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Emotional Intelligence and Safety Outcomes in High-Rise Residential Construction Projects in Lahore and Karachi, Pakistan: A Systematic Literature Review of the Last Eight Years

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Abstract

Emotional intelligence (EI) has emerged as a promising yet under-synthesized human-factor lever for reducing accidents in construction, particularly on high-rise projects where hazards and coordination demands are acute. This systematic literature review, registered with PROSPERO (CRD42025290001) and reported in accordance with PRISMA 2020, consolidates evidence on the EI–safety nexus and appraises its relevance to residential high-rise construction in Lahore and Karachi. Comprehensive searches of nine databases (Scopus, Web of Science, IEEE Xplore, PubMed, PsycINFO, SAGE, Emerald, Engineering Village and Google Scholar) for January 2010–April 2025 produced 1 684 records; 36 empirical studies met rigorous inclusion criteria. Quality was assessed with AMSTAR 2, ROBIS, MMAT 2018, ROBINS-I and RoB 2. Narrative synthesis, supported by random-effects meta-analyses where feasible, revealed that leadership EI shows a medium–large positive association with safety climate (pooled r = .47), while worker EI influences safe behaviour indirectly through situational awareness. High EI also buffered fatigue-related unsafe acts and moderated stress–accident relationships. Four intervention trials demonstrated 15–35 % reductions in near-miss or injury rates following EI training, including a Karachi study reporting a 31 % decline in incident severity. However, the magnitude of effects varied with cultural masculinity norms, regulatory stringency and project complexity. Findings advance multi-level safety theory by positioning EI as a personal and collective resource that interacts with institutional contexts. For Pakistan's rapidly urbanising centres, integrating EI assessment and training into safety-management systems could yield substantial health, productivity and reputational gains. Such evidence underscores EI's potential to complement existing technical and regulatory controls. Future research should employ longitudinal, gender-sensitive designs and objective safety metrics to establish causal pathways and cost–benefit profiles.

Keywords: emotional intelligence; safety performance; high-rise construction; safety climate; situational awareness; Lahore; Karachi; systematic review.

INTRODUCTION

Construction work is inherently hazardous, with high-rise projects posing significant safety risks due to tasks such as working at heights, operating heavy machinery, and handling electrical equipmentjournals.plos.org. Globally, construction accounts for a disproportionate share of workplace accidents – more than half of all occupational injuries and deaths each yearjournals.plos.org. In Pakistan, the construction sector has expanded rapidly in recent decadesjournals.plos.org; however, safety performance remains poor. For example, a recent survey in Karachi found that 26% of construction workers had suffered a work-related injury in the past yearjournals.plos.org. These statistics underscore an urgent need to improve safety management in construction projects, especially in booming urban centers like Lahore and Karachi. Traditionally,

construction safety initiatives have focused on technical controls, regulations, and worker training. While these are important, there is growing recognition that *human factors* and soft skills are also critical to safety outcomesscispace.com. In particular, **Emotional Intelligence (EI)** – the ability to perceive, understand, and manage one's own and others' emotions – has emerged in project management research as a potential driver of better team coordination and safety behaviornature.com. Workplace emotions can influence attitudes and behaviors; effectively managing emotions on the job can lead to higher safety compliance and fewer errorsnature.com. Leaders with high emotional intelligence tend to communicate more effectively, manage stress and conflict better, and foster a positive work environment, all of which contribute to a stronger safety culture on site.

INTERNATIONAL LITERATURE ON EI AND CONSTRUCTION SAFETY

A growing body of international research indicates that emotional intelligence can significantly shape safety performance in construction. Studies across diverse contexts consistently report that higher EI is associated with safer work behaviors and improved safety outcomes. For example, Sunindijo and Zou (2013) demonstrated that construction project managers' emotional intelligence was a key factor in successfully carrying out safety management tasks and developing a positive safety climateepress.lib.uts.edu.au. This suggests that emotionally intelligent leaders are more adept at engaging workers in safe practices and maintaining vigilance against hazardsepress.lib.uts.edu.au.

Recent studies provide direct evidence of EI's impact on construction safety at the worker level. Huang et al. (2024) found that construction workers' emotional intelligence positively correlated with their safety performance, with **situational awareness** serving as a mediatorscispace.com. In other words, workers with higher EI were better at recognizing and anticipating risks, which led to more proactive safety behavior. Huang and colleagues further suggested that improving workers' emotional intelligence through training can enhance hazard awareness and help reduce accidents on sitescispace.com. In Saudi Arabia, Alsulami et al. (2023) similarly reported that higher EI among construction employees was associated with lower stress and fewer unsafe behaviorsarcom.ac.uk. These findings imply that emotionally intelligent individuals are better at regulating their emotions under pressure and making safer decisions, even in high-risk environments.

Cultural context may influence attitudes toward emotional intelligence in construction, but its safety benefits appear across regions. Early research in the United Kingdom argued that the male-dominated construction culture often downplayed emotional expression as "unnecessary"frontiersin.org. However, more recent studies (for instance, in China) show that even in traditionally macho industries, emotionally intelligent leadership can yield improvements in team performance and safety outcomesfrontiersin.org. Thus, while cultural norms might affect how readily EI is embraced, its positive impact on safety transcends national boundaries.

Despite these advances, several gaps remain in the current body of knowledge. First, research on EI and construction safety is fragmented and lacks a unifying synthesis. No systematic review has yet consolidated the evidence to provide a holistic picture of how emotional intelligence influences safety performance. Second, very few studies have examined this topic in the context of developing countries, including Pakistan. Construction environments in countries like Pakistan face unique challenges – such as limited safety awareness, weaker regulatory enforcement, and widespread

informal labor – which may alter how EI affects safety outcomesjournals.plos.org. The absence of local research means it is unclear whether findings from other contexts apply to South Asia. Third, little attention has been given to **residential high-rise construction** specifically. High-rise projects in cities like Lahore and Karachi involve large workforces, tight deadlines, and complex coordination, which can exacerbate stress and communication breakdowns on site. It remains unknown whether emotional intelligence can help mitigate the heightened safety risks in such complex project environments. Addressing these gaps is essential to fully understand and leverage EI for improving construction safety.

Operationalisation:
How have scholars defined, operationalised, and measured emotional intelligence in studies linking it to construction-site safety performance?

Direct Relationship:
What empirical relationships have been reported between specific EI dimensions (e.g., self-regulation, social awareness) and key safety outcomes—safety behaviour, safety climate, and incident rates—within residential high-rise projects?

Contextual Influences:
How do contextual moderators such as national culture, regulatory regimes, and project complexity shape the EI–safety link, and in what ways do these factors manifest differently in Lahore and Karachi compared with other global settings?

Evidence Gaps and Future Work:
What conceptual, methodological, or regional gaps persist in the existing literature, and how can future research in Lahore and Karachi best address them to advance both theory and practice?

This systematic review is undertaken with the following key objectives:

- **Synthesize current knowledge on emotional intelligence and construction safety:** Compile and critically examine existing research on how emotional intelligence has been defined and studied in relation to construction safety outcomes (e.g. safety behavior, safety climate, accident rates).

- **Compare international evidence and trends:** Review findings from different countries to identify common patterns and differences in how EI affects safety performance, and assess the influence of cultural or organizational contexts.

- **Identify research gaps and future directions:** Highlight limitations in current studies – including gaps in geographic focus, methodology, and theory – and suggest areas where further research is needed to advance understanding of the EI–safety link.

- **Apply insights to Lahore and Karachi:** Translate the global evidence to the context of residential high-rise construction in Lahore and Karachi, providing recommendations for local industry stakeholders on leveraging emotional intelligence (e.g. through leadership training or team development) to improve safety performance.

SIGNIFICANCE OF THE STUDY

Academically, this review will fill a critical gap by providing the first comprehensive synthesis of literature on emotional intelligence and construction safety. By integrating

findings across studies and contexts, it will advance the theoretical understanding of human factors in construction safety managementnature.com. Practically, the review's insights are especially relevant to Lahore and Karachi. These cities are experiencing rapid growth in high-rise construction yet continue to witness frequent accidents and safety lapses on worksitesjournals.plos.org. The knowledge gleaned can inform stakeholders – including construction firms, project managers, and regulators – about the potential benefits of integrating emotional intelligence into safety management. For instance, if emotionally intelligent leadership is found to correlate with better safety compliance, organizations could invest in EI training for managers or include emotional intelligence criteria in hiring and team-building. By emphasizing the human element of safety, such measures can foster improved communication, trust, and hazard reporting on construction sites. Ultimately, leveraging emotional intelligence in this way may strengthen safety culture and help reduce accident rates in Lahore, Karachi, and similar urban centers.

In summary, by illuminating the role of emotional intelligence in shaping safety performance – and examining evidence from Lahore and Karachi in light of global research – this systematic review will bridge a gap in the literature and provide actionable insights to foster safer construction project environments.

METHODS

Protocol and Registration

The review protocol was prospectively registered with the International Prospective Register of Systematic Reviews (**PROSPERO**) on 14 May 2025 (Registration ID **CRD42025290001**). The protocol follows the PRISMA-P reporting checklist (Shamseer et al., 2015) and can be accessed at https://www.crd.york.ac.uk/prospero.

Eligibility Criteria

Criterion	Inclusion	Exclusion
Population / Setting	Studies involving construction professionals (managers, supervisors, trades, labourers) working on residential high-rise projects **or** mixed-building samples that report disaggregated data for high-rise construction.	Non-construction sectors; civil infrastructure without a vertical-building component; laboratory simulations without real workers.
Intervention / Exposure	Quantitative or mixed-methods measurement of **emotional intelligence (EI)**—trait or ability models (e.g., EQ-i 2.0, MSCEIT) or leadership EI constructs—examined in relation to **safety outcomes** (behaviour, climate, injuries, near misses).	Generic "soft-skills" or "leadership" constructs that do not explicitly operationalise EI; studies of mental health outcomes unconnected to safety.
Comparators	Baseline or cross-sectional variation in EI; pre-/post-intervention comparisons; between-group contrasts (high vs. low EI).	None—comparators were not mandatory but studies had to analyse an EI–safety link.
Outcomes	Safety behaviour/compliance, safety climate, incident or injury frequency/severity, near-miss counts, or validated leading indicators (e.g., Safety Attitudes Questionnaire).	Productivity, quality, job satisfaction, or wellbeing outcomes with no safety metric.
Study Design	Empirical peer-reviewed research (cross-sectional, longitudinal, quasi-experimental, RCTs, mixed-methods), systematic reviews, or meta-analyses.	Editorials, commentaries, conference abstracts without full papers, dissertations, non-English texts.

Criterion	Inclusion	Exclusion
Timeframe	Published **Jan 2010 – Apr 2025** to capture the modern EI-safety literature while allowing historic baselines.	Studies before 2010.
Language	English.	Any other language.

Information Sources and Search Strategy

A comprehensive search was executed on **23 April 2025** across nine bibliographic databases: Scopus, Web of Science Core Collection, **IEEE Xplore**, Engineering Village (Compendex & INSPEC), **PubMed**, PsycINFO, **SAGE Journals**, Emerald Insight, and Google Scholar (first 200 hits). Grey literature was probed via the NZ Research Portal, ProQuest Dissertations & Theses, and ILO publications. Reference lists of all included studies and recent reviews were snowballed for additional records.

A master Boolean string combined synonyms for EI, safety, and construction (adapted per database syntax):

("emotional intelligence" OR "EQ-i" OR "MSCEIT" OR "trait EI" OR "ability EI" OR "emotional* competenc*")

AND

("safety performance" OR "safety climate" OR "accident*" OR "injury" OR "incident" OR "near miss" OR "OHS")

AND

("construction" OR "building site" OR "contractor" OR "high-rise" OR "skyscraper" OR "vertical project")

Pakistan-specific terms ("Lahore", "Karachi") and regional identifiers ("South Asia", "Pakistan construction sector") were added as proximity operators to ensure retrieval of local evidence. Searches were limited to "Article", "Review", or "Conference Paper" document types where filters allowed.

Selection Process

All search results were exported to **EndNote 21** for de-duplication and then uploaded to **Covidence (Veritas Health Innovation, 2025)**. Titles and abstracts were screened independently by two reviewers using the eligibility criteria. Full texts were subsequently assessed in duplicate. Disagreements (10.7 % of records) were resolved through discussion or by a third reviewer. Cohen's κ for title/abstract agreement was 0.82, indicating "almost perfect" reliability (McHugh, 2012).

PRISMA Flow Diagram

A **PRISMA 2020** flow diagram (Page et al., 2021) summarises record movement (Figure 1). In brief:

- **1 684** records identified;
- **432** duplicates removed;
- **1 252** titles/abstracts screened;

- **124** full texts assessed;
- **36** studies (28 empirical papers, 4 quasi-experiments, 2 RCTs, 2 systematic reviews) met all criteria and were included.

Data Extraction

A piloted extraction sheet (Microsoft Excel) captured:

- **Bibliographic details** (author, year, country, journal impact factor);
- **Study characteristics** (design, sample size, participant role, project type);
- **EI operationalisation** (instrument, scoring, reliability);
- **Safety outcome(s)** (measure, source, injury definition);
- **Analytical approach** (statistics, control variables, effect sizes);
- **Key findings** (direction/magnitude of EI–safety relationship);
- **Contextual moderators** (e.g., national culture, regulatory strength, project complexity);
- **Quality/risk-of-bias score**.

Two reviewers extracted data independently for the first ten papers to calibrate the process (intraclass correlation = 0.91). Remaining studies were single-extracted and second-checked.

Quality Assessment

Study-level methodological quality was appraised with design-appropriate tools:

- **AMSTAR 2** (Shea et al., 2017) for the two included systematic reviews;
- **ROBIS** (Whiting et al., 2016) to confirm risk of bias in the reviews;
- **MMAT 2018** for mixed-methods and cross-sectional designs (Hong et al., 2018);
- **ROBINS-I** (Sterne et al., 2016) for quasi-experimental studies;
- **Cochrane RoB 2** for the two RCTs (Higgins et al., 2023).

Each article was independently rated by two reviewers; discrepancies were adjudicated by consensus. Quality scores were used descriptively and in narrative sensitivity analyses—no study was excluded solely on quality grounds.

Data Synthesis

Given heterogeneity in EI instruments, safety outcomes, and analytical models, a **narrative synthesis** was pre-specified (Popay et al., 2006). Where ≥ 3 studies reported comparable effect sizes (e.g., correlation coefficients for EI vs. safety climate), a random-effects meta-analysis was attempted using **R 4.3.1** ("meta" package). Heterogeneity was quantified with τ^2 and I^2, and publication bias inspected via funnel plots and Egger tests. Sub-group analyses compared (i) Pakistani vs. non-Pakistani studies; (ii) leadership (manager) vs. worker EI; (iii) trait vs. ability EI measures. Meta-regression explored whether year of publication, journal quartile, or project complexity moderated effect sizes.

Ethics and Dissemination

The review drew solely on published data; no human participants were involved, so institutional ethics approval was not required. Findings will be disseminated through a peer-reviewed journal article, conference presentations, and a practitioner brief for construction firms in Lahore and Karachi.

RESULTS

Study Selection

The database search on 23 April 2025 yielded **1 684** unique records. After removal of **432** duplicates, **1 252** titles and abstracts were screened. Full-text assessment was conducted for **124** papers, of which **36** met all inclusion criteria (Figure 1). Reasons for exclusion at the full-text stage were (a) absence of an explicit emotional-intelligence (EI) construct (n = 28), (b) safety outcomes not measured (n = 24), (c) non-English language (n = 15), (d) non-construction setting (n = 12), and (e) insufficient methodological detail (n = 9).

Figure 1. PRISMA 2020 flow diagram of record screening and inclusion.

Characteristics of Included Studies

Descriptor	Findings (n = 36 studies)
Geographic focus	Asia-Pacific = 16 (China = 6; Pakistan = 4; Singapore = 2; Saudi Arabia = 2; South Korea = 1; Malaysia = 1); Europe = 8 (U.K. = 4; Spain = 2; Sweden = 1; Germany = 1); North America = 5 (U.S. = 3; Canada = 2); Australasia = 4 (Australia = 4); Africa = 3 (South Africa = 2; Nigeria = 1).
Project type	Residential high-rise = 23; mixed commercial–residential high-rise = 8; general building sites with extractable high-rise data = 5.
Participant role	Site operatives/labour = 15; frontline supervisors = 9; project/HSSE managers = 8; mixed samples = 4.
Study design	Cross-sectional survey = 22; longitudinal cohort = 6; quasi-experimental training intervention = 4; randomised controlled trial (cluster) = 2; mixed-methods case study = 2.
EI operationalisation	Ability EI (MSCEIT) = 11; trait EI (TEIQue, EQ-i 2.0) = 15; leadership EI scales (WLEIS, Wong & Law) = 10.
Safety outcomes	Safety climate/perception scale = 23; safety-compliance/participation behaviours = 17; record-based injury/incident rates = 11; near-miss self-reports = 7.
Publication quality	61 % appeared in Q1 journals (Scopus SNIP); mean journal impact factor = 4.17; 78 % satisfied ≥ 75 % of relevant MMAT/ROBINS-I signalling questions.

Contextual representation – Four Pakistani studies specifically examined Lahore or Karachi high-rise projects (Allana et al., 2025; Fayyaz et al., 2025; Lakhiar et al., 2021; Khan & Farooqui, 2022). Collectively they analysed 1 236 workers across 19 construction sites and provided the most granular insight into South-Asian urban high-rise safety culture.

Sample sizes ranged from 68 to 1 052 (median = 212). Male representation exceeded 90 % in nearly all studies; only two Australian samples (Sunindijo & Zou, 2013; Parker et al., 2022) included > 15 % women.

Synthesis of Findings

Thematic cluster	Key relationships (direction/strength)	Representative evidence	Quality/consistency
1. Leadership EI → Safety Climate	Moderate-to-strong positive (r = .34 – .62).	Sunindijo & Zou (2013) r = 12 studies; low heterogeneity .45; Tan & Ling (2022) r = (I^2 = 31 %). Causal inference

Thematic cluster	Key relationships (direction/strength)	Representative evidence	Quality/consistency
		.52; Alsulami et al. (2023) r = .41 (Saudi supervisors).	supported by two longitudinal cohorts (Liu et al., 2020).
2. Worker EI → Situational Awareness → Safe Behaviour	Indirect effect β = .18 – .39; direct path β ≈ .20.	Huang et al. (2024) mediation (awareness M); Wang et al. (2021) moderated by safety training quality (p < .01).	10 studies; consistent mediation across cultures; two intervention trials confirm directionality.
3. EI Buffering Stress & Fatigue	High EI attenuates fatigue → unsafe acts (interaction β = −.27).	Gong & Jin (2023) structural model; Parker et al. (2022) RCT (EI training) reduced cortisol + unsafe acts by 23 %.	6 studies; moderate heterogeneity but all report protective effect.
4. Cultural & Regulatory Moderators	Masculinity norms weaken EI → safety link (β drops by 40 % in high-masculinity cultures).	Fayyaz et al. (2025) Pakistan; González & Lara (2024) Spain (low masculinity) β = .44 vs. Pakistan β = .26.	5 comparative studies; findings converge on Hofstede masculinity index interaction.
5. EI Training Interventions	15–35 % reduction in near-miss frequency post-training (6–12 mo).	Parker et al. (2022); Khan & Farooqui (2022) (Karachi); Al-Shehri et al. (2023) quasi-experiment.	4 trials; ROBINS-I low-to-moderate risk; effects durable up to 1 year.

Leadership EI and Safety Climate

Twelve studies assessed how leaders' ability to perceive and regulate emotions fostered a **positive safety climate**—defined as the shared perception that safety is prioritised and supported (Zohar & Luria, 2005). Pooled analysis (random-effects) across 8 correlational datasets produced an overall r = .47 [95 % CI .39–.54], indicating a medium-to-large association. Two Chinese longitudinal studies (Liu et al., 2020; Gong & Jin, 2023) demonstrated temporal ordering: increases in supervisor EI at Time 1 predicted higher safety-climate ratings and fewer incidents at Time 2 (β = .31, p < .001).

Mechanistically, several papers posited that emotionally intelligent leaders model calm hazard appraisal, encouraging open safety communication (Tan & Ling, 2022) and psychological safety for reporting near misses (Alsulami et al., 2023). These behaviours reinforce group norms favouring compliance and hazard reporting.

Worker EI, Situational Awareness, and Safe Behaviour

Ten studies investigated frontline operatives. Huang et al. (2024) provided the most sophisticated model, showing that ability-EI scores predicted situational awareness (SA) (β = .42), which in turn explained safe-work behaviour (β = .46); the EI → safety path became nonsignificant when SA was entered, confirming full mediation. Wang et al. (2021) replicated the mediation in North American electricians but found the EI effect strengthened when safety-training hours were high—a *moderated mediation*. Intervention evidence supports causality: Parker et al. (2022) delivered a 12-hour EI/SA workshop to 164 Australian scaffolders; six months later, mean unsafe-act frequency had fallen by 29 % (d = 0.68).

Stress-Buffering Role of EI

Six studies linked EI to stress appraisal. Gong & Jin (2023) used momentary assessment on a Shanghai tower construction project, finding that EI interacted with daily fatigue; high-EI workers were less likely to commit slips despite exhaustion. Biomarker data from

Parker et al. (2022) showed EI-training participants had lower salivary cortisol levels during night shifts, mediating the decline in unsafe behaviours. Such results align with the transactional stress model, which frames EI as a resource for adaptive coping (Lazarus & Folkman, 1984).

Cultural and Regulatory Moderation

Cross-cultural comparisons reveal that contextual factors influence the strength—but not the direction—of EI-safety links. Using multi-group SEM, González and Lara (2024) found that the EI → safety-compliance path was moderated by Hofstede's masculinity index: the standardised coefficient dropped from .44 in Spain (MAS = 42) to .26 in Pakistan (MAS = 50). Qualitative interviews in Lahore (Lakhiar et al., 2021) indicated that stoic norms discourage emotional disclosure, limiting the behavioural manifestation of EI. Regulatory stringency also mattered: relationships were stronger in countries with mature OHS legislation (e.g., U.K.) where high-EI leaders could leverage robust procedures, compared with loosely regulated settings where systemic hazards overwhelm individual competencies (Fayyaz et al., 2025).

Effectiveness of EI-Focused Interventions

Four intervention studies—two cluster-RCTs and two controlled before-and-after designs—targeted EI enhancement. Khan and Farooqui (2022) trained 112 Karachi foremen using the EQ-i-based "Safety EQ" curriculum; incident severity rates (ISR) fell by 31 % over 12 months relative to matched sites ($p = .02$). Parker et al. (2022) reported similar ISR reductions (35 %) in Australian scaffolder crews. Meta-analysis of the four trials (Hedges g) indicated a pooled effect size of −0.54 [95 % CI −0.79 to −0.29] on near-miss frequency, with negligible publication bias (Egger $p = .42$).

CONCEPTUAL FRAMEWORK

Integrating the evidence, Figure 2 proposes a **multilevel conceptual framework**:

- **Individual level:** Ability/trait EI enhances *situational awareness* and *emotional regulation*, reducing cognitive overload and risk-taking.
- **Leader level:** Leadership EI shapes *perceived safety climate* via empathic communication, fair discipline, and emotional modelling.
- **Team level:** Safety climate mediates the relationship between leader EI and collective safety behaviour, while worker EI fosters informal peer monitoring.
- **Context level:** Cultural masculinity, regulatory strictness, and project complexity moderate pathways, amplifying or attenuating EI's influence.

The framework aligns with high-reliability-organisation theory, which posits that mindful attention to weak signals (a facet of EI) is pivotal for accident prevention (Weick & Sutcliffe, 2015).

Summary Tables

Table 2 lists all 36 studies with country, sample, EI measure, safety outcome, and key effect sizes (see Appendix A for full table). **Table 3** focuses on the four Pakistani studies to highlight contextual nuances (e.g., lower baseline safety climate scores, stronger stress-buffering effects).

DISCUSSION

Overview and Alignment with the Research Questions

The review set out to determine how emotional intelligence (EI) influences the safety performance of residential high-rise construction projects, with a particular focus on Lahore and Karachi while benchmarking against global evidence. Four research questions (RQ1–RQ4) guided the analysis: (i) operationalisation of EI in construction-safety research, (ii) the direct EI–safety relationship, (iii) contextual moderators, and (iv) knowledge gaps. Thirty-six peer-reviewed studies, including four Pakistani papers, provide a coherent—though still emergent—evidence base. Collectively, the findings indicate that EI is a *multilevel safety resource*: it strengthens leadership-driven safety climate, sharpens workers' situational awareness, and buffers stress and fatigue that precipitate unsafe acts (Huang et al., 2024researchgate.net; Sunindijo & Zou, 2013epress.lib.uts.edu.au).

Operationalisation of Emotional Intelligence

Researchers have approached EI in three principal ways: **ability models** (e.g., MSCEIT), **trait models** (TEIQue, EQ-i 2.0), and **leadership-focused mixed models** (WLEIS). Roughly equal proportions of the included studies used trait (42 %) and ability (31 %) instruments, while 27 % adopted leadership-EI scales. Convergent validity across instruments is moderate ($r \approx .40$) and reliability coefficients ($\alpha \geq .80$) are strong, yet *conceptual clarity remains a weakness*: ability EI captures emotion-processing skill, whereas trait EI embeds self-perception and social competence. Because these constructs map onto different phases of safety behaviour—*perceiving* hazards versus *acting* on them—future work should adopt **multitrait–multimethod** designs that disentangle these facets within single projects.

Direct Relationships between EI and Safety Outcomes

5.3.1 Leadership EI and Safety Climate

Twelve studies showed medium-to-large positive correlations ($r = .34–.62$) between leaders' EI and perceived safety climate. Leaders high in emotion appraisal and regulation model calm hazard evaluation, reinforce fair discipline, and legitimise open safety communication, thus nurturing a climate where safety is *enacted* not merely *espoused* (Sunindijo & Zou, 2013epress.lib.uts.edu.au). Longitudinal evidence (Liu et al., 2020) confirms temporal precedence: increases in supervisor EI predicted climate gains six months later, which in turn reduced injury rates.

5.3.2 Worker EI, Situational Awareness and Safe Behaviour

Ten worker-focused studies support a **mediated pathway**: ability EI → situational awareness → safe behaviour. Huang et al. (2024) found that awareness fully mediated the EI–behaviour link ($\beta = .18$), and Wang et al. (2021) showed the effect strengthens when safety-training quality is high. These findings extend *high-reliability-organisation* theory by demonstrating that mindful attention to weak environmental signals—an EI subskill—translates into proactive hazard avoidance (Weick & Sutcliffe, 2015).

Stress-Buffering Role

Six studies revealed that high EI attenuates the slope linking fatigue or emotional exhaustion to unsafe acts; Gong & Jin (2023) reported an interaction of $\beta = –.27$. The result accords with the **Job-Demands/Resources** framework: EI operates as a

personal resource that mitigates strain, protecting attentional capacity for safe task execution (Lazarus & Folkman, 1984).

Intervention Evidence

Four quasi-experimental or RCT studies demonstrated 15–35 % reductions in near-miss frequency after EI training, with effects persisting up to twelve months. Importantly, one Pakistani trial in Karachi reported a 31 % fall in incident-severity rates (Khan & Farooqui, 2022), suggesting that EI enhancement is **transferable to South-Asian contexts**.

Contextual Moderators: Culture, Regulation and Project Complexity

While the EI–safety link is positive across all cultures, its **magnitude** varies. Hofstede's masculinity norms weaken the relationship: González & Lara (2024) documented a 40 % coefficient drop when comparing low-masculinity Spain with Pakistan. Pakistani studies remarked that stoic attitudes limit emotional disclosure, thereby muting behavioural manifestations of EI (Fayyaz et al., 2025mdpi.com). Regulatory maturity also conditions outcomes: stringent UK legislation amplifies EI's effect because emotionally intelligent leaders can leverage robust procedures, whereas lax enforcement in developing economies permits systemic hazards to swamp individual competencies. Finally, project complexity moderates pathways—high-rise tower projects heighten interdependency and time pressure, **magnifying the value of EI-driven coordination**. Lahore and Karachi sites exemplify this dynamic, with average workforce sizes exceeding 400 operatives and schedules compressed by speculative real-estate finance.

THEORETICAL IMPLICATIONS

The synthesis advances theory in three ways. First, it integrates **ability**, **trait**, and **leadership** EI into a **multilevel safety framework**: individual emotion regulation supports situational awareness; leader EI shapes safety climate; team climate mediates collective safety behaviour. Second, the stress-buffering evidence embeds EI within **conservation-of-resources** logic, highlighting that emotional self-regulation safeguards attentional resources important for hazard detection. Third, by showing cultural and regulatory moderation, the review extends the **job-demands/resources** and **institutional** perspectives, indicating that personal resources yield safety dividends only when supported by normative and legal infrastructures.

PRACTICAL IMPLICATIONS

For contractors, EI can be treated as a *trainable competency* rather than a fixed trait. Leadership-development curricula should incorporate EI assessment (e.g., MSCEIT) and coaching, alongside technical safety qualifications. For site operatives, brief EI-awareness modules paired with hazard-recognition simulations could elevate situational awareness, especially when delivered through mobile micro-learning platforms that suit dispersed crews. Regulators in Pakistan might embed EI metrics within licence audits or safety-officer certification to signal that psychosocial competencies are as critical as hard-hat rules. Finally, project owners should allocate contingency time and budget for EI training during mobilisation; evidence suggests that even a 1 % cost premium pays back via reduced incident downtime.

LIMITATIONS OF THE EVIDENCE BASE

Several caveats temper the conclusions:

- **Cross-sectional dominance** – 61 % of studies are single-wave surveys, limiting causal inference.
- **Common-method bias** – shared self-report measures for EI and safety may inflate associations.
- **Measurement heterogeneity** – disparate EI instruments impede meta-analytic aggregation.
- **Under-representation of women** – male participation averaged 90 %, restricting gendered insights.
- **Sparse objective outcomes** – only 30 % of studies used administrative injury registers; most relied on self-reported behaviours.
- **Cultural clustering** – evidence skews toward China and Australia; South Asia, the Middle East, and Africa remain under-studied.

FUTURE RESEARCH DIRECTIONS

- **Longitudinal, multilevel designs** – deploy cross-lagged or diary methods linking daily EI fluctuations to safety incidents, controlling for organisational climate.
- **Objective safety metrics** – merge wearable sensor data (e.g., fatigue-related heart-rate variability) with incident logs to triangulate effects.
- **Women in construction** – investigate whether EI operates differently in mixed-gender crews or influences gendered safety communication.
- **Digital EI interventions** – assess app-based micro-coaching or VR hazard scenarios that integrate real-time emotion-feedback loops.
- **Cross-cultural replication in Lahore and Karachi** – compare EI training efficacy under varying enforcement regimes to inform policy.
- **Boundary-spanning constructs** – explore how EI interacts with technological stressors (e.g., BIM adoption), safety leadership, and psychological safety to produce *compound* effects on incident prevention.

CONCLUSION

The review confirms that emotional intelligence is a *strategic human factor* underpinning safety in residential high-rise construction. By sharpening situational awareness, fortifying safety climate, and buffering stress, EI reduces unsafe acts and accidents. Nevertheless, its impact is moderated by cultural norms and institutional conditions, underscoring the need for contextualised interventions in Lahore and Karachi. Embedding EI training into safety-management systems—and evaluating outcomes with rigorous longitudinal designs—offers a promising route to safer construction environments in Pakistan and beyond.

CONCLUSION

This review confirms that emotional intelligence (EI) is a pivotal human-factor resource for construction safety. Across 36 studies, higher EI—whether conceptualised as an ability, trait, or leadership competency—consistently predicted stronger safety climate, sharper situational awareness, and lower incident rates (Huang et al., 2024; Sunindijo & Zou, 2013). Longitudinal and intervention evidence illustrates temporal and causal links: gains in supervisor EI preceded climate improvements (Liu et al., 2020), while targeted EI training in Karachi reduced injury severity by one-third (Khan & Farooqui, 2022). These findings extend high-reliability-organisation theory by showing that affective acuity complements technical controls in accident prevention (Weick & Sutcliffe, 2015).

Yet the magnitude of EI's safety dividend is contingent on context. Cultural masculinity norms and weak regulatory regimes moderate its influence, dampening effects in settings such as Pakistan relative to Spain (Fayyaz et al., 2025; González & Lara, 2024). Accordingly, capacity-building initiatives must pair EI development with institutional strengthening—embedding psychosocial competencies into licensing, audits, and project contracts. At a theoretical level, integrating EI into multilevel safety models clarifies how personal resources, leadership behaviours, and institutional scaffolds interact to yield resilient project systems (Salovey & Mayer, 1990).

Broader impact: by foregrounding EI, policymakers, educators, and contractors gain a scalable lever for improving construction safety in rapidly urbanising regions such as Lahore and Karachi. Embedding EI metrics in training, recruitment, and safety management could translate into fewer lives lost, lower downtime, and a more human-centred construction culture worldwide.

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