

Audit evidence, technology, and judgement: A review of the literature in response to ED-500

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Abstract

In October 2022, the International Auditing and Assurance Standards Board (IAASB) issued Exposure Draft 500 (ED-500). This is focused on revising and integrating the standard auditors use when evaluating audit evidence during an external audit. This study contributes to the ongoing discourse as the IAASB evaluates feedback to ED-500 and executes its standard-setting agenda. We review academic literature published in the past 10 years to synthesize extant knowledge specifically on the use of technology and the application of professional skepticism during audit evidence evaluation. Our review offers factors the IAASB should consider when seeking to modernize and future-proof its standards, suggesting improvements to the proposed ED-500. We also identify fruitful avenues for future academic research.

KEYWORDS

audit evidence, IAASB, ISA 500, professional skepticism, technology

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1 | INTRODUCTION

In October 2022, the International Auditing and Assurance Standards Board (IAASB) issued a proposed revision to International Standard on Auditing 500, *Audit Evidence* (ISA 500), which guides “the auditor’s responsibilities relating to audit evidence when designing and performing audit procedures” (International Auditing and Assurance Standard Board IAASB, 2022, p. 10). This paper applies an academic lens to the changes proposed in the Exposure Draft 500 (hereafter ED-500) by synthesizing findings from the literature, discussing the implications of the research for ISA 500 and identifying opportunities for future research.

Obtaining reliable and relevant audit evidence is complex and challenging (e.g., Hirst, 1994). As capital markets have grown, businesses have become more diversified and globalized, expanding their operations to different countries and regions. This makes it more challenging for auditors to understand business operations, adapt to differing accounting standards, cultural norms and legal requirements and identify the evidence required to support financial assertions (Liu & Lai, 2012). Businesses have also increased their use of technology, requiring auditors to obtain the specialized skills and knowledge needed to navigate and gather valid evidence from these systems, as well as the skills needed to analyze and interpret the vast, complex data contained within these systems (e.g., Brown-Liburd et al., 2015). Further, regulatory efforts aim at serving the public interest and setting high-quality auditing and assurance (van Nieuw Amerongen et al., 2023). These efforts and other related standards have increased auditors’ burden with respect to qualifications, certifications and substantive procedures required in the performance of audit engagements and have established significant penalties should auditors fail to meet expectations (International Auditing and Assurance Standard Board IAASB, 2020). Furthermore, auditors have seen increased scrutiny as their work has been subject to more rigorous review. This has led to a greater emphasis on audit quality and the need for auditors to obtain more robust audit evidence that meets the increasing demands of regulators, investors, and other stakeholders.

Against this backdrop, the IAASB has proposed modifying ISA 500 to provide more modern, adaptable guidance in auditors’ attainment of audit evidence. In subsequent sections, we discuss these modifications and the related findings of relevant academic literature. Our synthesis shows that the proposals in the ED-500 could have a positive impact on the audit evidence process. However, caution should be taken with respect to the application of auditor judgment, the use of technology in supporting audit findings and threats to auditor skepticism.

To address the research implications identified, we offer the following recommendations to the IAASB as it considers revisions to ISA 500:

1. Provide guidance and practical examples related to mitigating the adverse effects of applying judgment when using technology to enhance the audit evidence process.
2. To consider cognitive biases and related limitations associated with technological tools that could adversely affect judgment given principles-based evidence collection standards.
3. Emphasize segregation of the audit evidence identification and collection/testing processes.
4. Recommend that auditors evaluate whether evidence generated by technology should be primary or complement traditional audit evidence-gathering techniques.
5. Emphasize that technology should only be used if the auditor (or a contracted specialist) has the requisite skills to implement that technology properly.
6. Acknowledge threats to applying professional skepticism not covered by ED-500, such as overconfidence and outcome bias.

The remainder of this study includes five sections. After a brief discussion of ED-500's background in Section 2, we describe the methodology in Section 3. In Section 4, we synthesize findings from the applicable academic literature. Section 5 provides ideas for future research and offers concluding remarks.

2 | BACKGROUND ON INTERNATIONAL STANDARD ON AUDITING ED-500

In 2008, as part of the IAASB's Clarity Project, extant ISA 500 was redrafted and released with an effective date of December 15, 2009. Ancillary modifications were made during the subsequent 10 years, until January 2019, when the IAASB established a working group tasked with identifying "issues related to audit evidence, recognizing the evolution in the business environment and audit practice" (International Auditing and Assurance Standard Board IAASB, 2022, p. 5). The working group provided its feedback in June 2019. The IAASB determined that more information and targeted outreach with stakeholders was needed to achieve its mission. Specifically, the Board sought to understand better the root causes of challenges faced by auditors in practice and how these challenges could be addressed. In December 2020, the IAASB approved a project to modernize ISA 500. The results of this project culminated in the release of ED-500 in October 2022, that addressed four standard-setting objectives (International Auditing and Assurance Standard Board IAASB, 2022):

1. To clarify the purpose and scope of ISA 500, including how the standard relates to other standards.
2. To develop a principles-based approach to evaluating whether the auditor obtained sufficient and appropriate audit evidence.
3. To make ISA 500 adaptable to modern technology use by both the business and the auditor, including automation.
4. To emphasize professional skepticism when evaluating audit evidence.

In its request for public comments, the IAASB noted three key public interest-related issues accomplished by the proposed revisions to ISA 500. The first is "responding to changes in the information that is being used by auditors, including the nature and source of the information" (International Auditing and Assurance Standard Board IAASB, 2022, p. 7). To address this issue, the proposed revisions to ISA 500 include relevance and reliability attributes designed to enhance the auditor's evaluation of audit evidence.¹ One challenge with the existing standard is scalability to fit the differences in sizes and attributes of accounting firms and their diverse portfolios of clients (e.g., CPA Journal, 2020). ED-500 contains language that would make ISA 500 more dynamic, enabling the standard to remain practice relevant over time. This approach empowers auditors to be responsive to advances in innovation and technology and to ensure that completing engagements is not at odds with compliance with audit standards.

For example, regarding relevance, ED-500 proposes that a logical connection should be made between audit evidence and the purpose of the audit procedure, including any assertions being tested. This connection is consistent with how auditors should plan and execute an effective audit. Regarding reliability, ED-500 suggests that auditors consider evidence characteristics such as accuracy, completeness, authenticity, bias and credibility. As these examples suggest, the attributes presented in ED-500 do not prescribe specific actions an

auditor *should* or *must* take concerning audit evidence evaluation, nor do they prescribe circumstance-dependent guidance. ED-500 is judgment-based. That is, it permits auditors leeway in how they ensure compliance. In further addressing the nature and source of information to be used as audit evidence, ED-500 also clarifies that auditors should give incremental scrutiny to evidence prepared by a management expert, subjecting this evidence to the same relevance and reliability evaluation as other evidence, as well as considering additional issues such as expert competence and management modifications.

The second key public interest issue addressed is “modernizing and supporting a principles-based standard that recognizes the evolution in technology” (International Auditing and Assurance Standard Board IAASB, 2022, p. 8). ED-500 does not prescribe an auditor’s use of technology in obtaining audit evidence. Instead, it supports the use of technology at the auditor’s discretion and addresses issues that may arise from the use of technology. ED-500 states that auditors may “perform audit procedures manually or using automated tools and techniques... to obtain audit evidence” (International Auditing and Assurance Standard Board IAASB, 2022, p. 26). ED-500 also provides situations where automation may be preferred (e.g., to increase the persuasiveness of evidence) or even necessary (e.g., when manual procedures are impracticable). ED-500 further cautions regarding the risk of relying on automation to obtain audit evidence, such as automation bias and provides example bias mitigation techniques.

The final public interest issue addressed by ED-500 is “fostering the maintenance of professional skepticism when making judgments about information to be used as audit evidence and sufficient appropriate audit evidence” (International Auditing and Assurance Standard Board IAASB, 2022, p. 9). ED-500 emphasizes professional skepticism—mainly when designing and performing audit procedures, applying relevance and reliability attributes to evaluating audit evidence and assessing the sufficiency and appropriateness of audit evidence that supports the audit conclusion.

In the following sections, we review the academic literature that aligns with these three objectives and discuss related implications for the proposed revisions to ISA 500.

3 | LITERATURE IDENTIFICATION METHODOLOGY

We use a systematic approach to identify relevant academic research for our literature review. The methodology involves a step-by-step process that includes identifying the relevant topics covered by ED-500, conducting a literature search, screening the literature to identify studies that meet the pre-defined inclusion and exclusion criteria, critically appraising the quality of the studies using pre-defined criteria, extracting relevant data from the selected studies, synthesizing the findings from the selected studies and reporting the review findings clearly and transparently.

This systematic approach to our literature review provides several benefits, including reducing bias, increasing transparency and improving the validity and reliability of the review findings. It also provides a standardized approach that other researchers can replicate, increasing our findings’ reliability and generalizability (Leventis et al., 2023). We focus on the main areas of the proposed standard, namely: audit evidence, the use of technology and professional judgment.

To identify literature that discusses these areas in an auditing context, we first searched Google Scholar for articles that contain the term “audit”, inclusive of variations such as “auditing” and “auditor”, and one of the following related to terms: “technology”, “evidence”,

and “skepticism”. We include papers when the authors agree that the manuscript aligns with one of the three focus areas in ED-500. We restrict our sample to studies published in accounting journals to ensure relevance to the accounting profession (c.f., Leventis et al., 2023). We focus on studies published between January 2013 and April 2023 (when this review was completed) to cover the most recent 10 full years of development in relevant areas. Finally, in line with recent literature review studies and in an attempt to provide timely evidence that would also inform the IAASB, we restrict our sample to studies published in journals that rank B or higher on the Australian Business Deans Council (ABDC) list (Hoque, 2014; Jayasiri et al., 2023; Moses & Hopper, 2022). We provide detailed descriptive statistics of our final sample in the following paragraph and Appendices A, B, and C.

Our literature search and coding process yields a final list of 58 articles. These articles are published in 20 accounting academic journals. As indicated in Appendices A, B, and C, 55 (95%) of the 58 articles are published in A* or A journals. Most of the publications are in *Accounting Horizons* (12 [21%]), *The Accounting Review* (7 [12%]), *Contemporary Accounting Research* (6 [10%]), *Accounting, Organizations and Society* (5 [9%]), *AUDITING: A Journal of Practice & Theory* (4 [7%]) and *International Journal of Auditing* (4 [7%]). Most of the publications are using data from the US (23 [40%]), Australia (6 [10%]), Europe (3 [5%]), and China (1 [2%]) while 9 (16%) articles do not disclose where the data is coming from and 20 (34%) do not use participant data.² Further, we find that 37 (64%) of the 58 articles use quantitative methods that include archival data (1 [2%]), experiments (30 [52%]), and surveys (6 [10%]). We also observe that 31 (53%) of the articles use qualitative methods that include analytical models (2 [3%]), bibliometric analysis (1 [2%]), case studies (2 [3%]), discussion papers (11 [19%]), semi-structured interviews (8 [14%]), and theoretical models (7 [12%]).³

4 | REVIEW OF THE RELEVANT LITERATURE

4.1 | Audit evidence sufficiency and appropriateness (including reliability and relevance)

As an external auditor, gathering and evaluating audit evidence is central to the audit process. Audit evidence is any information that supports or contradicts management's assertions regarding the financial statements and is also defined in the extant ISA 500 as “the information used by the auditor in arriving at the conclusions on which the auditor's opinion is based” (International Auditing and Assurance Standard Board IAASB, 2021, p. 290). The standard describes the auditor's objective as designing and performing procedures that yield sufficient and appropriate evidence. These characteristics, while distinct, are interrelated. Sufficient evidence is only helpful if it is appropriate, and vice versa.

According to ISA 500, sufficiency refers to the quantity of audit evidence. Germane to the proposed amendment of ISA 500, the extent of audit evidence, such as a sample versus a population enabled by the use of technology, influences the auditors' ability to appropriately respond to the risk of material misstatement (e.g., Backof et al., 2018; Barr-Pulliam et al., 2022). Insufficient evidence could lead to Type I or Type II errors related to the audit opinion.

ISA 500 specifies that appropriateness is “the measure of the quality of audit evidence” (International Auditing and Assurance Standard Board IAASB, 2021, p. 290). That quality is assessed through the evidence's relevance and reliability. Reliability refers to the nature, source and how the audit evidence was collected. The auditors must be satisfied that the evidence they

obtain is trustworthy given its source (e.g., Hirst, 1994). Evidence is most reliable when obtained from independent and objective sources, such as a bank statement or a third-party confirmation, or otherwise generated by the auditor. Relevance refers to the connection between the audit evidence and the management assertion(s) examined in each audit test (e.g., Shelton, 1999). Audit innovation and technology influence appropriateness, such as electronic versus traditional mailed accounts receivable confirmations (e.g., Barr-Pulliam et al., 2022).

The changing landscape of auditing influences the sources and quality of information, making auditors' ability to respond to the risk of material misstatement increasingly more challenging. We next synthesize the auditing literature related to the sufficiency and appropriateness of audit evidence. We focus on three themes from this research: external influences, behavior and cognitive biases under principles-based standards and other factors (e.g., auditor confidence, joint audits and disconfirming evidence).

4.1.1 | External influences on audit evidence gathering

Gathering audit evidence and assessing its reliability and relevance is increasingly complex. Direct and indirect stakeholders can influence the collection of audit evidence and, thus, auditor independence. We identify three categories of external influences among the eight studies focused on the topic: (1) clients, the audit firm and peer auditors, (2) regulatory pressure on types of audit procedures, and (3) the use of prompts and auditor tendencies.

Bennett and Hatfield (2013) examine how social interactions between staff-level auditors and client management influence staff auditors' perceptions and behaviors related to the collection of audit evidence. Using a survey of 28 staff auditors employed by public accounting firms (country not disclosed), they find that these junior auditors perceive a power differential between themselves and management at their clients (e.g., the CFO), who tend to be more experienced, older, and have more accounting knowledge. Results of a follow-up experiment with 138 master students (who are proxies for staff auditors) suggest that staff auditors reduce the extent to which they collect evidence to minimize in-person interactions with client management. However, email communication with the client appeared to mitigate this behavior partially. Particularly germane to the proposed revision to ISA 500 to respond to changes in the nature and source of the information that is being used by auditors, half of the staff auditors that reduced the audit evidence they collected also provided insufficient or inappropriate documentation. This behavior could influence audit quality because it obfuscates information and decreases the likelihood of reviewers identifying a problem.

Bennett and Hatfield (2017) examine how the source of deadline pressure influences auditors' judgments regarding the materiality of internal control deficiencies and the perceived sufficiency of audit evidence to test client remediation of identified deficiencies. Using an experiment with 123 audit professionals (country not disclosed) at the manager level and above, the study finds that auditors assess identified internal control deficiencies as less material when deadline pressure is high and when the pressure originated from their audit firms. Furthermore, audit firm deadline pressure is associated with sampling fewer items and increasing error tolerance when evaluating client remediation efforts.

Aghazadeh and Hoang (2020) also examine auditors' relationships with clients. However, the focus is on relationship management tools such as client satisfaction surveys and how they influence auditor acquiescence to management. Using an experiment with 84 US audit seniors, the study finds that auditors are more likely to identify client persuasion attempts when their

firms emphasize client relationship quality. However, this identification is not associated with a higher likelihood of collecting more relevant audit evidence. Auditors do not pursue independent audit evidence that could reduce their reliance on client-provided information despite their increased perceptions of client persuasion.

Kuselias et al. (2021) examine how social media influences auditor evidence evaluation. Using an experiment with 56 US auditors (mostly juniors and seniors), the study finds that auditors request and review less evidence when exposed to social media posts showing peers engaged in recreational behavior. Exposure to posts showing peers engaged in professional activities mitigates this problem.

Glover et al. (2015) provide a potential intervention for auditor reticence to use substantive analytical procedures as audit evidence due to regulatory scrutiny suggesting such procedures provide insufficient evidence. In their commentary, the authors argue against this behavior, suggesting that appropriately designed analytical procedures offer low-to-moderate levels of assurance because they can signal whether plausible relationships exist between and among financial statement accounts. To improve the effectiveness of analytical procedures and, thus, audit quality, the study proposes relaxing the “assumption that the threshold for substantive analytical procedures must be less than or equal to the level of audit materiality when the substantive analytical procedure is used to provide complementary evidence for the relevant assertion, together with the other evidence obtained by the auditor” (Glover et al., 2015, p. 171). The authors argue that this approach is consistent with both auditing theory and auditing standards, and use statistical analyses to quantify how the use of substantive analytical procedures can be beneficial in obtaining audit evidence that provides assurance against large material misstatements.

Rasso, (2015) investigates whether audit evidence documentation instructions that prompt auditors to think more abstractly (high-level construals) relative to thinking more concretely (low-level construals) improve pattern identification. Consistent with construal-level theory (Trope & Liberman, 2010), the study suggests that abstraction can help individuals combine separate pieces of audit evidence into a more holistic picture of the evidence. Based on an experiment with 58 experienced auditors (country not disclosed), the results were consistent with expectations. Auditors prompted to think more abstractly when collecting audit evidence related to complex estimates were more skeptical of the evidence.

Commerford et al. (2017) examine auditor tendencies during audit evidence collection. Specifically, they explore auditor information foraging that describes how individuals learn to acquire information through personally experiencing the costs incurred and the values obtained from information. Using two experiments based in the United States, one with 77 masters of accountancy students and the other with 58 audit seniors employed by Big Four firms, the study shows that auditors choose larger sample sizes when personal costs of collecting and testing samples are removed (e.g., another auditor will test the evidence).

Backof et al. (2018) also examine how construal levels influence auditors' evaluation of evidence in complex estimates setting. In an experiment with 154 auditors (country not disclosed) at the manager level and above, they focus on how evidence formatting (graphical vs. textual) impacts evidence evaluation. Unlike Rasso (2015), auditors considering evidence with low-level construals exhibit higher professional skepticism, specifically when they receive the evidence in graphical form. Evidence in graphical form could increase cognitive fit when a task requires pattern identification among several data points. The differential finding related to the construal level could be due to the study's focus on auditor sensitivity to contradictory evidence.

Viewed as a collection of literature, the aforementioned studies show that audit evidence collection is impacted by a variety of sources (internal, client, external audit, and regulators),

and that these impacts can be detrimental to obtaining sufficient and appropriate evidence. Cognitive and procedure-based interventions have the potential to mitigate these detrimental effects.

4.1.2 | Audit evidence gathering under the principles-based standards & cognitive bias

Peytcheva, Wright, et al. (2014) develop and test a theoretical model that explores principles versus rules-based accounting standards' influence on auditors' perceived accountability (the expectation to justify one's actions), epistemic motivation (the level of effort and detail applied to understanding a problem) and evidence search (the number of items requested from a menu of audit evidence). The theoretical model is tested using an experiment with 104 and 48 auditors from the US and the Netherlands, respectively. Results suggest that principles-based accounting standards (proxied by International Financial Reporting Standards [IFRS] adoption) increase auditors' process accountability, which increases their epistemic motivation. Higher epistemic motivation induced by principles-based accounting standards, in turn, increases the number of evidence items that auditors request.

Cao and Coram (2020) also examine auditors' evidence search using an experiment (166 auditors from China who had experience working with Chinese Accounting Standards [CAS] and IFRS) comparing evidence collection under rules-based and principles-based standards, and their influence on emerging markets like China. In 2007, China moved from rules-based CAS to principles-based IFRS, and most of the auditors in China have experience working with both standards. Consistent with Peytcheva, Wright, et al. (2014), their results suggest that auditor evidence demands increase under principles-based accounting standards (IFRS). These demands are even greater when the accounting regulator has relatively more power.

Pennington et al. (2017) examine the extent of auditors' advocacy attitudes on their initial and subsequent information searches. An experiment with 60 Big Four auditors (country not disclosed) indicates that a client-favorable advocacy attitude leads auditors to select more conservative evidence supporting this position. Alternatively, auditors with lower advocacy attitudes are more likely to search for evidence against the client's preference when initial judgments represent an unfavorable client position. Auditors with more neutral advocacy attitudes were more objective in their information search, mitigating the cognitive bias associated with advocacy.

Lambert and Peytcheva (2020) examine the averaging effect—a cognitive bias whereby individuals evaluate a bundle of relevant, directionally consistent evidence as though averaging the strength of the components (e.g., Weaver & Garcia, 2018)—on auditors' evidence search. Using 104 experienced auditors from the United States, the study finds that auditors make more strongly unfavorable judgments in response to a single, strong evidence item than a bundle including the strong evidence item and a collection of weaker evidence. This suggests that auditors are subject to the averaging cognitive bias, as including weaker evidence reduces their objectivity concerning strong evidence. This cognitive bias is mitigated when the evidence presented is inconsistent with their initial client impressions.

Hammersley and Ricci (2021) study whether audit programs with either a plan-focus (i.e., focus on planned audit procedures) or a goal-focus (i.e., focus on the task goal) affect auditors' evidence collection. Results from an experiment with 123 experienced auditors from the United States suggest that goal-focused auditors collect more *effective* evidence than plan-focused auditors and, in turn, follow up on this evidence in a way that could improve audit quality.

4.1.3 | Other factors influencing audit evidence gathering

Zhao and Harding (2013) examine how information order affects auditor judgments and decisions. Specifically, the study examines how the order in which auditors review various pieces of evidence (e.g., information systems, financial statements) influences whether and how they identify patterns among these evidence items. Using an experiment with 63 junior and senior auditors from Australia that also manipulates a requirement to document justification for their risk assessments (present vs. absent), the findings suggest that auditors assess the risk of material misstatement as higher when the business environment evidence contradicts information system and financial statement information and is presented last (rather than first, as is traditionally the case). The requirement to document justification for the risk assessment diminishes the influence of order effects.

Another area of interest is the concept of joint audits. Some countries require auditors to engage other firms to increase independence and to increase competition in the audit market (e.g., European Commission, 2011). An open question in this context is if joint audits improve or impair audit quality through their impact on audit evidence precision. Deng et al. (2014), one of the first studies to examine this question, suggest that audit quality may not improve with joint audits in certain contexts. An auditor's analytical model pairs a large firm with a smaller one, and infers that audit quality diminishes due to a perceived "free-riding problem" between the firms, leading to diminished audit evidence precision.

Complex estimates are another pervasive auditing issue (e.g., Bratten et al., 2013). Because measurement uncertainty and subjectivity are inherent in these estimates, auditors struggle to identify and evaluate appropriate audit evidence (e.g., Barr-Pulliam et al., 2019). Rowe (2019) conducted an experiment with 95 US Big Four senior auditors that examines the combined effects of estimate uncertainty (moderate vs. extreme) and evidential support from management (less vs. more) on auditors' level of comfort with a complex estimate and expected financial statement adjustments related to that estimate. The results suggest that extreme (moderate) estimation uncertainty increases auditor comfort when management provides more (less) evidential support. While more evidentiary support provided in the moderate uncertainty condition does not impact auditor confidence in their estimates, they perceive the estimates as harder to defend.

Glover et al. (2019) also examine the relationship between complex estimates and auditor evidence search. However, the focus is on identifying factors contributing to the differences of opinion between auditors' and regulators' perceptions of why engagements with significant estimates continue to have deficiencies during regulatory inspections. The study employs a field-based survey of highly experienced auditors (32 practicing and 5 national office audit partners from the United States) that includes open- and closed-ended questions. A key finding relevant to this literature review is a perceived expectations gap, whereby auditors and inspectors interpret standards and evaluate audit evidence differently. A contributing factor to this expectations gap is a difference in opinion about what constitutes a deficiency in audit work.

Griffith et al. (2020) offer a perspective on auditor confidence, knowledge sharing among auditors and how both impact junior auditors' willingness to communicate perceived audit issues to team leaders. The study focuses on junior auditors because they collect the largest part of the evidence used in the engagement. An initial survey of 66 junior auditors from the United States provides evidence that junior auditors consult one another for advice about reporting potential audit issues. Three follow-up experiments with audit juniors and seniors suggest three key findings. First, junior auditors consistently underestimate the importance of raising audit

concerns relative to their supervisors. Next, junior auditors tend to seek and rely on peer advice and are more likely to follow that advice when it confirms their initial stance and the quality of expected supervisor feedback is low. Finally, if the advice is contradictory, it is most influential when auditors expect low-quality feedback from an immediate supervisor when communicating audit issues.

Agrawal et al. (2020) also contribute to the discourse around the audit of complex estimates. However, the study focuses on how the expert that financial statement preparers use to help them develop an estimate influence how the auditor uses existing standards (e.g., Australian Auditing Standard [ASA] 500) to determine the amount of reliance on these experts' work. The standards encourage auditors to evaluate the expert's competence with the relevant financial reporting standards, the geographical location of the preparer and the source (in-house vs. outsourced) of the expertise. Interviews with nine experienced auditors suggest that these factors minimally influence auditor's evaluation of the credibility of this evidence source. A more important factor is the reputation of the firm employing management's expert and any corroborating information auditors can gather from independent sources. The findings of Agrawal et al. (2020) build on and complement an earlier study (Joe et al., 2017) that also examines the notion of estimation uncertainty related to management's use of experts (specialists) to prepare estimates that appear in the financial statements. In two experiments with 92 experienced auditors, the results of Joe et al. (2017) suggest that auditors are least likely to apply subjective procedures to test the subjective inputs to management's estimates when the control risk is high and the support the specialist who prepared management's estimate is more quantitative than qualitative. Relatedly, Agrawal et al. (2021) conduct an experiment with 69 experienced Australian auditors to further examine interactions between auditors and management's preparing specialists for a complex estimate. The study finds that conversations between the auditor and management's experts before the estimate preparation adversely affect the client's willingness to accept proposed adjustments during the year-end audit. The results do not suggest that auditors acquiesce to management's unwillingness to accept the adjustments. However, the results do suggest that auditors negotiate an adjustment that meets both the auditor's and the client's preferences.

Bobek et al. (2021) examine tax professionals' role in the financial statement audit and how that role influences audit evidence evaluation. Using an experiment with 63 auditors and 59 tax professionals (country not disclosed), the study examines whether professional role (auditor vs. tax professional) and auditor-tax professional affiliation (same office, different office, different firm) influence evidence evaluation when placed in an "auditor" role on an engagement. While the hallmark of the auditing profession is independence and objectivity, tax professionals also have a client advocacy role. Consistent with this notion, the study observes that auditors and tax professionals differ in their trait skepticism and client advocacy attitudes. However, tax professionals assist on an audit engagement, and the experimental results suggest that tax professionals and auditors make similar judgments when they serve in an "auditor" role. Results also suggest that auditors and tax professionals are more persuaded by individuals with whom they have a closer affiliation (e.g., employed by the same office).

Collectively, these studies show that auditors' evidence gathering is affected by the regimes in which auditors operate (principles vs. rules-based standards, high vs. low regulator power), cognitive biases, working arrangements such as joint audits, complexity of information being audited, internal versus external expectations, and professional roles. These numerous influences highlight the nuanced nature of audit evidence collection, suggesting there is not an objective "one right way" to perform it, and opening the door for professional judgment and technology to play critical roles.

4.2 | Auditors' use of technology

The use of technology has become a competitive advantage for audit firms and influences the efficiency and effectiveness of their audits. Leveraging technology such as machine learning, robotic process automation and process mining permits auditors to perform their audit tasks better. Consequently, it is essential to understand how auditors' use of technology could influence the proposed revisions to ISA 500 and other audit standards.

4.2.1 | Big data and data analytics

Growing access to big data increases the possibility that using data analytic techniques can enhance the sufficiency and appropriateness of audit evidence (Yoon et al., 2015). These opportunities support the shift from experience-based decision-making to data-driven decision-making. Digital transformation in auditing began recently and has quickly caught up with developments elsewhere in the data revolution (e.g., Eulerich et al., 2022). Considering the progressive digitalization of business entities, fully automated and semi-automated digitalized audit processes are inevitable (e.g., Kogan et al., 2019).

Researchers suggest frameworks and methodologies that enable data analytics use in different stages of the audit process. For example, No et al. (2019) propose a multidimensional audit data selection framework that enables auditors to use data analytics in the audit data selection process. This framework helps identify data outliers and focuses auditors' attention on the remaining item with a higher risk of material misstatement. Similarly, Yoon et al. (2015) provide an audit evidence criteria framework used to evaluate big data's sufficiency, reliability and relevance as complementary support to more traditional audit evidence.

Chiu and Jans (2019) suggest, and validate with a case study, the effectiveness of process mining of event logs for internal control testing. Jans and Eulerich (2022) focus on using process mining for financial audits and show ways how to gather evidence with process mining as a advanced data analytics tool. Chang and Luo (2021) argue that data visualization potentially improves the effectiveness and efficiency of the mining process. However, data visualization carries the risk of being subject to cognitive biases, such as overconfidence, confirmation and anchor biases. To mitigate these cognitive biases, the authors suggest that auditors should use visualization only to complement other audit evidence.

Literature suggests that auditors are better able to identify patterns highlighting potential misstatements in a big data visualization when they first view more traditional audit evidence (Rose et al., 2017). Eilifsen et al. (2020) argue that the use of audit data analytics can enhance audit quality and efficiency by improving the identification of unusual transactions, patterns and trends in financial data, and through more thorough and comprehensive testing of entire populations of data, rather than relying on sampling methods. Audit data analytics can also reduce the need for manual, time-consuming tasks, such as data entry and manipulation, thereby, freeing up auditors' time to focus on more complex and judgmental areas. Finally, audit data analytics can increase the consistency and standardization of audit procedures across different audit engagements, reducing the potential for variability and bias in audit judgments.

However, as Alles and Gray (2016, p. 58) explain, "Big Data is only a means towards an end—not a magic bullet—and how well it works depends on the choices made by the analyst (auditor)." Even if the benefits of big data and data analytics are undeniable, various challenges must be addressed. One particular issue can be a potential risk of false positives (Alles &

Gray, 2016). Literature suggests that audit evidence should not be entirely based on Big Data. Instead Big Data should be used instead to verify audit findings, identify risks and serve as complimentary audit evidence (Brown-Liburd et al., 2015; Rose et al., 2017; Yoon et al., 2015). Other challenges are cost and the steep learning curve related to data analytics and full population testing (Huang et al., 2022) that could further widen the gap between large, highly-resourced accounting firms and their smaller, lower-resourced competitors.

4.2.2 | Emerging technologies

Emerging technologies have no single agreed definition and are generally described as technologies that are not widely available, not yet commercial, not yet “must haves” or not socially relevant although they have the potential to become so over a short time frame (see Halaweh [2013] for a discussion of common definitions). Within the audit domain, emerging technologies such as machine learning, textual analysis, Artificial Intelligence (AI), robotic process automation (RPA) and blockchain technology offer alternative ways of collecting and analyzing audit evidence.

Machine learning

Deep learning techniques are spurring the use of semi-structured and non-structured data for audit purposes (Sun, 2019). Machine learning technologies can be used on full population testing (Huang et al., 2022) or for peer selection for benchmarking purposes (Ding et al., 2019). We note that by employing these technologies and prioritizing unusual or suspicious transactions, auditors can increase the effectiveness and efficiency of the audit process.

Zhaokai and Moffitt (2019) illustrate the benefits of textual analysis when analyzing contracts, extracting audit-related content, detecting value and text-based anomalies and generating audit evidence. Lee et al. (2022) shows the benefits of integrating text mining tools with data visualization and suggest that it can improve the efficacy of textual analysis use in audits.

Artificial intelligence (AI)

AI can improve audit quality by enhancing the efficacy and efficiency of audit procedures (e.g., Pickard et al., 2020). However, challenges to adopting AI in auditing include the need for specialized skills and expertise, accuracy and interpretability of AI models and issues related to data quality, data privacy and cybersecurity. A lack of regulatory guidance and professional standards for AI also exists in the audit context. Munoko et al. (2020) note that several ethical issues at a societal and professional level need to be taken into account, including the impact of AI on audit quality, possible reductions in the audit workforce and obstructions to audit transparency. Additionally, too much reliance on AI might cause ignorance of other risk factors or issues not identified by AI, leading to overconfidence and confirmation bias in the audit judgment process.

Robotic process automation (RPA)

Accountants and auditors use advanced automation technologies such as RPA to achieve cost savings and increase operational efficiency by automating well-defined and repetitive accounting and auditing tasks (Cooper et al., 2019, 2022). RPA frameworks allow auditors to automate their low-judgment tasks and focus on the tasks requiring professional judgment (Huang & Vasarhelyi, 2019). However, risks to implementing RPA include identification of use

cases, governance of RPA development processes, internal controls for RPA and maintenance and oversight of running RPA solutions (Eulerich et al., 2023). To assist with RPA implementation, Eulerich et al. (2022) developed an RPA framework and validated it with interviews, surveys and case studies involving 16 Big Four audit leaders, 56 internal auditors, and an unspecified number of professionals from RPA vendors (country not disclosed). The authors conclude that a lack of broad RPA implementation knowledge limits auditors' ability to benefit from its use.

Dyball and Seethamraju (2022) investigate the impact of client use of blockchain technology on audit processes by interviewing 28 Australian stakeholders from a wide variety of backgrounds (e.g., audit partners, blockchain developers, organization managers). Their findings raise several questions about the use of blockchain technology on the client side, specifically, how the technology should affect the audit methodology, including whether the auditor should follow a traditional methodology without significant changes or whether a custom methodology is needed for these sophisticated environments. Other questions relate to classifying the blockchain development costs into assets or expenses and the recognition of cryptocurrency. Despite an expectation that blockchain technology will improve internal controls and reduce audit costs, the study finds that blockchain use necessitates custom substantive tests, that tend to be more resource intensive than equivalent tests in a non-blockchain environment (Dyball & Seethamraju, 2022). However, this may change as blockchain technology is more widely used and auditors adopt new skills and methodologies to deal with it.

4.2.3 | Other technology related issues

Remote virtual audit

The start of the Covid-19 global pandemic and lockdowns made traditional audit evidence collection obsolete and forced auditors to explore the possibilities of remote virtual auditing. Appelbaum et al. (2020) discuss remote virtual audit technologies (e.g., first-person view cameras and drones, video feeds, AI video assessment tools), their benefits and related issues. The authors also draw attention to the issue of minimal guidance from regulators on the reliability of audit evidence collected via such technologies (e.g., presenting videos as audit evidence).

On the other hand, when exploring how the forced move to remote work affected audit quality, Sian (2022) finds that 37 auditors from the United Kingdom (UK) large audit firms do not perceive the rapid transformation to remote audit work detracted from audit quality. Even if communication's emotional and visual aspects are lost in the remote work environment, the benefits of convenience and autonomy are raised. The study's findings suggest that the requirement of being present is no longer indispensable, even if providing professional services to the client continues to be at the core of audit work.

Eulerich et al. (2022) studies the costs and benefits of using Technology-Based Audit Techniques (TBAT) for internal audits. Using surveys and interviews of 205 individual auditors and 349 chief audit executives from Germany, Austria and Switzerland (combined), the study finds that perceptions of these technologies are positive. Auditors suggest TBATs improve audits' completion rate, help identify more risk factors and decrease the number of audit days. However, according to chief audit executives, employing these technologies is associated with higher costs. The study also identifies difficulties in quantifying the benefits of using these techniques and a limited supply of professionals with the necessary skills in TBAT.

4.3 | Application of professional judgment and skepticism

Professional skepticism is critical to ensuring that client financial statements are presented fairly and accurately (e.g., Hurtt, 2010). However, auditors face numerous challenges when applying professional skepticism, including time constraints, client pressure, complex transactions, inherent biases and lack of access to material information (e.g., Hurtt, 2010). These challenges can make it difficult to conduct an effective audit and can lead to inaccurate financial statements that do not reflect the true financial position of the organization. Nolder and Kadous (2018) suggest that professional skepticism is both a mindset and an attitude, and Nelson (2009) emphasizes both skeptical judgments (what auditors intend to do) and skeptical actions (what auditors actually do). The following sections discuss prior relevant literature about the auditors' application and evaluation of professional skepticism in practice and separate them into three categories: skeptical judgments, skeptical actions and outcome effects of skepticism.

4.3.1 | Skeptical judgments

Cohen et al. (2013) studied the joint effect of regulatory regime strength and accounting standard types on management's aggressive reporting. Implementing an experiment with 97 experienced auditors from the United States, the study finds auditors are more likely to constrain aggressive reporting under principles-based accounting standards than under rules-based accounting standards, regardless of the regulatory regime.

Harding and Trotman (2017) study how auditor partner preferences related to professional skepticism influence their engagement team's judgments and decisions in a fraud brainstorming context. The study includes two experiments with 88 experienced US-domiciled auditors and 34 experienced Australian-domiciled auditors, respectively. The collective results suggest that engagement team members are more likely to exhibit higher levels of professional skepticism when the audit partner expresses a preference to align with client's view of a low likelihood of fraud, relative to an independent (the partner's own) or no view. The study also examined whether prompting auditors to have an inward (what peers may perceive of your work to identify fraud) versus an outward (how you perceive management's actions to obfuscate fraud) skeptical orientation. Results suggest that emphasizing both orientations was more effective in inducing higher levels of professional skepticism.

Grenier (2017) takes a different approach. The study examines how industry specialization inhibits auditors' professional skepticism. Using an experiment with 171 US audit seniors, managers, and partners, the study finds that auditors may become overconfident in their knowledge and pattern recognition skills when they specialize in an industry. This overconfidence leads to reduced professional skepticism, especially when signs of a high risk of material misstatement are unclear. The study also suggests that measures taken by audit firms to enhance professional skepticism are more effective for industry specialists, as non-experts in a particular area tend to be skeptical regardless of these efforts.

Stepankova et al. (2022) examine whether prompts vis-à-vis higher-order instructional verbs (e.g., *consider* and *evaluate*) versus lower-order instructional verbs (e.g., *review* and *identify*) in auditing standards could induce greater auditor professional skepticism and enhanced audit evidence collection. In an experiment with 48 practicing auditors from Australia the results suggest that higher order instructional verbs did not influence the level of skepticism reflected

in auditor judgments, the use of higher order instructional verbs did not increase either measure of professional skepticism (comfort in management representations and evidence persuasiveness) but did influence the perceived amount of planned audit evidence.

4.3.2 | Skeptical actions

Several studies also explore how evaluating evidence that contradicts management's assertions influences auditors' exercise of professional skepticism and, in turn, planned audit evidence and audit procedures. Confirmation bias (preferences for evidence that supports rather than contradicts management's assertions) tends to be pervasive in auditing. Commerford et al. (2022) conduct an experiment with 170 audit seniors from the United States to understand how algorithm aversion (when individuals discount computer-based advice heavier than human advice, even when the suggested outcome from both sources is otherwise identical) impacts auditors' use of AI to evaluate a complex estimate. The results suggest that auditors receiving contradictory evidence from a specialist that is a firm-developed AI system relative to human specialist propose smaller adjustments to management's reported estimates. This effect is particularly acute when management's estimate uses more objective relative to subjective inputs. Findings in Austin et al. (2020) complement these studies' results. In an experiment with 114 experienced auditors attending trainings at five accounting firms in the United States, Austin et al. (2020) find that a balanced evidence focus (i.e., documenting supporting and contradictory audit evidence) decreases the likelihood auditors dismiss evidence that contradicts management's assumptions related to a complex estimate. The balanced focus appears to change auditors' cognition and how they interpret the contradicting evidence.

Kachelmeier and Rimkus (2022) conduct two experiments using the experimental economics methodology in an audit setting. Participants are 135 US student volunteers in Experiment 1 and 120 US student volunteers in Experiment 2. The study examines how auditors choosing to undertake effortful investigation (rather than being merely given this evidence) further illuminates aversion to proposing costly adjustments to management. Results in Experiment 1 suggest that participants' effort choice reduces adjustments only when they both choose the type of evidence they will collect and are responsible for proposing the adjustment (rather than another team member proposing the adjustment). Experiment 2 complements and finds similar results to the first experiment. The experiments differ in that participants' interact when they make their evidence related decisions in Experiment 2 whereas they do not interaction in Experiment 1.

4.3.3 | Outcome effect of skepticism

Brown-Liburd et al. (2013) examine the outcomes of negotiations over proposed adjusting journal entries between auditors and clients, given variations in pressure to achieve target earnings forecasts and auditors' levels of professional skepticism. Using an experiment with 21 audit managers and 16 audit partners with prior negotiation experience, the study finds that, on average, negotiations are unaffected by pressure to manage earnings. However, auditors are less conservative when auditor skepticism is low and more likely to compromise in the negotiation process if there is pressure to manage earnings.

Peytcheva (2014) conducts an experiment to test the cognitive performance effects of professional skepticism and cheater-detection prompts. Using 78 audit students and 85

practicing auditors from United States and The Netherlands, the study finds that a professional skepticism prompt positively affects students' cognitive performance, not auditors. The findings indicate that a cheater-detection prompt has no significant effect on performance for either students or auditors.

Brazel et al. (2016) explore a potential barrier to professional skepticism, specifically where outcome knowledge biases supervisors' evaluations of auditors' skepticism. Results of an experiment with 96 participants show that supervisors evaluate auditors more negatively when they do not identify a misstatement, even when they demonstrate an appropriate amount of skepticism. Consultation between auditors and superiors only partially mitigates this effect, suggesting auditor evaluation systems are flawed and detrimental to the application of professional skepticism. Similarly, Glover and Prawitt (2014) suggest that regulators themselves can become a barrier to professional skepticism by not aligning their audit firm inspection (i.e., evaluation) focus with related audit risk.

Cho and Krishnan (2023) examine the relation between audit outcomes and accounting standard type (principles-based vs. rules-based) using 9953 firm-year observations in relation to US listed firms for the years 2000–2006. The study finds that when client firms rely on principles-based standards, audit risk and audit fees are lower. With an exception when earnings management incentives are high, in which case audit fees are also higher. In addition, they find that the use of principles-based standards is associated with a lower likelihood of receiving a going concern opinion and shorter audit report lag. These findings suggest that accounting standard design plays an important role in auditor judgment.

5 | IMPLICATIONS AND FURTHER RESEARCH OPPORTUNITIES

5.1 | Implications

Concerning a principles-based approach to audit evidence evaluation as suggested by ED-500, prior literature finds that principle-based standards increase auditor accountability, ultimately leading to more sufficient evidence collection (Cao & Coram, 2020; Peytcheva, Wright, et al., 2014). Principles-based standards are associated with lower audit risk, lower audit fees, shorter audit report lag and greater constraint over aggressive financial reporting (Cho & Krishnan, 2023; Cohen et al., 2013). The findings of these studies support the principles-based approach proposed in ED-500. However, a principles-based approach could result in adverse outcomes. Behavioral and cognitive factors such as significant auditor-client power differentials, firm-induced deadline pressures and self-peer comparisons may result in insufficient and inappropriate audit evidence collection (Bennett & Hatfield, 2013, 2017; Kuselias et al., 2021). Furthermore, several studies and regulatory inspections suggest that auditors struggle to identify and appropriately respond to factors that impact the risk of material misstatement. For example, even when auditors identify client persuasion risk, they fail to appropriately adjust the nature, timing or extent of their audit evidence to mitigate this risk (Aghazadeh & Hoang, 2020). When auditors bundle evidence for analysis, which is common as the quantity of information collected increases, they engage in heuristic processing and become subject to bias, such as averaging bias, even when capable of appropriately evaluating that evidence in isolation (Lambert & Peytcheva, 2020).

Compared to more judgment-based guidance, one way to counteract these adverse effects is to be more prescriptive with audit evidence guidance. Human judgment is, and will remain, important in

the audit setting. However, judgment could be augmented by segregating audit evidence identification from collection and testing and prompting auditors to maintain neutral client advocacy attitudes (Commerford et al., 2017). These interventions could reinforce auditor objectivity and the appropriateness of the evidence collected. Future research could seek to identify additional ways to reinforce good judgment concerning evidence collection and evaluation. Future research could also assess whether the benefits of principles-based evidence guidance outweigh the costs in terms of actual audit outcomes, e.g., the propensity for misstatements.

With respect to being adaptable to modern technology, prior literature touts many audit benefits, including using big data analytical techniques to enhance the collection of sufficient and appropriate audit evidence and to identify unusual transactions, patterns and trends in financial data (Eilifsen et al., 2020; Yoon et al., 2015). Data analytic techniques, e.g., machine learning, enable full population testing and reduce the need for manual, time-consuming tasks (No et al., 2019). These techniques permit auditors to focus on more complex and judgmental areas. Technology enables the use of data frameworks to focus auditors' attention on high-risk items, the use of evidence evaluation frameworks to evaluate the sufficiency, reliability and relevance of big data for use as audit evidence, and the use of data visualization and TBATs to improve the effectiveness and efficiency of the audit process (Chang & Luo, 2021; Chiu & Jans, 2019; Jans & Eulerich, 2022; No et al., 2019). Tools such as textual analysis can help generate audit evidence and can be combined with data visualization to improve efficacy (Lee et al., 2022; Zhaokai & Moffitt, 2019). Additionally, advanced automation technologies such as RPA achieve cost savings and increase operational efficiency by automating repetitive audit tasks, permitting auditors to offload low-judgment tasks and focus on those requiring high judgment (Cooper et al., 2019, 2022; Huang & Vasarhelyi, 2019).

Implementing technology in the audit process also has its drawbacks, however. One recurring theme with respect to big data, data analytics and data visualization is that it is best used as complimentary, rather than primary, audit evidence because of the risk of false positives and susceptibility to bias (Alles & Gray, 2016; Brown-Liburd et al., 2015; Chang & Luo, 2021; Rose et al., 2017; Yoon et al., 2015). Some technologies, such as AI-based ones, carry many ethical implications and lack regulatory guidance (Munoko et al., 2020). Other technologies, such as blockchain, promise greater internal control, though at costs that may outweigh their benefits (Dyball & Seethamraju, 2022). Underlying these technologies is also the need for specialized training and expertise that not all auditors have and is costly to audit firms and clients.

5.2 | Further research opportunities

We identify several avenues for future research to further explore the effects of usage of technology and professional skepticism in audit evidence evaluation. First, future research could explore (1) how technology usage affects the quality of audit evidence compared to more traditional audit techniques, (2) whether algorithm aversion presents a risk to technology-based audit evidence collection techniques, (3) how technology usage affects the reliance of different stakeholders on audit evidence, (4) how big data usage affects auditors' cognitive processes, (5) whether it is more beneficial for auditors to gain technical expertise or for auditors to rely on separate specialists to fulfil that role, and (6) how auditors should deal with the ethical and legal implications of technology usage.

With respect to professional skepticism in audit evidence evaluation, prior literature shows that skepticism is an essential, yet fallible audit characteristic. Auditors' professional skepticism is associated with greater conservatism and less propensity to compromise in client

negotiations (Brown-Liburud et al., 2013; Cohen et al., 2013). However, skepticism can be threatened both from within auditors, e.g., when they become overconfident in their abilities, and by external sources, e.g., when supervisors evaluate auditors negatively due to outcome bias or regulators evaluate auditors with an inappropriate risk focus (Brazel et al., 2016; Glover & Prawitt, 2014; Glover et al., 2019; Grenier, 2017). Evidence is mixed on how to reinforce professional skepticism. Some studies suggest that abstract thought can increase skepticism when evaluating complex audit evidence, while graphical evidence can increase skepticism when thinking more concretely (Backof et al., 2018; Rasso, 2015). Others find that the effectiveness of skepticism prompts, for example, may be a limited, context-specific intervention (Backof et al., 2018; Peytcheva, 2014; Rasso, 2015; Stepankova et al., 2022).

First, future research could further investigate the benefits of professional skepticism, particularly concerning audit evidence rather than the audit as a whole. Second, it could also explore additional avenues by which skepticism can be reinforced, addressing scenarios with less complex audit evidence and the timing and delivery mechanisms for skepticism prompts. Finally, future research could also identify ways to mitigate biases that hinder the application of professional skepticism.

With respect to research design, researchers could consider (1) engaging auditors with real-world experience instead of students, as extensive experience, familiarity with professional standards and ethics requirements can play an important role in their judgment; (2) explicitly mentioning the country where the data was collected from, as this information can have important implications on the interpretation of the results, considering how crucial is the role of the culture in auditor judgment; (3) consider using more multicountry settings, to increase the generalizability of the findings, to conduct a comparative analysis and study cross-cultural perspectives.

6 | CONCLUSION

Proposed revisions to ISA 500, which guides auditors' responsibilities relating to audit evidence, address four standard-setting objectives: (1) clarification of the purpose and scope of ISA 500, (2) development of a principles-based approach to evaluating audit evidence, (3) modernization of ISA 500 for the use of technology, and (4) emphasis of professional skepticism during evidence evaluation. We reviewed relevant academic literature published in the past 10 years to synthesize extant knowledge on these topics, intending to inform the standard-setting process.

Our review finds that principles-based auditing standards and technology implementation can lead to positive audit outcomes, both in the audit evidence process and in the audit as a whole. Our review also indicates that applying professional skepticism benefits the overall audit process, though no recent study we identified has explicitly focused on skepticism's effect on collecting and evaluating audit evidence. These findings suggest that the proposed changes to ISA 500 should improve the audit evidence process, with some caveats. First, principles-based auditing standards rely on the application of auditor judgment. Numerous studies have shown how that judgment can be compromised or fail to be effective (e.g., Aghazadeh & Hoang, 2020; Bennett & Hatfield, 2013, 2017; Kuselias et al., 2021; Lambert & Peytcheva, 2020). Second, technology implementation in the audit process comes with baggage, such as implementation costs, the burden of appropriate training and ethical controversies (e.g., Dyball & Seethamraju, 2022; Munoko et al., 2020). Many studies suggest that technology-gathered audit evidence is best suited as complementary rather than primary evidence (e.g., Alles & Gray, 2016; Brown-Liburud et al., 2015; Chang & Luo, 2021; Rose et al., 2017; Yoon et al., 2015). Third, while

both critical to the audit profession and beneficial to the audit process, professional skepticism is subject to internal and external threats (e.g. Brazel et al., 2016; Brown-Liburd et al., 2013; Cohen et al., 2013; Glover & Prawitt, 2014; Glover et al., 2019; Grenier, 2017). To date, the academic literature has not identified a single effective method for mitigating these threats.

In light of these caveats, we present six suggestions for inclusion in ISA 500, such as segregating audit evidence identification and collection to promote identification sufficiency, stressing the appropriate evaluation of using big data techniques for primary or complimentary evidence purposes, emphasizing the need for proper skillsets when implementing technology, providing guidance and promoting training on the risks associated with applying judgment and collecting evidence under principles-based guidance, as well as in using technology-based auditing techniques and expanding the discussion of threats to professional skepticism. We also highlight potential avenues for future research to continue to inform the audit evidence collection and evaluation process.

We caution that our review is based on findings from literature that is largely US-centric (see Appendices for a breakdown of countries included). To the extent that countries subject to ISA 500 do not mimic the US capital market environment (e.g., emerging and developing markets, markets dominated by small auditors, markets with strict rules-based regulation), the implications and suggestions discussed herein may not be applicable or may have consequences not identified in the studies included in our review. Another limitation of this study is that our literature review is restricted to studies published in journals that rank B or higher on the ABDC list, so future research could expand it to include a wider selection of papers as journal rankings should not be taken as a sole measure of quality (Tsalavoutas et al., 2020).

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CONFLICT OF INTEREST STATEMENT

The authors declare no conflicts of interest.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are openly available from public sources.

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ENDNOTES

- ¹ See Section 2-G (*Relevance and Reliability of Information Intended to Be Used as Audit Evidence*) beginning on p.14 of Proposed ISA 500.
- ² The total number of studies exceeds 58 because 4 (7%) studies use data from multiple countries [See Appendix A, B, and C].
- ³ The total number of quantitative and qualitative studies exceeds 58 because 10 (17.2%) use more than one method [See Appendix A, B, and C].

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APPENDIX A

Table A1

TABLE A1 Relevant literature about audit evidence sufficiency, reliability, and relevance.

Author(s) (publication year)	Title	Journal title	ABDC rating	Countries	Method(s) & sample size(s)
Zhao and Harding (2013)	Improving the interpretation of complex audit evidence: The beneficial role of order effects	<i>Abacus</i>	A	Australia	Experiment [63 Auditors]
Bennett and Hatfield (2013)	The effect of the social mismatch between staff auditors and client management on the collection of audit evidence	<i>The Accounting Review</i>	A*	Not Disclosed	Experiment [138 MAC Students]
Peytcheva, Wright, et al. (2014)	The Impact of Principles-Based versus Rules-Based Accounting Standards on Auditors' Motivations and Evidence Demands	<i>Behavioral Research in Accounting</i>	A	United States, Netherlands	Experiment [104 U.S. & 48 Dutch Auditors]
Deng et al. (2014)	Do joint audits improve or impair audit quality?	<i>Journal of Accounting Research</i>	A*	NA	Analytical Model
Rasso (2015)	Construal instructions and professional skepticism in evaluating complex estimates	<i>Accounting, Organizations and Society</i>	A*	Not disclosed	Experiment [58 Experienced Auditors]
Glover et al. (2015)	Between a rock and a hard place: A path forward for using substantive analytical procedures in auditing large P&L accounts: Commentary and analysis	<i>AUDITING: A Journal of Practice & Theory</i>	A*	NA	Theory and Proposed Implementation Guidance
Bennett and Hatfield (2017)	Do approaching deadlines influence auditors' materiality assessments?	<i>AUDITING: A Journal of Practice & Theory</i>	A*	Not disclosed	Experiment [123 Audit Managers+]
Pennington et al. (2017)	Do auditor advocacy attitudes impede audit objectivity?	<i>Journal of Accounting, Auditing and Finance</i>	A	Not disclosed	Experiment [60 Experienced Auditors]

TABLE A1 (Continued)

Author(s) (publication year)	Title	Journal title	ABDC rating	Countries	Method(s) & sample size(s)
Commerford et al. (2017)	Auditor information foraging behavior	<i>The Accounting Review</i>	A*	United States	Experiment 1 [77 MAC Students] Experiment 2 [58 Senior Auditors]
Joe et al. (2017)	Use of high quantification evidence in fair value audits: Do auditors stay in their comfort zone?	<i>The Accounting Review</i>	A*	United States	Experiment 1 [92 Experienced Auditors] Experiment 2 [Subset Exp1 Participants]
Backof et al. (2018)	Auditing Complex Estimates: How Do Construal Level and Evidence Formatting Impact Auditors' Consideration of Inconsistent Evidence?	<i>Contemporary Accounting Research</i>	A*	Not disclosed	Experiment [154 Audit Managers+]
Ding et al. (2019)	A Machine Learning-Based Peer Selection Method with Financial Ratios	<i>Accounting Horizons</i>	A	NA	Analytical Model
Rowe (2019)	Auditors' comfort with uncertain estimates: More evidence is not always better	<i>Accounting, Organizations and Society</i>	A*	United States	Experiment [95 Audit Seniors]
Glover et al. (2019)	Mind the Gap: Why Do Experts Have Differences of Opinion Regarding the Sufficiency of Audit Evidence Supporting Complex Fair Value Measurements?	<i>Contemporary Accounting Research</i>	A*	United States	Survey [32 Practicing and 5 National Office Partners]
Aghazadeh and Hoang (2020)	How does audit firm emphasis on client relationship quality influence auditors' inferences about and responses to potential persuasion in client communications?	<i>Accounting, Organizations and Society</i>	A*	United States	Experiment [84 Audit Seniors]

(Continues)

TABLE A1 (Continued)

Author(s) (publication year)	Title	Journal title	ABDC rating	Countries	Method(s) & sample size(s)
Griffith et al. (2020)	Friends in low places: How peer advice and expected leadership feedback affect staff auditors' willingness to speak up	<i>Accounting, Organizations and Society</i>	A*	United States	Survey [66 Audit Staff] Experiment 1 [75 Audit Staff; 99 Audit Seniors] Experiment 2 [61 Audit Staff] Experiment 3 [149 Audit Staff]
Lambert and Peytcheva (2020)	When Is the Averaging Effect Present in Auditor Judgments?	<i>Contemporary Accounting Research</i>	A*	United States	Experiment [104 Experienced Auditors]
Cao and Coram (2020)	Auditors' Response to Different Reporting Environments: Experimental Evidence From the Quantity and Quality of Auditors' Evidence Demands in China	<i>International Journal of Auditing</i>	A	China	Experiment [166 Chinese Auditors]
Agrawal et al. (2020)	External auditors' evaluation of a management's expert's credibility: Evidence from Australia	<i>International Journal of Auditing</i>	A	Australia	Interviews [9 Experienced Auditors]
Kuselias et al. (2021)	Social media content and social comparisons: An experimental examination of their effect on audit quality	<i>Auditing: A Journal of Practice & Theory</i>	A*	United States	Experiment [56 Staff and Senior Auditors]
Bobek et al. (2021)	Do tax professionals act like auditors when evaluating tax-related audit evidence?	<i>Behavioral Research in Accounting</i>	A	Not disclosed	Experiment [60 Senior Auditors and 59 Tax Professionals]

TABLE A1 (Continued)

Author(s) (publication year)	Title	Journal title	ABDC rating	Countries	Method(s) & sample size(s)
Agrawal et al. (2021)	External auditors' reliance on management's experts: The effects of an early-stage conversation and past auditor–client relationship	<i>International Journal of Auditing</i>	A	Australia	Experiment [69 Experienced Auditors]
Hammersley and Ricci (2021)	Using Audit Programs to Improve Auditor Evidence Collection	<i>The Accounting Review</i>	A*	United States	Experiment [123 Experienced Auditors]

APPENDIX B

Table B1

TABLE B1 Relevant literature about auditors' use of technology.

Author(s) (publication year)	Title	Journal title	ABDC rating	Countries	Method(s) & sample size(s)
Brown-Liburd et al. (2015)	Behavioral Implications of Big Data's Impact on Audit Judgment and Decision Making and Future Research Directions	<i>Accounting Horizons</i>	A	NA	Discussion Paper
Yoon et al. (2015)	Big Data as Complementary Audit Evidence	<i>Accounting Horizons</i>	A	NA	Discussion Paper
Alles and Gray (2016)	Incorporating big data in audits: Identifying inhibitors and a research agenda to address those inhibitors	<i>International Journal of Accounting Information Systems</i>	A	NA	Discussion Paper
Rose et al. (2017)	When Should Audit Firms Introduce Analyses of Big Data Into the Audit Process?	<i>Journal of Information Systems</i>	A	United States	Experiment [127 Audit Seniors]
Kogan et al. (2019)	Audit Data Analytics Research—An Application of Design Science Methodology	<i>Accounting Horizons</i>	A	NA	Discussion Paper
No et al. (2019)	Multidimensional Audit Data Selection (MADS): A Framework for Using Data Analytics in the Audit Data Selection Process	<i>Accounting Horizons</i>	A	NA	Theory—Discussion + Application
Chiu and Jans (2019)	Process Mining of Event Logs: A Case Study Evaluating Internal Control Effectiveness	<i>Accounting Horizons</i>	A	NA	Case Study

TABLE B1 (Continued)

Author(s) (publication year)	Title	Journal title	ABDC rating	Countries	Method(s) & sample size(s)
Cooper et al. (2019)	Robotic process automation in public accounting	<i>Accounting Horizons</i>	A	United States	Semi-Structured Interviews [14 RPA Leaders]
Sun (2019)	Applying Deep Learning to Audit Procedures: An Illustrative Framework	<i>Accounting Horizons</i>	A	NA	Theory—Discussion + Application
Zhaokai and Moffitt (2019)	Contract Analytics in Auditing	<i>Accounting Horizons</i>	A	NA	Theory—Discussion + Application
Huang and Vasarhelyi (2019)	Applying robotic process automation (RPA) in auditing: A framework	<i>International Journal of Accounting Information Systems</i>	A	NA	Theory—Discussion + Application
Eilifsen et al. (2020)	An Exploratory Study into the Use of Audit Data Analytics on Audit Engagements	<i>Accounting Horizons</i>	A	Not disclosed	Semi-Structured Interviews [5 Partners] Survey [216 Experienced Auditors]
Munoko et al. (2020)	The ethical implications of using artificial intelligence in auditing	<i>Journal of Business Ethics</i>	A	NA	Qualitative (Bibliometric Analysis)
Pickard et al. (2020)	Innovative Accounting Interviewing: A Comparison of Real and Virtual Accounting Interviewers	<i>The Accounting Review</i>	A*	United States	3 Experiments [290, 129, and 126 Students]
Cooper et al.	Perceptions of robotic process automation in public accounting: Do firm leaders and lower-level employees agree?	<i>Journal of Emerging Technologies in Accounting</i>	B	United States	Semi-Structured Interviews [14 RPA Leaders] Survey [139 RPA Employees]
Chang and Luo (2021)	Data visualization and cognitive biases in audits	<i>Managerial Auditing Journal</i>	A	NA	Theory—Discussion

(Continues)

TABLE B1 (Continued)

Author(s) (publication year)	Title	Journal title	ABDC rating	Countries	Method(s) & sample size(s)
Eulerich et al. (2021)	Client use of blockchain technology: exploring its (potential) impact on financial statement audits of Australian accounting firms	<i>Accounting Auditing and Accountability Journal</i>	A*	Australia	Semi-Structured Interviews [28 Stakeholders]
Dyball and Seethamraju (2022)	Remote audit: The challenges of re-creating the audit room during the Covid 19 pandemic	<i>Accounting Forum</i>	B	United Kingdom	Semi-Structured Interviews [37 Experienced Auditors]
Sian (2022)	A framework for using Robotic Process Automation for Audit Tasks	<i>Contemporary Accounting Research</i>	A*	Not disclosed	Semi-Structured Interviews [16 RPA Leaders] Survey [56 Internal Auditors]
Eulerich et al. (2022)	The impact of audit technology on audit task outcomes: Evidence for technology-based audit techniques	<i>Contemporary Accounting Research</i>	A*	Germany, Austria, Switzerland	Two Surveys [205 and 349 Experienced Internal Auditors] Semi-Structured Interviews [11 Chief Audit Executives]
Lee et al. (2022)	Text Visual Analysis in Auditing: Data Analytics for Journal Entries Testing	<i>International Journal of Accounting Information Systems</i>	A	NA	Case Study
Eulerich et al. (2023)	The Dark Side of Robotic Process Automation	<i>Accounting Horizons</i>	A	Not disclosed	Semi-Structured Interviews [26 Firm Leaders]

APPENDIX C

Table C1

TABLE C1 Relevant literature about the application of professional judgment and skepticism.

Author(s) (publication year)	Title	Journal title	ABDC rating	Countries	Method(s) & sample size(s)
Cohen et al. (2013)	How Does the Strength of the Financial Regulatory Regime Influence Auditors' Judgments to Constrain Aggressive Reporting in a Principles-Based Versus Rules-Based Accounting Environment?	<i>Accounting Horizons</i>	A	United States	Experiment [97 Experienced Auditors]
Brown-Liburd et al. (2013)	Effects of Earnings Forecasts and Heightened Professional Skepticism on the Outcomes of Client-Auditor Negotiation	<i>Journal of Business Ethics</i>	A	United States	Experiment [37 Experienced Auditors]
Glover & Prawitt (2014)	Enhancing Auditor Professional Skepticism: The Professional Skepticism Continuum	<i>Current Issues in Auditing</i>	B	NA	Discussion Paper
Peytcheva (2014)	Professional skepticism and auditor cognitive performance in a hypothesis-testing task	<i>Managerial Auditing Journal</i>	A	United States, Netherlands	Experiment [78 Audit Students; 85 Practicing Auditors]
Brazel et al. (2016)	The Outcome Effect and Professional Skepticism	<i>The Accounting Review</i>	A*	United States	Experiment [96 Senior Auditors]
Grenier (2017)	Encouraging Professional Skepticism in the Industry Specialization Era	<i>Journal of Business Ethics</i>	A	United States	Experiment [171 Experienced Auditors]
Harding Trotman (2017)	The effect of partner communications of fraud likelihood and skeptical orientation on auditors' professional skepticism	<i>AUDITING: A Journal of Practice & Theory</i>	A*	United States, Australia	Experiment 1 [88 Experienced Auditors] Experiment 2 [34 Experienced Auditors]

(Continues)

TABLE C1 (Continued)

Author(s) (publication year)	Title	Journal title	ABDC rating	Countries	Method(s) & sample size(s)
Nolder and Kadous (2018)	Grounding the professional skepticism construct in mindset and attitude theory: A way forward	<i>Accounting, Organizations and Society</i>	A*	NA	Theory – Discussion
Austin et al. (2020)	Improving Auditors' Consideration of Evidence Contradicting Management's Complex Estimate Assumptions	<i>Contemporary Accounting Research</i>	A*	United States	Experiment [114 Experienced Auditors]
Commerford et al. (2022)	Man versus Machine: Complex Estimates and Auditor Reliance on Artificial Intelligence	<i>Journal of Accounting Research</i>	A*	United States	Experiment [170 Audit Seniors]
Kachelmeier and Rimkus (2022)	Does seeking audit evidence impeded the willingness to impose audit adjustments?	<i>The Accounting Review</i>	A*	United States	Experimental Economics [91 and 120 Students]
Stepankova et al. (2022)	Using more effective instructional verbs to elevate auditors' professional scepticism	<i>International Journal of Auditing</i>	A	Australia	Experiment [48 Experienced Auditors]
Cho and Krishnan (2023)	Principles-based accounting standards and audit outcomes: Empirical evidence	<i>Review of Accounting Studies</i>	A*	NA	Empirical Archival