakeholder welfare, and harm prevention. Beyond identifying an important boundary condition, these findings also have normative implications. The weaker effectiveness of whistleblowing protection in high power distance settings should not be interpreted as evidence that employees are less ethically committed to preventing harm. Rather, it suggests that cultural norms may prevent employees from acting on ethical judgments they have already formed. In such environments, moral responsibility increasingly shifts from individuals towards organisations, which bear a heightened obligation to design reporting systems that reduce cultural barriers to speaking up while safeguarding employees against retaliation. Effective ethical governance therefore requires protecting not only the right to report, but also employees' practical ability to exercise moral agency.

Beyond organisational practice, the findings also carry significant implications for policymakers and regulators.

Over the past two decades, governments have increasingly introduced whistleblower protection legislation in response to high-profile corporate scandals. While such legislation is often justified as a means of strengthening financial transparency and combating corruption, the results of this study suggest that whistleblowing protections may also generate broader societal benefits by improving workplace safety. By enabling employees to report hazards and unsafe practices without fear of retaliation, whistleblowing protection laws can contribute directly to reducing occupational injuries and protecting worker welfare. In this sense, whistleblowing protection should be viewed not only as a tool of corporate accountability but also as part of a broader labour and occupational safety policy framework. The evidence from the Dodd-Frank Act further suggests that regulatory reforms can institutionalise ethical voice and strengthen organisational safety outcomes when supported by credible enforcement mechanisms.

The policy implication is not only that whistleblowing laws may improve safety outcomes, but that national institutions have an ethical role in protecting employees who act to prevent harm. Without credible legal protection, employees may be asked to bear the personal risks of disclosure while organisations and societies benefit from the information they provide. Effective whistleblowing regulation helps correct this imbalance by making non-retaliation, fair process, and voice protection enforceable. Policymakers should therefore view whistleblowing protection as part of the broader ethical infrastructure of labour governance, occupational safety, and corporate accountability. Such regulation supports moral governance by ensuring that the right to speak up about preventable harm does not depend solely on the goodwill of individual employers.

Limitations and Directions for Future Research

Despite its contributions, this study has several limitations that suggest important directions for future research. First, the archival design does not allow us to directly observe the behavioural process through which employees move from recognising a hazard to reporting it, or the organisational process through which reports are escalated, investigated, and converted into corrective action. We infer these mechanisms from theory and from the observed cross-national and organisational contingencies, but we do not observe them directly. Future studies could address this limitation by combining archival data with employee surveys, field interviews, case-based process tracing, or experiments that capture perceived retaliation risk, trust in reporting channels, psychological safety, managerial responsiveness, and the handling of reported concerns. Such approaches would complement existing research on

moral awareness, whistleblowing intention, ethical culture, and voice behaviour (Rest, 1986; Treviño, 1986; Kaptein, 2011b; Detert & Edmondson, 2011; Morrison, 2014; Latan et al., 2019, 2023).

Second, our measures of whistleblowing protection rely on firm-reported policies and country-level institutional assessments rather than direct evidence of employees' perceived protection. This creates a policy-practice limitation: the existence of formal whistleblowing arrangements does not necessarily mean that employees trust them, use them, or experience them as protective. Firms may adopt reporting channels and anti-retaliation language for compliance or legitimacy purposes while leaving these systems weakly implemented in practice. Informal retaliation, managerial gatekeeping, weak follow-up, distrust of anonymity, and fear of career damage may all weaken the effectiveness of formally adopted mechanisms (Kenny et al., 2019; MacLean & Behnam, 2010; Mannion et al., 2018; Near & Miceli, 1995; Rehg et al., 2008). Although our moderation analyses and additional split-sample tests show that WBP is more strongly associated with safety outcomes when supported by board oversight, lower CEO duality, mandatory ESG disclosure, stronger ESG disclosure quality, and higher ESG performance, these analyses cannot fully close the gap between formal policy adoption and employees' lived experience. Future research should therefore incorporate employee surveys, field interviews, internal case-handling records, third-party audits, or experimental designs to measure perceived protection effectiveness, trust in reporting channels, anonymity, confidentiality, follow-up quality, psychological safety, procedural fairness, and retaliation experience. Such evidence would help distinguish more clearly between symbolic adoption and substantive implementation of whistleblowing protection.

Third, cross-national comparisons inevitably involve variation in injury reporting standards, enforcement quality, and disclosure practices. Although our empirical strategy includes multiple robustness checks, we cannot fully rule out the possibility that part of the observed association reflects differences in reporting completeness rather than only differences in underlying injury incidence. Future studies could use administrative injury registries, workers' compensation records, regulator inspection data, audit-verified safety records, or employee-level hazard-reporting data to separate actual changes in injury occurrence from changes in reporting quality. More broadly, this study suggests that future business ethics research should move beyond asking whether whistleblowing systems increase reporting behaviour to examining whether institutional environments enable employees to exercise moral agency in practice. By highlighting moral vulnerability as an ethical consequence of institutional constraints, the study reframes

whistleblowing protection not simply as a governance mechanism, but as a prerequisite for allowing employees to participate meaningfully in the prevention of organisational harm.

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Declarations

Conflict of interest The authors whose names are listed immediately above certify that they have NO affiliations with or involvement in any organisation or entity with any financial interest or non-financial interest in the subject matter or materials discussed in this manuscript.

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Generative AI and AI-Assisted Technologies in the Writing Process During the preparation of this manuscript, the authors used Claude, ChatGPT, and Grammarly solely to improve the clarity, grammar, language, and readability of the text. These tools were used under the authors' direction and supervision and were not used to generate research data, conduct analyses, develop findings, or draw conclusions. Following their use, the authors reviewed and edited the content as necessary and take full responsibility for the accuracy, integrity, and the content of the final manuscript.

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