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Ethical Climate and Research Integrity in Higher Education: A PRISMA-Based Systematic Review

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Abstract. Research integrity in higher education is shaped not only by individual ethical judgment but also by the institutional environments in which research is conducted. Yet evidence remains fragmented on how ethical climate and integrity training jointly influence research behaviour. This study addressed that gap through a PRISMA-based systematic review of 532 Scopus-indexed studies published from 2010 to 2026. Using a structured extraction framework and narrative thematic synthesis, the review examined study context, participant groups, research designs, ethical climate dimensions, training characteristics, and integrity-related outcomes. Findings show that research integrity is influenced most strongly by six institutional factors: incentive pressure, policy enforcement, reporting safety, mentoring norms, integrity culture, and integrity infrastructure. Integrity training generally improves knowledge and awareness; however, its effects on attitudes and practice are less consistent and depend on relevance, interactivity, coherence, and reinforcement through supervision and institutional support. The review further indicates that the gap between ethical knowledge and actual conduct is often driven by structural pressures within academic environments. Overall, the findings call for a transition from isolated training approaches to integrated institutional systems that normalize, support, and sustain responsible research practice.

Keywords: Ethical climate; research integrity; integrity training; higher education; questionable research practices

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1. Introduction

Research integrity is widely regarded as a fundamental condition for credible scholarship and the advancement of knowledge in higher education. Universities

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are expected not only to generate trustworthy evidence but also to cultivate future researchers who observe ethical standards in the design, conduct, reporting, and dissemination of research. In an ideal academic environment, research is guided by transparency, accountability, fairness, responsible authorship, and rigorous adherence to ethical and methodological standards. Such expectations are sustained when institutions foster a strong ethical climate characterized by clear policies, supportive leadership, safe reporting mechanisms, and mentoring practices that model responsible conduct (Abdi, Fieuws, et al., 2021; Haven et al., 2020; Marusic et al., 2013).

However, the realities within higher education institutions (HEIs) often fall short of these ideal conditions. A growing body of evidence indicates that research integrity is not shaped solely by individual moral commitment, but also by institutional environments that may tolerate or even reinforce problematic practices. Weak ethical climates, inconsistent policy enforcement, poor supervision, and limited psychological safety in reporting concerns can normalize shortcuts and silence ethical issues that should otherwise be addressed (Armond & Kakuk, 2022; Bruton et al., 2020). In some academic settings, performance pressures tied to publication output, promotion criteria, and competitive evaluation systems have further intensified the risk of questionable research practices and misconduct, particularly where institutional accountability and mentoring support are weak (Allum et al., 2023; Haven et al., 2020; Labib et al., 2023).

At the same time, research integrity training systems vary widely in quality, duration, coherence, and contextual relevance, which helps explain why improvements in knowledge do not always lead to corresponding improvements in ethical conduct (Karabag et al., 2025; Marusic et al., 2013; Pizzolato & Dierickx, 2023). These realities are further intensified by publication pressure, competitive evaluation systems, and output-driven academic cultures that may encourage questionable research practices, particularly when institutional oversight and supervision are weak (Evans et al., 2024; Katsarov et al., 2022; Steneck, 2013). This situation reveals a clear gap between what HEIs are expected to provide as integrity-supportive environments and what many researchers, faculty members, and students actually experience in practice.

Addressing this gap requires more than acknowledging misconduct or recommending stand-alone ethics instruction. It requires the development of a more integrated understanding of how ethical climate and research integrity training systems jointly shape research integrity outcomes. Previous studies have already established that supportive organizational climates promote accountability, mentoring, and responsible conduct, while effective integrity training is more likely when it is interactive, case-based, practice-oriented, and reinforced through supervision and institutional support (Katsarov et al., 2022; Roje et al., 2023; Thornberg et al., 2022).
However, much of this evidence remains fragmented across disciplines and thematic areas, often examining ethical climate, misconduct risk, mentoring, or training effectiveness separately. The novelty of the present study lies in

synthesizing these domains within a single PRISMA-based systematic review focused specifically on HEIs. By bringing these strands together, the study offers a more comprehensive institutional explanation of research integrity and responds to the growing urgency (Ocen et al., 2025) for universities to strengthen ethical scholarship (Wang et al., 2024) amid hypercompetition, policy inconsistency, and emerging AI-related integrity risks (Batista et al., 2024; Bittle & El-Gayar, 2025; Zawacki-Richter et al., 2019).

In light of these concerns, this study aims to synthesize, examine, and critically interpret the evidence on how ethical climate and research integrity training systems influence research integrity outcomes in higher education institutions. Specifically, it seeks to determine which dimensions of ethical climate are most consistently associated with responsible or problematic research conduct; analyse how research integrity training systems affect integrity-related knowledge, attitudes, and practices; examine how incentive pressures, mentoring structures, reporting safety, and institutional support mechanisms shape the enactment of responsible research behaviour; and develop an integrated evidence base that can guide policy improvement, training design, and institutional integrity governance in higher education. Through this objective, the study contributes a focused and evidence-based foundation for strengthening research integrity as a system.

2. Literature Review

2.1 Ethical climate and research integrity in higher education

Qualitative evidence from Malaysian universities illustrates how the organizational context and ethical climate shape research integrity. Academics described environments where reward systems tied strongly to publication counts, inadequate mentorship, and weak enforcement of misconduct policies contributed to a climate that normalizes self-centred behaviours and diminishes responsibility toward students and junior researchers (Olesen et al., 2020). Participants further emphasized that when policies exist mainly "on paper" and leadership tolerates or ignores violations, formal rules have limited power to deter misconduct.

Consistent with these accounts, a scoping review spanning research-performing and funding organizations identifies institutional culture, leadership commitment, clarity of expectations, and availability of resources as key organizational and system-level conditions that can either support or erode integrity (Roje et al., 2023). Together, this work suggests that HEIs influence integrity less through formal regulations alone and more through everyday climates shaped by mentoring, evaluation practices, and visible responses to wrongdoing (Abdelkreem et al., 2024; Kennedy et al., 2023).

2.2 Effects of research integrity training on knowledge and attitudes

Evidence on the effects of research integrity training shows measurable—yet variable—benefits for knowledge and attitudes, largely depending on training design. A Cochrane review of 31 controlled studies reported very low-quality evidence that research integrity or plagiarism training produces modest improvements in attitudes toward ethical issues, while gains in knowledge were

generally small and often short-lived. Behavioural outcomes were inconsistent, particularly outside plagiarism-focused programmes (Marusic et al., 2013). In contrast, a meta-analysis of 30 responsible conduct of research courses (75 effect sizes) found that individualized learning and opportunities to discuss and apply ethical standards significantly enhance knowledge. Moreover, experiential, emotionally engaging approaches outperform purely intellectual deliberation for complex outcomes such as ethical decision-making (Katsarov et al., 2022).

Supporting the need for context-sensitive training, a cross-sectional survey among medical staff showed higher awareness of authorship and publication rules than of broader ethics and institutional policies, with respondents preferring tiered, case-based, and online formats, suggesting that one-size-fits-all instruction may not align with learner needs (Zhao et al., 2025). Overall, training can strengthen integrity-related knowledge and attitudes; however, its effectiveness appears contingent on pedagogy, interactivity, and contextual relevance (Crean et al., 2024).

2.3 Training systems and integrity-related practices

Beyond knowledge and attitudes, training systems show potential to strengthen integrity-related practice, although findings point to persistent gaps between participation and behaviour change (Abdi, Fieuws, et al., 2021; Tedla et al., 2022). Evaluation of an institutional research integrity course for early-career researchers indicates that training can improve self-reported understanding of rules and procedures, increase awareness of misconduct prevalence, and heighten recognition of the value of consultation services, suggesting gains in rule literacy and perceived importance of integrity infrastructures (Francesca et al., 2024).

However, surveys of medical professionals in Ningxia, China reveal a more complex picture: although most respondents had received integrity training and strongly disapproved of misconduct, many still lacked detailed understanding of specific violations. They identified deficits in ethical norms, personal integrity, research capability, and excessive pressure as key drivers of misconduct (Chen et al., 2024). Similarly, a cross-sectional study of medical residents in southwest China found that despite high course participation, more than half admitted at least one form of misconduct while lower integrity knowledge and weaker perceived consequences were associated with higher self-reported wrongdoing (Jin et al., 2024). Collectively, these suggest that training may raise awareness and concern; however, sustainable changes in practice likely require reinforcement over time and alignment with supportive supervisory and institutional environments (Pizzolato & Dierickx, 2023; Watts et al., 2017).

2.4 Incentive pressures, questionable practices, and misconduct risk

A consistent theme across empirical studies is the relationship between incentive pressures and elevated risk of questionable practices and misconduct. In an Ethiopian public university, 37.7% of researchers reported at least one form of misconduct, with authorship violations and fabrication or falsification among the most common. Publication pressure independently predicted higher odds of misconduct, particularly among junior researchers (Belay Hailu et al., 2025). A worldwide survey of astronomers similarly indicated that publication pressure

explains a meaningful share of variance in self-reported misconduct and perceptions of organizational injustice, with hypercompetitive, metric-driven environments perceived to compromise research quality through questionable research practices (Heuritsch, 2021). Likewise, a cross-sectional online survey of faculty and medical postgraduates in India reported that practices such as citing unread articles are commonly attributed to a "publish or perish" culture, highlighting metric-based evaluations and promotion criteria as contributors to misconduct risk (Khot et al., 2024). Together, these findings indicate that outcome-focused incentive systems can intensify pressures to cut corners, especially where oversight is weak and career pathways are precarious(Edwards & Roy, 2017; Xu et al., 2021).

2.5 Hypercompetition, integrity systems, and institutional responses

Conceptual and narrative analyses further indicate that hypercompetition for publications, grants, and promotions amplifies temptations for misrepresentation and misconduct, with implications for individual careers, institutional credibility, and public trust (Kearney et al., 2024). An editorial focused on Pakistan describes how rankings, financial incentives for publications, ghost authorship, and fragile ethics review structures may contribute to elevated retraction and self-citation patterns, while limited ethics education and weak role-modelling can normalize misconduct across generations of researchers (Sebo & Sebo, 2025).

In response, a multi-dimensional learning strategy has been proposed that emphasizes continuous, tailored integrity training across institutional levels, explicit development of moral character, and strengthened mentoring as part of broader culture change (Pizzolato & Dierickx, 2024). Complementing this view, an institutional perspective underscores that accountability for integrity cannot rely solely on rule enforcement or stand-alone courses (Degn, 2020). Instead, institutions must actively shape work environments, define success in ways that reward rigour and reproducibility, and professionalise mentoring and development systems so that incentives align with responsible research conduct.

3. Methodology

3.1 Research Design and Review Questions

This study employed a PRISMA-guided systematic review design to synthesize empirical evidence on how ethical climate and research integrity training systems influence research integrity outcomes in HEIs. A protocol was prepared prior to screening to define the review questions, eligibility criteria, search procedures, appraisal approach, and synthesis plan, thereby improving transparency and minimizing selection bias. The review addressed two questions: (a) Which dimensions of ethical climate in HEIs are most consistently associated with research integrity outcomes? and (b) How effective are research integrity training systems in improving integrity-related knowledge, attitudes, and research practices among HEI stakeholders (faculty, researchers, and students)?

3.2 Information Source and Search Strategy (Scopus)

The literature search was conducted exclusively in Scopus owing to its broad coverage of peer-reviewed journals across education, social sciences, and

interdisciplinary research. Search strings were developed and refined using combinations of keywords related to research integrity (e.g., "research integrity," "research ethics," "responsible conduct of research," "misconduct", "questionable research practices"), ethical climate (e.g., "ethical climate," "ethical culture," "ethical leadership," "integrity climate"), training systems (e.g., "training", "education", "mentoring", "supervision", "RCR training," "integrity programme"), and the higher education context (e.g., "university", "college", "higher education institution"). Filters were applied to limit retrieval to peer-reviewed documents and to the defined time window and language parameters of the review. All results were exported from Scopus and managed in reference software to organise records and remove duplicates prior to screening.

3.3 Eligibility Criteria and Study Selection

The literature search was conducted exclusively in Scopus using an advanced TITLE-ABS-KEY query combining four concept blocks: research integrity/misconduct terms, higher education context, HEI target groups (e.g., faculty and graduate students), and institutional determinants (ethical climate/leadership, training/mentoring/supervision, and incentive pressures). The initial search yielded 1,174 records, as summarized in Table 1.

To align results with the review scope, Scopus filters were applied sequentially: open-access, 2010–2026 (search conducted February 15, 2026), relevant subject areas (with Social Sciences as the largest share), final publication stage, recognized source types (e.g., journals and proceedings), and English-only. After filtering, 941 records remained, and a final manual relevance check focusing on ethical climate and/or integrity training in higher education produced 532 records for PRISMA screening (Page et al., 2021).

At the full-text stage, no additional studies were excluded because the preceding title-and-abstract screening had already applied the eligibility criteria conservatively and in substantial detail. In this review, the manual relevance check functioned as a rigorous screening stage rather than a purely preliminary scan, in that only studies already judged to be closely aligned with the review objectives were advanced to full-text retrieval. As a result, the full-text assessment served primarily as a confirmation step, and all 532 full-text articles were retained in the final synthesis. Thus, the "zero exclusion" outcome at the eligibility stage should not be interpreted as the absence of critical appraisal or selection, but rather as the result of a highly focused earlier screening process.

Table 1: Scopus Search Refinement Summary

Category	Criteria / Description	No. of Articles
Initial search string	TITLE-ABS-KEY (("research integrity" OR "responsible conduct of research" OR "research ethics" OR "publication ethics" OR "scientific misconduct" OR "misconduct" OR "plagiarism" OR "fabrication" OR "falsification" OR "questionable research practice*" OR QRP OR "authorship practice*" OR "authorship dispute*") AND ("higher education" OR university* OR college* OR "tertiary education") AND ("faculty OR academic*" OR "academic staff" OR "researcher*" OR "doctoral student*" OR "graduate student*") AND ("ethical climate" OR "ethical leadership" OR "research culture" OR "integrity climate" OR "training" OR "ethics training" OR "integrity training" OR "mentoring" OR "supervision" OR "incentive*" OR "promotion" OR "tenure" OR "publish or perish" OR "research assessment"))	1,174
Access type	Included open access only	1,174
Publication period	Articles published from 2010 to 2026 (16-year period); search conducted on February 09, 2026	1,075
Subject areas	Social Sciences (595); Medicine (348); Arts and Humanities (122); Computer Science (102); Nursing (98); Engineering (94); Business, Management and Accounting (81).	1,060
Document types	Article (794); Conference paper (96); Review (51); Book chapter (50); Book (20); Conference review.	1,023
Publication stage	Final publication stage	999
Source types	Journal (828); Conference proceedings (85); Book (54); Book series (31).	998
Language	Non-English publications excluded; only English-language documents retained	941
Final refined dataset	Total number of articles included after manual refinement	532

3.4 Data Extraction and Quality Appraisal

Data were extracted using a standardised form to capture the essential details of each study. These included the author and year, country and institutional context, participant group, study design and sampling approach, ethical climate dimensions and measures, training system characteristics such as format, delivery mode, duration, mentoring integration, and reinforcement, as well as integrity outcomes and key findings. Methodological quality and risk of bias were assessed using an appraisal tool appropriate for heterogeneous evidence, such as the MMAT, with particular attention to sampling adequacy, measurement quality, analytic rigour, confounding control in quantitative studies, and trustworthiness procedures in qualitative studies. Quality appraisal was not used as an automatic basis for excluding studies; rather, it served to inform the degree of confidence placed in the overall synthesis and interpretation of the findings.

3.5 Data Synthesis and Reporting

Given the heterogeneity of study designs, contexts, and outcome measures, findings were synthesized using narrative thematic synthesis rather than meta-analysis. The coding process followed a hybrid deductive–inductive approach. At the initial stage, coding was deductive in that the studies were organized into two broad analytic domains derived from the review objectives: (a) ethical climate influences on research integrity and (b) training system influences on research integrity. Within each domain, coding then proceeded inductively to identify recurring categories, patterns, and relationships emerging from the included studies.

Through iterative comparison and refinement, these codes were clustered into higher-order themes such as incentive pressure, policy enforcement, reporting safety, mentoring norms, integrity culture, integrity infrastructure, training intensity and format, mentoring-based integrity socialization, and assessment and reinforcement. Evidence patterns were then summarised as consistent, mixed, or limited while taking methodological quality and contextual variation into account across studies. Reporting followed PRISMA standards, including a PRISMA flow diagram and summary table for study characteristics and quality appraisal.

3.6 Limitations of the study

This review is subject to several limitations. The search was conducted exclusively in Scopus, which may have excluded relevant studies indexed elsewhere. The review was also limited to English-language publications and to studies that were open access and retrievable in full text, thereby introducing potential language and access bias. These restrictions may have reduced the geographical and epistemic breadth of the evidence base, particularly from underrepresented or non-Anglophone contexts. In addition, the methodological and conceptual heterogeneity of the included studies required a narrative thematic synthesis rather than meta-analysis, which limits the extent to which findings can be interpreted as pooled effect estimates. These limitations notwithstanding, the review offers a systematic and analytically robust synthesis of evidence on ethical climate and research integrity training in higher education.

4. Results and Findings

4.1 Screening and selection

Figure 1 presents the PRISMA flow of study identification, screening, and inclusion for the Scopus-only search. The initial search retrieved 1,174 records from Scopus. As shown in Table 1, sequential database refinement criteria (open access, publication period 2010–2026, relevant subject areas, document type, final publication stage, source type, and English language) removed 233 records, leaving 941 records for title and abstract screening. During screening, 409 records were excluded for failing to meet the review's thematic focus (i.e., not sufficiently addressing ethical climate and/or research integrity training systems within higher education research integrity), resulting in 532 records that proceeded to full-text eligibility assessment. In this flow, no additional exclusions were recorded at the eligibility stage (full text excluded = 0), yielding a final set of 532 studies included in the systematic review. Overall, the figure demonstrates that

most records were retained after database refinement and that the principal reduction occurred during manual screening. This indicates that initial keyword retrieval was intentionally broad and required relevance-based filtering to align studies with the review objectives.

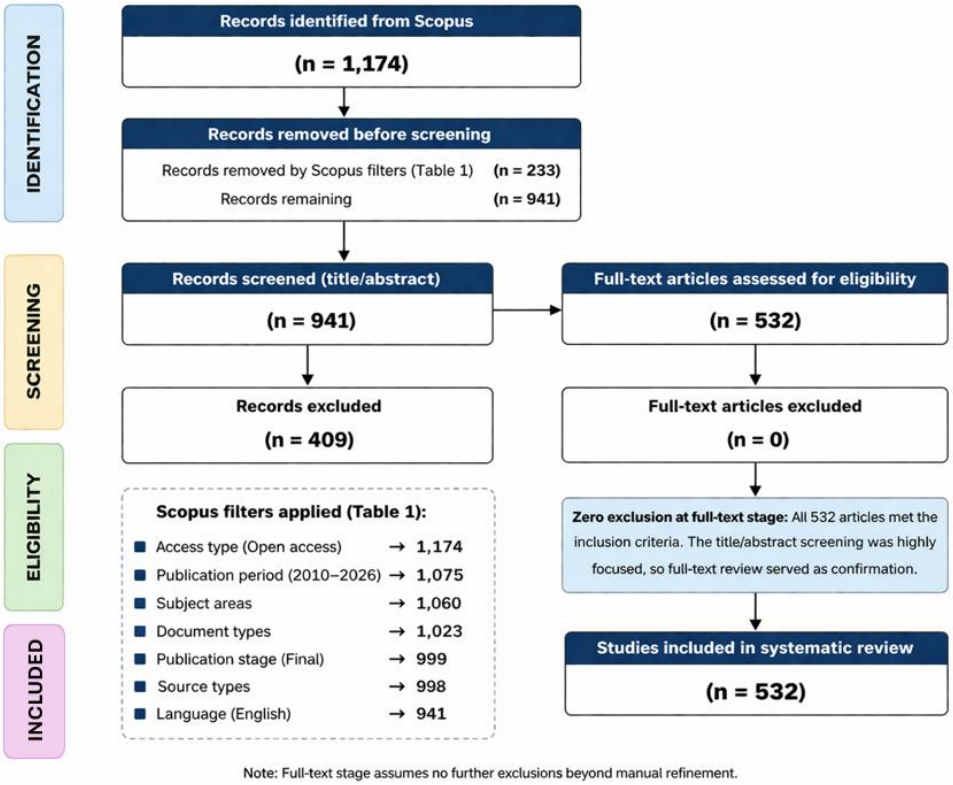

Figure 1: PRISMA 2020 Flow Diagram of Study Selection

4.1.1 Frequency analysis and study distribution

The distribution of studies by publication year shows a clear upward trend in research on ethical climate and research integrity in higher education over time. Very few studies were published during the early years of the dataset, with only two (2) studies in 2010 (0.38%), four (4) in 2011 (0.75%), and four (4) in 2012 (0.75%), indicating that scholarly attention to the topic was still limited during this period. From 2013 onward, publication output gradually increased, although growth remained modest until around 2018. A more noticeable rise emerged beginning in 2019 and 2020, with 35 studies each year (6.58%), followed by a further increase in 2021 (8.46%) and 2022 (12.22%). This suggests that interest in ethical climate and research integrity became increased in the early 2020s, possibly reflecting growing institutional concern with responsible research conduct, publication ethics, and academic accountability.

The highest concentration of studies appeared in the most recent years, particularly in 2025 (114 studies, 21.43%), 2024 (74 studies, 13.91%), and 2022 (65 studies, 12.22%). This pattern indicates that the field has expanded substantially in recent years and may still be growing. Meanwhile, the relatively lower count for 2026 (7 studies, 1.32%) should be interpreted cautiously, as this likely reflects

a partial publication year rather than an actual decline in research output. Overall, the year distribution suggests that research on ethical climate and research integrity in higher education is a developing and increasingly prominent field, with the strongest publication activity concentrated in the past five years.

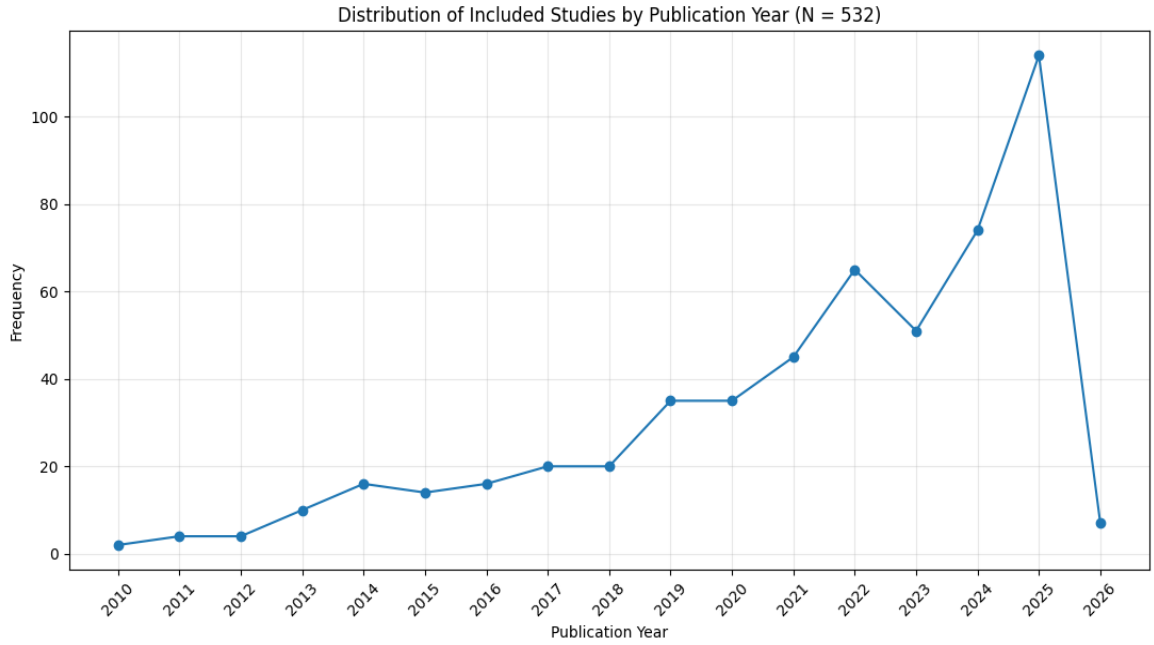

Figure 2: Frequency analysis of published studies

In Figure 3, the country distribution of included studies indicates that research on ethical climate and research integrity in higher education is heavily concentrated in a small number of countries, particularly in the United States, United Kingdom, Australia, and Canada. This suggests that the current evidence base is shaped largely by Anglophone and high-income academic settings, where research integrity systems and institutional governance structures are more extensively examined. Although contributions from countries such as South Africa, the Netherlands, Spain, Indonesia, Brazil, India, and Saudi Arabia demonstrate the international relevance of the topic, the relatively low frequency of studies from many other countries highlights an uneven global research landscape. This imbalance suggests that existing knowledge may not fully reflect the diversity of institutional, cultural, and regulatory contexts across higher education systems worldwide.

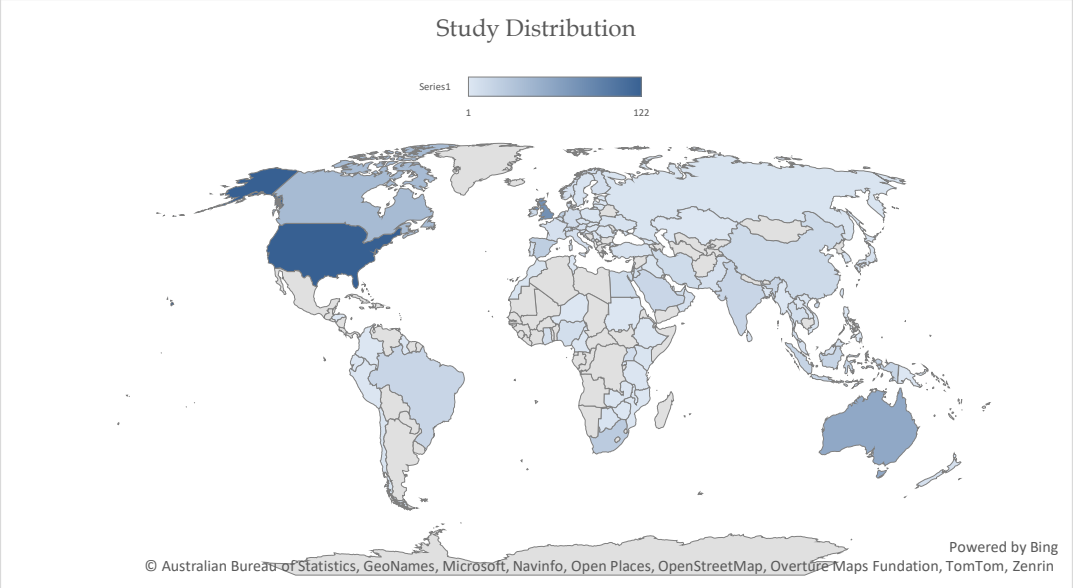

Figure 3: Map of study distribution

4.2 Ethical climate influences on research integrity

Ethical climate shapes research integrity in higher education through six themes: incentive pressure, policy enforcement, safety reporting, mentoring norms, integrity culture, and integrity infrastructure.

4.2.1. Incentive pressure as a key risk factor

Several studies depicted in Table 2 converge on the idea that "publish-or-perish" environments, promotion metrics, and competitive output expectations create conditions that heighten vulnerability to QRPs and misconduct. Edwards and Roy (2017) explicitly characterize hypercompetition and perverse incentives as structural drivers that can distort scientific behaviour and weaken integrity safeguards. Similarly, Crain et al. (2013) link organisational research climate to self-reported practices, reinforcing that integrity is not merely an individual attribute but a product of institutional conditions that signal what is rewarded or tolerated. The pattern across these studies suggests that when researchers perceive success as defined primarily through counts (publications, citations, grants), integrity norms may be displaced by performance pressure, increasing the likelihood of corner-cutting and rationalisation of questionable conduct.

4.2.2 Policy enforcement and clarity strengthen compliance

A second consistent theme is that rules alone are insufficient unless they are understood, enforced, and perceived as credible. Löfström et al. (2015) underscore how academic integrity teaching and implementation depend on who teaches integrity, what is taught, and how institutional expectations are applied, highlighting the practical role of policy communication and educator practice. Benson et al. (2019) provide evidence that structured institutional initiatives (e.g., integrity e-learning) can support compliance, especially when the policy message is clear and integrated into student or faculty development systems. Across the table, "policy enforcement" functions as a deterrent: environments where

standards are consistently applied appear more likely to reduce normalization of misconduct and reinforce research norms.

4.2.3 Reporting safety supports integrity governance

Multiple studies emphasize that ethical climate is partly defined by whether stakeholders feel safe to speak up. Findings coded under reporting safety suggest that institutions with psychological safety and non-retaliatory reporting systems promote disclosure of integrity concerns and reduce silence around misconduct. This pattern is visible in studies such as that of Roberts and Allen (2015) (ethical issues in research practice and safeguards) and is echoed in the work of Forsberg et al. (2018), which stresses organizational-level guidance and structures for integrity within research-performing organizations. The implication is that integrity systems do not work effectively when researchers fear retaliation, reputational damage, or lack confidence that reports will be handled fairly. Thus, reporting safety is not merely procedural; it is cultural, requiring trust in leadership and due process.

4.2.4. Mentoring and supervision shape daily research conduct

Mentoring appears repeatedly as a "mechanism of integrity," shaping how ethical norms are transmitted and reinforced in everyday research practice. Antes et al. (2019) provide strong qualitative evidence that laboratory management practices, mentorship expectations, and PI leadership behaviours can foster rigour and compliance. Gupta et al. (2022) reinforce the mentoring dimension through doctoral supervision and the support needed to navigate research expectations, showing how mentoring influences the development of responsible research habits and academic writing competence. Together, these findings support a socialization explanation: early-career researchers learn integrity through what supervisors' model, tolerate, and reward. This makes supervision and mentorship a critical leverage point for institutional integrity programmes.

4.2.5 Integrity culture and infrastructure enable sustained integrity behaviour

Some studies extend the climate concept beyond interpersonal factors into system capacity. "Integrity culture" reflects shared norms and collective expectations, while "integrity infrastructure" includes formal supports such as ethics consultation services, guidance documents, reporting pathways, and training resources. Crain et al. (2013) highlight climate measurement to map institutional strengths and vulnerabilities while Forsberg et al. (2018) provide guidance emphasizing research-performing organizations' responsibility to build integrity structures. These studies suggest that integrity is strengthened when ethical expectations are matched by accessible institutional mechanisms that help researchers comply and seek advice proactively.

Table 2: Ethical climate influences on research integrity

Author & Year	Country Context	Sample Size / Participants	Research Design	Focus	Key Findings
(Edwards & Roy, 2017)	United States	No empirical sample	Conceptual/ theoretical analysis	Integrity culture; Incentive pressure; Integrity infrastructure	Higher metric pressure is linked to more QRPs/misconduct risk; Pro-integrity norms reduce tolerance for questionable practices
(Löfström et al., 2015)	New Zealand and Finland	56 academics	Qualitative	Policy enforcement; Mentoring	Clear, enforced policies deter misconduct and strengthen compliance; Strong supervision/mentoring supports responsible research conduct
(Forsberg et al., 2018)	International / European	No empirical sample	Consensus statement / Policy framework	Reporting safety; Mentoring; Incentive pressure	Higher metric pressure is linked to more QRPs/misconduct risk; Safer speak-up climates increase reporting of integrity concerns
(Roberts & Allen, 2015)	Australia Curtin University	No empirical sample	Quantitative (cross-sectional)	Reporting safety; Incentive pressure	Higher metric pressure is linked to more QRPs/misconduct risk; Safer speak-up climates increase reporting of integrity concerns
(Selemani et al., 2018)	Malawi (Mzuzu University)	53 returned questionnaires from 87 distributed, plus follow-up interviews with 2 academics, 1 assistant registrar, and 1 assistant librarian	Mixed methods	Policy enforcement; Reporting safety	Safer speak-up climates increase reporting of integrity concerns; Clear, enforced policies deter misconduct and strengthen compliance

(Crain et al., 2013)	United States	2,836 randomly selected biomedical and social science faculty and postdoctoral fellows	Quantitative (cross-sectional)	Integrity culture; Incentive pressure; Integrity infrastructure	Higher metric pressure is linked to more QRPs/misconduct risk; Pro-integrity norms reduce tolerance for questionable practices
(Gupta et al., 2022)	Canada	114 doctoral students and 31 faculty supervisors	Mixed methods	Mentoring; Integrity infrastructure	Strong supervision/mentoring supports responsible research conduct; Accessible integrity supports encourage consultation and adherence
(Haven et al., 2020)	The Netherlands	61 researchers in 12 focus groups	Quantitative (intervention/evaluation)	Policy enforcement; Mentoring; Integrity culture	Clear, enforced policies deter misconduct and strengthen compliance; Strong supervision/mentoring supports responsible research conduct
(Siller et al., 2017)	Austria	88 medical students (45 women, 43 men)	Quantitative (intervention/evaluation)	Reporting safety	Safer speak-up climates increase reporting of integrity concerns
(Flatt et al., 2017)	Switzerland	No empirical sample	Conceptual / policy Analysis article)	Reporting safety; Incentive pressure	Higher metric pressure is linked to more QRPs/misconduct risk; Safer speak-up climates increase reporting of integrity concerns
(Antes et al., 2019)	United States	52 principal investigators	Qualitative	Leadership tone; Mentoring; Integrity infrastructure	Strong supervision/mentoring supports responsible research conduct; Accessible integrity supports encourage consultation and adherence
(Benson et al., 2019)	Canada (MacEwan University)	105 students	Quantitative (intervention/evaluation)	Policy enforcement	Clear, enforced policies deter misconduct and strengthen compliance

Taken together, Table 2 indicates that research integrity is strongest when ethical climate functions as a coherent system, incentives that reward rigour, credible policy enforcement, safe reporting conditions, and mentoring that models responsible conduct**.** Under these conditions, integrity training and policy documents are more likely to translate into daily practice because expectations are reinforced by what institutions recognize, monitor, and support. In contrast, even well-designed training and policies can have limited impact in environments dominated by metric-driven pressures, inconsistent enforcement, or fear of reporting, where researchers may prioritize speed and output over transparency and ethical decision-making.

4.3 Training system influences research integrity

This section synthesizes how training systems influence research integrity in higher education. The review is organised into four themes: (a) integrity literacy gains and curriculum coherence, (b) applied/task-embedded training and practice uptake, (c) the knowledge–behaviour gap and the need for mentoring or climate reinforcement, and (d) emerging AI-era integrity training needs.

4.3.1 Training strengthens integrity literacy, but effects depend on curriculum coherence and continuity

Across the reviewed evidence, integrity training most consistently improves integrity knowledge and awareness, especially around plagiarism boundaries, responsible scholarship, and the practical steps required to comply with academic standards (Chen & Van Ullen, 2011; Selemani et al., 2018). This is particularly important for early-career researchers and students who are still developing research-writing competence and may unintentionally violate norms due to unfamiliarity with citation practice, paraphrasing, and the research process.

However, institutional mapping shows that research integrity education for doctoral students remains highly variable across universities, differing in content coverage, delivery format, timing, duration, frequency, and compulsory status (Abdi et al., 2021). Such variation implies that "having training" is not equivalent across institutions: in some settings, learners receive structured, scaffolded instruction, while in others exposure may be minimal or optional. This helps explain why training effects can appear modest or inconsistent in practice—because the "dose" and quality of training is uneven. The implication is that integrity literacy gains are strongest when training is delivered as a sequenced programme (early orientation + reinforcement at key milestones such as proposal writing, ethics submission, data management, authorship decisions, and publication) rather than as a single stand-alone session (Abdi et al., 2021).

4.3.2 Applied, task-embedded training is more likely to influence practice than informational or compliance-only approaches

A recurring pattern is that training shows clearer impact when it is hands-on and tied to authentic research tasks. Implementation evidence indicates that a structured workshop can translate into observable practice indicators—such as rapid increases in active users and in projects advanced to "production" status in a research data platform—suggesting that training can strengthen operational

research capacity when it teaches concrete skills and workflows (Klipin et al., 2014). While this is not a direct measure of misconduct reduction, it shows how training can build the infrastructure of good practice: better data handling, more systematic project setup, and wider adoption of secure tools.

In parallel, guidance for research-performing organisations emphasises that integrity education should be integrated with supervision and mentoring, so that ethical expectations are applied in daily decisions rather than retained as abstract policy knowledge (Forsberg et al., 2018). This theme implies that training works best when it moves beyond "what the rules are" toward "how to operationalise the rules" through examples, scenarios, feedback, and guided performance. In practice, this favours formats such as workshops, case-based discussions, supervised practice, and tool-based demonstrations, supported by checklists, exemplars, and consultative services (Forsberg et al., 2018; Klipin et al., 2014).

4.3.3 The knowledge–behaviour gap persists, training needs reinforcement through mentoring, support systems, and climate alignment

Although training often improves awareness, several studies imply that knowledge alone does not guarantee consistent integrity behaviour. For example, plagiarism-focused work suggests that even where students understand plagiarism, violations can persist owing to time pressure, language and writing constraints, skill gaps in paraphrasing and citation, or ambiguous expectations from teachers and supervisors (Selemani et al., 2018). This highlights the distinction between competence (knowing rules) and capability (being able to apply rules under real constraints). Research climate evidence reinforces this interpretation by showing that integrity is enacted within organisational contexts, where norms of openness, fairness, mentoring quality, and psychological safety influence whether individuals seek guidance, admit uncertainty, and correct problems early (Haven et al., 2020).

In environments where researchers feel unsupported or fear negative consequences, they may conceal mistakes or avoid reporting, weakening the practical impact of training. Thus, training is most effective when it is paired with mentoring structures, accessible consultation services, and clear procedures that normalise early help-seeking and correction. From a systems perspective, training should be linked to supervisory practice (e.g., feedback routines, authorship conversations, data management planning) and supported by "integrity infrastructure" (e.g., ethics support, data stewardship guidance, and transparent reporting channels) so that learning is reinforced through repeated practice (Forsberg et al., 2018; Haven et al., 2020).

4.3.4 Integrity training must evolve in response to AI-era risks by emphasising verification, disclosure norms, and ethical judgement

Emerging evidence suggests that integrity training is expanding beyond traditional plagiarism and citation instruction to include AI-enabled risks such as text generation misuse and misinformation. Reviews and practice papers argue that institutions must explicitly teach learners how to verify outputs, evaluate evidence quality, disclose AI use appropriately, and apply ethical judgement when using AI tools for writing and learning (Eager & Brunton, 2023; Lo, 2023).

Evaluation work on detection approaches indicates that combining academic judgement with software can improve identification decisions; however, detection remains imperfect and cannot replace clear policy and trained human judgement (Perkins et al., 2024). This means that integrity education now has to address both technical literacy (how AI tools work and where they fail) and ethical literacy (what counts as acceptable use, how to document assistance, and how to prevent fabrication or unverified claims). In practice, this calls for training modules on verification strategies, citation of AI-assisted work where applicable, transparency and disclosure expectations, and assessment redesign to reduce opportunities for misuse (Eager & Brunton, 2023; Lo, 2023; Perkins et al., 2024).

Table 3: Training strengthens research integrity

Author & Year	Country	Sample Size / Participants	Research Design	Focus	Key Findings
(Lo, 2023)	Education University of Hong Kong, Hong Kong	50 articles	Rapid literature review (50 articles)	Impact of ChatGPT on education	ChatGPT's performance varies across subjects, can support teaching and learning if used responsibly, and poses risks of plagiarism and misinformation that require training in verification, critical thinking, and ethical use.
(Eager & Brunton, 2023)	University of Tasmania affiliation visible in records	No empirical sample	Commentary / Case study	Case-based, Plagiarism-focused AI-augmented teaching	ChatGPT can enhance learning, engagement, and assessment design if used responsibly, with proper training, clear goals, and prompt skills.
(Martín et al., 2021)	Spain / virtual learning during COVID-19	398	Quantitative (cross-sectional)	Online, Plagiarism-focused	Addresses integrity knowledge/awareness; Shows moderate improvement in detection practices, but some AI-generated work still evaded reporting.
(Perkins et al., 2023)	Vietnam	22 GPT-4 submissions assessed by 15 academic staff	Experimental	Detecting AI-generated student work	Addresses integrity knowledge/awareness; Shows some improvement in practices/reduced misconduct.
(Gan & Snell, 2014)	Malawi, Mzuzu University	41 of 174 eligible students	Quantitative (intervention /evaluation)	Intervention	Addresses integrity knowledge/awareness; Targets ethical attitudes/confidence.
(Forsberg et al., 2018)	United States, University at Albany	Sample size not visible in search snippets	Consensus statement / Policy framework	Case-based, Mentoring-integrated	Shows some improvement in practices/reduced misconduct; Applied/case-based delivery appears more effective.

(Selemani et al., 2018)	The Netherlands, Vrije Universiteit Amsterdam and Amsterdam UMC	61 researchers in 12 focus groups	Mixed methods	Plagiarism-focused	Knowledge of plagiarism was high, but attitude and behavior change were modest, as many students still intentionally or unintentionally committed plagiarism.
(Y. H. Chen & Van Ullen, 2011)	International education literature	Samples were 70 for the research-process workshop and 65 for the plagiarism workshop.	Quantitative (intervention /evaluation)	Workshop, Plagiarism-focused	Workshops significantly improved international students' understanding of research processes and plagiarism, though some gaps in citation skills and library knowledge remained.
(Milara et al., 2020)	Higher education commentary; University of Tasmania affiliation visible in records	24 stakeholders	Longitudinal case studies, qualitative	STEAM/DF training on principals, teachers, and CoP developmen t	Shows some improvement in practices/reduced misconduct; Applied/case-based delivery appears more effective.
(Abdi, Pizzolato, et al., 2021)	Europe	11 of 23 LERU universities' didactic materials	Content analysis	Course on research integrity education	Shows some improvement in practices/reduced misconduct.
(Gupta et al., 2022)	Canada	114 doctoral students; 31 faculty supervisors	Mixed methods	Course, Online, Case-based, Supervision-linked	Knowledge/attitude gains are modest; behavior change is mixed; Applied/case-based delivery appears more effective.
(Haven et al., 2020)	The Netherlands	61 Researchers in 12 focus groups	Qualitative multi-focus group study	RCR-focused, Supervision-linked, Intervention	Strengthens ethical attitudes/confidence; Shows some improvement in practices/reduced misconduct.
(Klipin et al., 2014)	Malawi, Mzuzu University	(81) users	Descriptive implementati on evaluation	Workshop	Clinical and research data are essential for patient care, research and healthcare system planning.

Taken together, Table 3 shows that training strengthens research integrity most convincingly when it functions as a coherent institutional system rather than a one-time requirement. The reviewed evidence implies that staged delivery across degree milestones improves consistency by reducing uneven exposure and by clarifying expectations at the points when integrity risks typically arise. It also indicates that applied formats such as case discussions, hands-on workshops, and task-embedded activities produce more practice-relevant effects than lecture-style

instruction, with implementation evaluations showing measurable increases in real research-support behaviours after training.

At the same time, Table 3 highlights a persistent gap between knowing rules and consistently acting on them, as plagiarism-focused studies report improved understanding but continued violations when learners face writing and citation skill deficits, unclear supervisory guidance, or limited access to feedback and consultation. This pattern supports the need to reinforce training through mentoring routines, psychologically safe help-seeking, and accessible support services that encourage early correction. Finally, the inclusion of AI-related studies indicates that integrity training must now explicitly teach verification, transparency, and ethical judgement for tool-assisted work, since policies and detection approaches alone cannot reliably prevent misuse.

5. Discussion

Research integrity is the cornerstone of credible scholarship and the advancement of knowledge in higher education; nevertheless, it is increasingly challenged by questionable research practices and misconduct that can distort evidence, waste resources, and erode public trust. Based on the synthesis of 532 studies, the present review indicates that research integrity is best understood as an outcome of interacting institutional conditions rather than an individual trait alone. Across the evidence base, the strongest pattern is that integrity is most robust when HEIs function as coherent systems in which incentives, leadership tone, policies, reporting mechanisms, mentoring practices, and capacity-building structures reinforce one another (Briskin & Gunsalus, 2025; Cao et al., 2023; Lacey & Wilkinson, 2025). Where these elements are aligned, integrity expectations become visible, feasible, and socially reinforced, making responsible conduct more likely to be sustained in daily research decisions (Field et al., 2024; Valkenburg et al., 2021).

The findings suggest that ethical climate shapes integrity through recurring institutional signals about what counts as success and what behaviours are tolerated or sanctioned. Metric-driven environments that elevate publication counts, promotion targets, and competitive outputs consistently emerge as risk conditions that increase vulnerability to shortcuts and rationalisations. When researchers perceive that career progression depends primarily on output volume and speed, integrity norms can be displaced by performance pressure, particularly among early-career scholars navigating precarious pathways. In contrast, climates that reward rigour, transparency, careful documentation, and responsible authorship practices appear more likely to discourage questionable conduct because they reduce the perceived trade-off between ethical behaviour and academic survival.

The review also reinforces that policies alone are insufficient when they are unclear, inconsistently applied, or treated as symbolic. Institutions that demonstrate credible enforcement and clearly communicate expectations create boundaries that are easier to follow and harder to negotiate through informal exceptions (Huybers et al., 2020). Consistency matters because it shapes

perceptions of fairness and consequence; when standards are applied unevenly, ambiguity increases and questionable practices can become normalised. In such contexts, individuals may infer that integrity is optional or that violations are tolerated when outputs are strong, weakening the deterrent function of institutional rules and undermining the moral authority of integrity initiatives.

Another recurring feature of ethical climate is whether stakeholders feel safe to raise concerns, ask for guidance, or report wrongdoing without fear of retaliation, reputational harm, or procedural unfairness. The synthesis indicates that reporting safety is not simply a procedural issue but a cultural one, dependent on trust in leadership, confidentiality safeguards, and transparent processes (Haven et al., 2022). When reporting is perceived as risky or futile, silence becomes adaptive, and misconduct can persist unchallenged. Conversely, climates that normalise early help-seeking and protect those who speak up strengthen integrity governance by enabling correction before problems escalate and by reinforcing shared accountability.

Mentoring and supervision emerge as central mechanisms through which integrity is transmitted and enacted in everyday research work. Across study contexts, the daily practices of supervisors and senior researchers—how they discuss authorship, manage data, model transparency, provide feedback, and respond to mistakes – shape the ethical habits of students and early-career researchers. This suggests that integrity is learned through socialisation as much as through formal instruction, and that mentoring quality can either buffer pressures that encourage shortcuts or intensify them when supervisors primarily reward productivity without emphasising responsible processes.

Beyond interpersonal dynamics, the evidence indicates that sustainable integrity requires institutional capacity in the form of accessible supports and infrastructure. Integrity culture (Labib et al., 2024) is strengthened when institutions provide practical resources that make ethical behaviour easier to perform, such as consultation services, clear guidance on authorship and data management, reporting pathways, and continuous professional development opportunities (Zhaksylyk et al., 2023). When such infrastructure is absent, individuals may still value integrity but struggle to operationalise it under constraints, increasing the likelihood of unintentional violations or ethically compromised decisions made under time pressure and uncertainty.

Regarding training systems, the review shows that integrity education most reliably improves knowledge and awareness, especially around boundaries of plagiarism, responsible scholarship, and the steps required to comply with research standards. However, effects are variable, and improvements in knowledge do not consistently translate into behaviour change. A major explanation supported by the synthesis is that integrity training differs widely across institutions in timing, duration, content coverage, and whether it is reinforced over time, meaning that "training" can range from a single compliance session to a structured, scaffolded developmental programme (Abdi, Pizzolato, et al., 2021).

Where training is fragmented or optional, gains may be modest and short-lived, particularly if learners do not encounter opportunities to practice ethical decision-making in realistic contexts. Training appears more likely to influence practice when it is applied, interactive, and embedded in authentic research tasks rather than delivered as purely informational or rule-focused content. Approaches that engage learners in case-based dilemmas, supervised practice, feedback-driven writing and data tasks, and guided application to real milestones tend to support deeper understanding and practical uptake because they show how norms operate in real decisions. This pattern supports the broader finding that integrity is a competence that must be developed through repeated performance, reflection, and correction rather than a set of policies to be memorised.

Despite these benefits, a persistent knowledge–behaviour gap remains visible across the literature, indicating that knowing what is right does not guarantee acting ethically under real-world conditions. Many integrity lapses are linked to pressure, skill deficits, unclear expectations, and low perceived consequences, suggesting that training must be reinforced through mentoring, supportive feedback structures, accessible consultation, and climates that encourage early correction (Gopalakrishna et al., 2022; Holtfreter et al., 2020; Maggio et al., 2019). When institutions deliver training but maintain hypercompetitive incentive systems, weak supervision, or unsafe reporting environments, training effects may be limited/minimised because learners face daily signals that reward speed and output over careful process. Conversely, when climate and training are aligned, integrity messages are amplified by consistent expectations and by practical supports that make ethical conduct both achievable and professionally valued.

Finally, the synthesis indicates that integrity systems must adapt to emerging risks associated with AI-enabled writing and research workflows by emphasizing verification practices, transparency, and ethical judgment. As tool-assisted work becomes more common, institutions will need to ensure that training addresses how to evaluate accuracy, document assistance appropriately, and maintain accountability for claims and evidence. This reinforces the broader conclusion of the review: research integrity is strengthened most effectively when institutions treat it as an integrated system, where incentives support rigour, policies are credible, reporting is safe, mentoring models responsible conduct, and training is continuous, applied, and reinforced, so that ethical expectations become the normal and supported way of doing research rather than an added burden competing with performance demands.

6. Conclusion

This review positions research integrity in higher education as an institutional accomplishment rather than a purely individual virtue. Synthesizing 532 Scopus-indexed studies, it shows that responsible research conduct is produced through the alignment—or misalignment—of ethical climate, incentive systems, policy enforcement, reporting safety, mentoring practices, and integrity-support infrastructures. Across the evidence base, integrity was most fragile in

environments organized around hypercompetitive output metrics and most durable where expectations, supports, and accountability mechanisms operated coherently as part of everyday research life.

The review also clarifies the conditional value of research integrity training. Training consistently strengthens knowledge and awareness; however, its effects on attitudes and practice are far less automatic. What matters is not simply whether training exists, but whether it is cumulative, context-sensitive, interactive, and reinforced through supervision, consultation, and institutional follow-through. In other words, training is most consequential when embedded within a broader ecology of mentoring and support that enables researchers to translate ethical understanding into routine practice.

A central implication of this is that the persistent gap between integrity as principle and integrity as practice is fundamentally structural. Researchers may know the rules yet still work within conditions that reward speed, output, and competitiveness more visibly than rigour, transparency, and reflexive judgment. This suggests that efforts to improve research integrity remain limited so long as institutions treat misconduct as an individual deviation rather than as a phenomenon patterned by organizational culture and evaluative regimes. The review further indicates that integrity governance must now adapt to AI-mediated scholarship. As generative tools become woven into academic writing, teaching, and knowledge production, integrity systems can no longer rely on traditional plagiarism frameworks alone. They must incorporate verification, disclosure, transparency, and ethical judgment as core competencies of contemporary research practice.

Taken together, the evidence supports a shift from compliance-based models of integrity toward whole-of-institution integrity systems. The contribution of this review lies in showing that research integrity is sustained not by isolated policies or one-off training events, but by institutional arrangements that make responsible conduct credible, supported, and realistically practicable. For HEIs, the challenge is therefore not only to teach integrity, but to organize academic life in ways that allow integrity to be lived.

7. Conflict of Interest

The researchers declare that there are no conflicts of interest, financial or otherwise, that could have influenced the conduct, results, or interpretation of this study. The research was carried out independently, and all findings are presented objectively and without any undue influence from external parties.

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