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Grounding the professional skepticism construct in mindset and attitude theory: A way forward[☆]

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ABSTRACT

The concept of professional skepticism is pervasive throughout auditing standards, and inspectors around the globe often identify a lack of skepticism as a root cause of audit deficiencies (IFIAR, 2015, 2016). Despite its importance, the professional skepticism construct remains ill-defined and measurements used in research do not map well into practice. The purpose of this paper is to develop a conceptualization of professional skepticism that will facilitate the conduct of research with meaningful implications for practice, providing a way forward for skepticism researchers. To that end, we propose a dual conceptualization of professional skepticism as both a mindset and an attitude, and we rely on mindset and attitude theory to develop measures of each component. Mindsets drive cognitive processing, and the mindset component captures the critical thinking that is an important element of professional skepticism and is required by standards. Including the mindset component reflects the idea that skepticism involves critical analysis of evidence, and not just doubt. Attitudes include affective and cognitive components to predict intentions and behavior, and attitudes recognize the influence of social factors on evaluative judgments. Including an attitude component thus expands the notion of evaluation to include auditors' feelings, as well as their beliefs, about risk, and it improves the predictive power of "skepticism" for auditors' evidence collection. We expect that our skeptical mindset and skeptical attitude theoretical approach will move the literature forward, especially in terms of framing standards, developing interventions to improve audit quality, and performing root cause analyses.

1. Introduction

Professional skepticism is a foundational construct in auditing. Auditors are required to exercise skepticism throughout the conduct of each engagement (IAASB, 2012a; PCAOB, 2006). The proper application of professional skepticism requires that auditors question the reliability of evidence (PCAOB, 2003), be alert to indicators of fraud (IAASB, 2006) and management bias (IAASB, 2017), and critically assess the evidence (IAASB, 2012a; PCAOB, 2006). The IAASB (2012a) asserts that skepticism reduces the risks of overlooking unusual circumstances, over-generalizing when drawing conclusions from audit observations, and using inappropriate assumptions in determining the nature, timing, and extent of the audit procedures and evaluating the results thereof. Thus, skepticism can be viewed as the force that drives auditors to recognize potential errors and irregularities and to

investigate misstatements, should they exist. This implies that an appropriate level of professional skepticism is essential to a high-quality audit.

Despite the importance of the professional skepticism construct, there is no clear consensus regarding what professional skepticism is and how it can be measured (IAASB, 2015). Regulators generally refer to professional skepticism as an attitude that includes a questioning mind and a critical assessment of evidence (AICPA, 1997; PCAOB, 2006; IAASB, 2016). Practitioners often refer to professional skepticism as a mindset that influences auditors' professional judgment (e.g., Glover & Prawitt, 2014; Ranzilla, Chevalier, Herrmann, Glover, & Prawitt, 2011). While neither group has determined how to measure or document professional skepticism, regulators often attribute audit deficiencies to a lack of skepticism (e.g., IFIAR, 2015; 2016).

Researchers employ a variety of conceptualizations of professional

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skepticism (e.g., see Nelson, 2009; Hurtt, Brown-Liburd, Earley, & Krishnamoorthy, 2013). For example, some view professional skepticism as an individual characteristic or personality trait (e.g., Cohen, Dalton, & Harp, 2017; Hurtt, 2010; Quadackers, Groot, & Wright, 2014). In contrast, other researchers view a more skeptical auditor as one who assesses the likelihood that the financial statements are misstated as higher or demands more evidence to conclude they are fairly stated. As a result, skepticism is commonly measured by higher risk assessments (i.e., skeptical judgments) and a higher demand for evidence (i.e., skeptical actions) (Nelson, 2009).

The purpose of this paper is to develop a conceptualization of professional skepticism that researchers can use to move the skepticism literature forward and to better link their work with practice. The lack of guidance and lack of agreement among researchers about how skepticism should be conceptualized and measured, as well as the discrepancy between the professional skepticism conceptualizations of researchers and those of regulators and practitioners, interferes with researchers' ability to facilitate positive change in practice and regulation. That is, it is not always clear that researchers examining "skepticism" are looking in the right place if their goal is to help auditors improve their judgments and help regulators improve standards, enforcement, and audit quality, more generally. For example, researchers focusing on skepticism as a trait of the individual auditor may not be able to provide insight into structural features of the audit environment or features of standards that inhibit or promote skepticism. Likewise, researchers focused on encouraging auditors to demand more evidence may generate schemes that increase audit costs without increasing audit quality.

We propose that professional skepticism can be productively conceptualized as both a mindset and an attitude. Mindsets consist of a collection of judgment criteria and cognitive processes and procedures to facilitate completion of a particular task (Gollwitzer, 1990). Accordingly, mindsets are evidenced by cognitive processing measures, such as those capturing an individual's openness or receptivity to information (Fujita, Gollwitzer, & Oettingen, 2007) and the extent to which they seek out confirming or positive information (Bayer & Gollwitzer, 2005). Thus, a mindset conceptualization of professional skepticism captures the idea that information processing—in particular, critical thinking—is an essential component of skepticism. We rely on mindset theory to inform the development of measures to capture the nature and extent of auditors' critical thinking, which indicates whether the auditor's mindset was indeed "questioning", "alert", "objective", and "receptive" to information, including disconfirming evidence. This critical thinking influences the formation and strength of auditors' skeptical attitudes.

Attitudes are evaluative responses associated with a target. These evaluative responses include beliefs and feelings that drive individuals' intentions and actions (Ajzen, 2005). Relevant targets for the attitude of professional skepticism are the financial statements (i.e., management's assertions) and the evidence. This implies that an auditor's attitude of professional skepticism can be measured in terms of his or her beliefs about risks and feelings of doubt associated with management's assertions or the supporting evidence. Thus, an attitude conceptualization of skepticism captures the idea that appropriate evaluative judgments, both cognitive and affective, are critical components of skepticism. We rely on attitude theory to develop measures that reflect auditors' beliefs about risk and what constitutes sufficient evidence to address those risks, as well as their emotional responses to both. These attitude measures correspond to, and thus help predict, auditors' intended and actual behaviors.¹

¹ Our work is based on the premise that researchers, regulators, and auditors are typically concerned with insufficient auditor professional skepticism. We acknowledge that it is possible for auditors to exhibit too much professional skepticism by over-estimating risk and engaging in inefficient questioning and evidence collection. Establishing an optimal level of skepticism is beyond the scope of this paper.

Our dual conceptualization of professional skepticism as a mindset and an attitude allows for more comprehensive examination and measurement of the professional skepticism construct, and this facilitates a more direct line from research to practice. For example, the measures of auditors' skeptical mindset incorporate standard setters' view of skepticism as including "being alert" to the possibility of fraud, bias, and contradictory evidence, and critically assessing the evidence. The measures of auditors' skeptical attitude capture standard setters' views of skepticism as serving as a lens through which evidence is interpreted and as driving auditors' actions. While audit firms sometimes use the term "mindset" and standard setters sometimes use the term "attitude" in discussing skepticism, they use these terms in their colloquial, versus scientific, sense. We apply mindset and attitude theory to map these scientific constructs into audit standards, and we develop measures based on these theories that capture skepticism in a way that allows researchers, firms, and standard setters to use a common conceptualization.

The rest of the paper proceeds as follows. Section 2 provides an overview of our conceptualization and situates it within a framework. The section also describes the major implications of the conceptualization for audit research, including how it is useful for moving skepticism research forward. Section 3 describes the application of mindset theory to professional skepticism and provides measures that researchers can use to assess auditors' skeptical mindsets. Section 4 describes the application of attitude theory to professional skepticism and provides measures that researchers can use to assess auditors' skeptical attitudes. Section 5 offers future research opportunities and concludes.

2. Professional skepticism as mindset and attitude

2.1. Conceptualization of professional skepticism

We view auditors' professional skepticism as comprising two components, a skeptical mindset and a skeptical attitude. The mindset component captures the idea that professional skepticism is reflected in particular ways of thinking, or processing information. For example, auditing standards about skepticism require that auditors be open and receptive to evidence about fraud (IAASB, 2012a; PCAOB 2010b) and management bias (IAASB, 2012a; PCAOB, 2010a), and that they critically assess audit evidence (IAASB, 2012a; PCAOB, 2010a). This implies that a skeptical mindset is reflected in open, objective, and critical thinking about audit evidence and related matters.

The attitude component of professional skepticism captures the idea that skepticism is reflected in auditors' evaluations, both cognitive and affective, of the evidence and of managements' assertions. The audit literature historically views auditors' beliefs about management's assertions and evidence as capturing some aspects of skepticism (Nelson, 2009). Use of the attitude construct expands that view to acknowledge that auditors' feelings, as well as their beliefs, about management's assertions and the evidence influence their intentions and behaviors (i.e., skeptical actions). For example, auditors' comfort with an assertion or dread about the possibility of insufficient evidence is likely to drive decisions about further evidence collection. A conceptualization of skepticism including these feelings increases researchers' ability to explain auditors' subsequent skeptical judgments and actions.²

Fig. 1 depicts auditors' professional skepticism conceptualized as both a mindset and an attitude. Mindsets are measured in terms of cognitive processing variables. Attitudes are measured in terms of judgments (evaluative responses) associated with a target. The arrow connecting the processing and judgment measures illustrates the bi-

² For example, Pentland (1993) views the audit as an exercise in transmitting comfort "up the chain of command, from staff to the partner" (p. 610). Thus, comfort drives auditor behavior and is socially derived from others within the firm.

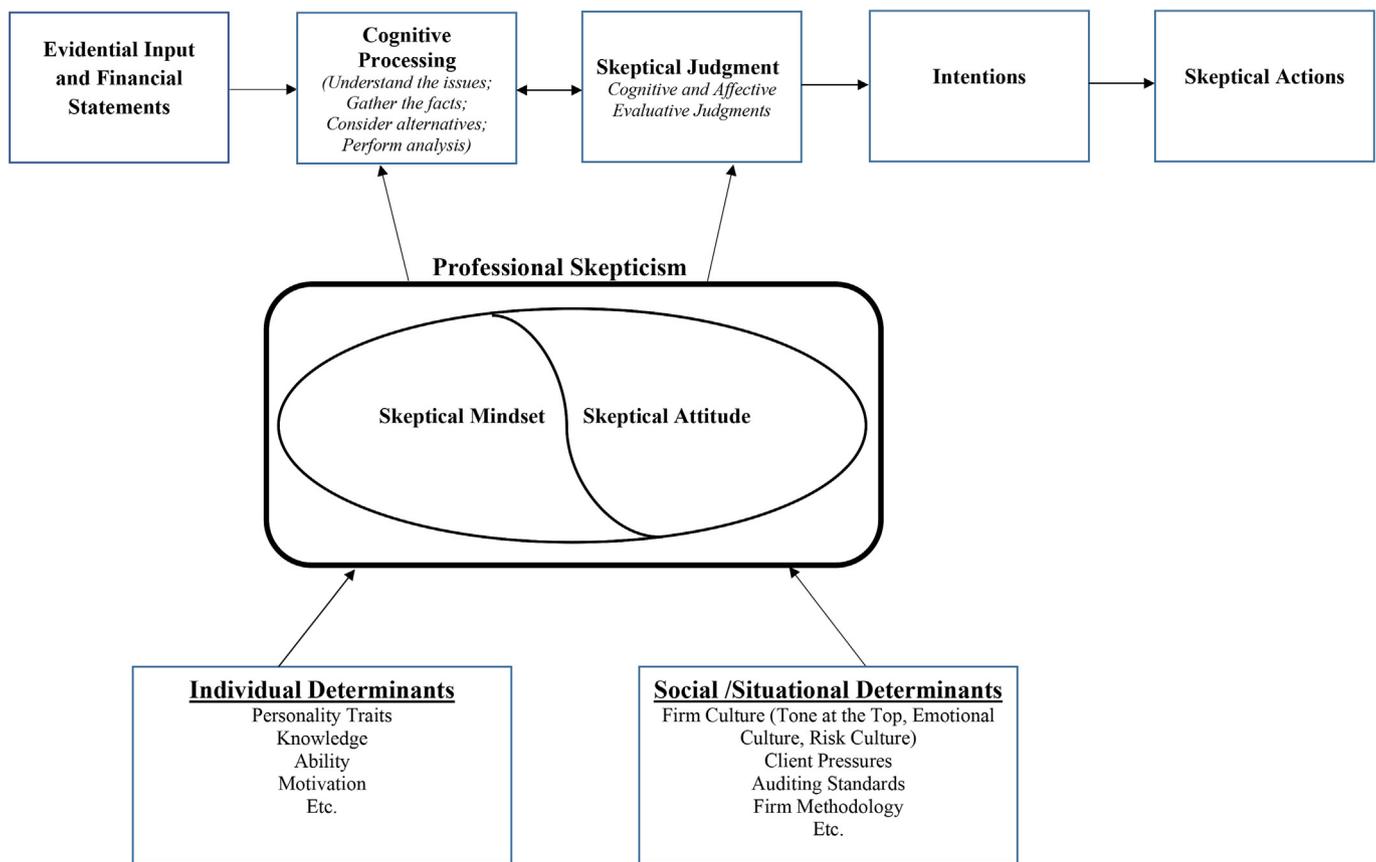


Fig. 1. Antecedents and consequences of the Auditor's professional skepticism.

directional nature of their relationship. That is, auditors' cognitive processing determines their attitudes, and auditors' attitudes influence their subsequent cognitive processing. For example, more open, objective, and critical processing of evidence will lead to more accurate ideas about risk, impacting auditors' beliefs and feelings about risk. On the other hand, a belief that risk is high or a feeling of dread that evidence is insufficient should lead to more careful, skeptical processing.³ Including both mindset and attitude components in the conceptualization of professional skepticism offers insights into how researchers can examine whether auditors' lower quality judgments can be traced back to attitudes, mindsets, or both, as well as how researchers can go about improving auditors' skeptical judgments and actions.

Fig. 1 places the dual conceptualization of professional skepticism in a framework in which auditors' skepticism is influenced by both individual and social factors. Individual factors include auditors' personality traits, knowledge, ability, and motivation. Social factors include firm culture, client pressures, auditing standards, and firm methodology. The financial statements and evidence serve as inputs into cognitive processing, and skeptical judgments predict intentions and, ultimately, skeptical actions. In the remainder of this section, we describe how the dual conceptualization of professional skepticism advances research by describing how it accommodates and extends existing models (Section 2.2), assigns central roles to

situational (versus individual) factors (Section 2.3) and cognitive processing factors (Section 2.4) as determinants of attitudes, and includes affective evaluations as precursors of intention and action (Section 2.5).

2.2. Relation to prior models of professional skepticism

Our conceptualization of professional skepticism as a mindset and an attitude complements and extends the usefulness of prior models in the literature. Nelson's (2009) model of professional skepticism depicts skeptical judgments and skeptical actions as being influenced by auditors' incentives, traits, knowledge, and experience and training. These four moderators also influence the likelihood that skeptical judgments result in skeptical actions (i.e., behaviors). Hurtt et al. (2013) extend Nelson's framework by augmenting the moderators to include four broad and comprehensive categories (i.e., characteristics of the auditor, client, evidence, and environment).⁴ These accepted models do not explicitly define the professional skepticism construct, so researchers employ a variety of conceptualizations and measures (e.g., see Nelson, 2009; Hurtt et al., 2013). For example, we noted that some view professional skepticism as an individual characteristic (Hurtt, 2010). That said, most researchers tend to take the view that a more skeptical auditor is one who views it as more likely that the financial statements are misstated or demands more evidence to conclude they are fairly stated. Accordingly, higher risk assessments (i.e., skeptical judgments) and

³ More generally, attitudes are driven by cognitive processing (Chaiken, 1987; Kruglanski & Thompson, 1999; Petty & Cacioppo, 1986; Petty et al., 1995), and they can be shaped or changed with variations in mindsets. Moreover, mindsets have systematic effects on attitude strength (Henderson et al., 2008). In the opposite direction, attitudes influence goal development (Kruglanski et al., 2015), an important determinant of mindsets (e.g., Gollwitzer, 1990).

⁴ Our framework simplifies this aspect of prior frameworks by consolidating influencers of skepticism into two categories, individual and social/situational factors. We do so to emphasize the important role that social and situational factors have for skepticism and to accommodate factors, such as firm culture, that are not readily categorized into existing schemes.

higher demand for evidence (i.e., skeptical actions) are generally viewed as indicating skepticism (Glover & Prawitt, 2014; Nelson, 2009).

Our conceptualization accommodates the Nelson (2009) and Hurr et al. (2013) models by including the most common skeptical judgments (i.e., risk assessments). We extend the models by including feelings about risk of misstatement and evidence insufficiency. Adding feelings increases researchers' ability to predict, and therefore manage, auditors' intentions and behaviors (i.e., skeptical actions), as we discuss in Section 2.5. Moreover, our mindset measures further extend existing models of professional skepticism by providing an antecedent to attitude measures in the form of cognitive processing measures. This increases the models' ability to predict the content and strength of attitudes, which also increases researchers' ability to predict auditor intentions and behavior, as we discuss further in Section 2.4.

2.3. Professional skepticism is situational

Conceptualizing professional skepticism as a mindset and an attitude implies that skepticism is exercised, and thus should be measured, situationally. While individual and social characteristics can make particular mindsets chronically available, contextual features such as task demands shift people from one mindset to another (Hamilton, Vohs, Sellier, & Meyvis, 2011). Similarly, attitudes can endure over time and across tasks, but they are also influenced by contextual and other situational features (Ajzen, 2005; Banaji & Heiphetz, 2010; Olson & Kendrick, 2008; Smith & Hogg, 2008). Thus, our conceptualization of professional skepticism as a mindset and an attitude implies that auditors' professional skepticism is best assessed situationally. This is consistent with extant models of professional skepticism (Hurr et al., 2013; Nelson, 2009), which implicitly assume that skepticism is at least in part situational.

While these models view skepticism as at least partially contextually determined, some researchers conceptualize professional skepticism as an individual trait. That is, while Hurr (2010) notes that skepticism is affected by both stable personality traits and by contextual factors, researchers use Hurr's (2010) scale, which captures a set of stable traits, to measure professional skepticism (e.g., Cohen et al., 2017; Quadackers et al., 2014).⁵

The trait approach measures general response tendencies in the abstract and attempts to use these tendencies to predict specific auditor judgments and decisions across a variety of auditing contexts. Hurr's (2010) scale includes measures of six general characteristics or tendencies, including auditors' general desire to learn ("search for knowledge") and their tendency to wait to decide on issues until more information is gathered ("suspension of judgment"). The measurement items are purposefully general; however, generality comes at a cost to predictive power. Responses to items such as "I think that learning is exciting" or "I take my time when making decisions" will not always translate into specific behaviors such as requiring more evidence before making a particular judgment in a particular audit.⁶ Ajzen (2005) argues that the likelihood that an underlying disposition is reflected in behavior increases as the match in the level of specificity of the disposition and the behavior increases. The attitude portion of our conceptualization of professional skepticism offers

⁵ Quadackers et al. (2014) and Cohen et al. (2017) use the Hurr (2010) scale to measure the trait capturing the neutrality perspective of skepticism and the inverse of the Rotter Interpersonal Trust Scale (Rotter, 1967) to measure the trait capturing the presumptive doubt perspective of skepticism. Both note that contextual factors can modify how skepticism translates into specific judgments and behaviors.

⁶ Hurr (2010) deals with this problem by depicting trait skepticism as an input into a skeptical mindset and skeptical behaviors, where the impact of trait skepticism on the latter two constructs can be moderated by other variables, such as engagement circumstances (see Fig. 1 in Hurr (2010)). Our model also accommodates trait skepticism as an individual factor that influences the larger professional skepticism construct.

greater specificity of this match because the attitude measures share a specific target (e.g., evidence) and context (e.g., audit engagement) with the attitude. Thus, we expect that our conceptualization of professional skepticism as a mindset and attitude will allow for better prediction of behavior.

The trait approach also implies that beliefs are internally derived and stable whereas our mindset and attitude conceptualization allows for professional skepticism that is both (1) contextually driven and (2) malleable. On the first point, mindsets and trait skepticism are similar in that their existence can be inferred from processing behaviors such as searching for more evidence, searching for disconfirming evidence, asking questions, noticing inconsistencies, weighting disconfirming evidence and inconsistencies, and suspending judgment. Moreover, both mindsets and traits endure over time and across tasks. Traits endure because they are by definition innate. Mindsets endure because they are "sticky" (Hamilton et al., 2011). That is, a mindset instilled in one situation carries over to a subsequent situation and continues to influence the thoughts of auditors until a new situation or task feature changes that mindset. A key difference between the endurance of traits and mindsets is that individuals have access to numerous mindsets and so they can change mindsets relatively easily, if prompted (Hamilton et al., 2011). This implies that researchers can develop interventions and firms can develop methodologies to induce mindsets that invoke the appropriate cognitive processes for the task at hand.

On the second point, attitudes—but not traits—are socially formed and malleable. That is, beliefs and feelings about risk (components of the attitude conceptualization of professional skepticism) are derived, at least in part, from the social environment and referent groups (Leiss, 1996; Slovic, 1999). For example, factors in the social environment of the firms, including firm culture, the preferences of an auditor's peer group, client culture, and the strength of the firm's monitoring and accountability systems shape auditors' beliefs and feelings about risk, management's assertions, and the evidence. This may be one reason that firms have different collective beliefs about risk (Kirkham, 1992). In addition, "emotions-in-the-workplace" research suggests that organizations possess different emotional cultures (Parkinson, Fischer, & Manstead, 2005). These emotional cultures influence the ways in which people express emotions and the ways in which emotions manifest in judgments and decisions (Hatfield, Cacioppo, & Rapson, 1992). We expect that auditors' emotional responses to the risk of a material misstatement (e.g., worry, concern, comfort) are, in part, socially (i.e., firm) imposed.

This fact that auditors' beliefs and feelings about risk are, at least in part, fostered within the firms, and not innate, implies that firms have some control over auditors' skepticism. Because the attitude portion of professional skepticism is socially constructed, skeptical attitudes should be receptive to interventions (see Ajzen, 2005; Banaji & Heiphetz, 2010; Olson & Kendrick, 2008; Smith & Hogg, 2008). In sum, conceptualizing professional skepticism as a mindset and an attitude reflects the idea that professional skepticism is situational and provides researchers with a way forward for helping auditors to manage their professional skepticism.

2.4. Critical thinking is essential for skepticism

The mindset portion of our conceptualization of professional skepticism reflects the idea that individuals' cognitive processing determines both the content and strength of their resulting attitudes (Petty, Haugtvedt, & Smith, 1995). For example, biased processing of evidence will naturally result in biased beliefs and feelings about the risk of misstatement (i.e., a biased attitude). In addition, more effortful processing leads to stronger attitudes (Blankenship & Wegener, 2008; Petty, Cacioppo, & Schumann, 1983). Attitude strength refers to the attitude's persistence over time, resistance to change, impact on subsequent information processing and judgments, and correlation with

behavior (Krosnick & Petty, 1995).⁷ Thus, including cognitive processing in the conceptualization of professional skepticism offers a way to better understand the source and strength of the professionally skeptical attitude.⁸

While regulations highlight the importance of cognitive processes in describing skepticism, research on auditors' professional skepticism often omits examination of such processes. Studies that examine auditors' professionally skeptical attitudes and skeptical judgments without examining underlying process run the risk of mistaking high risk assessments arising from a negative feeling about risk or a belief that is not well substantiated for actionable skepticism. If auditors' beliefs and feelings tell them that risk is high, but they have not engaged in appropriate cognitive processing to specifically identify the cause of their concerns, their concerns may not allow them to design appropriate follow-up procedures (Hammersley, Johnstone, & Kadous, 2011) or report appropriately to those who can change behavior (Griffith, Hammersley, Kadous, & Young, 2015b; Kadous & Zhou, *in press*). This implies that risk assessments alone do not sufficiently capture the professional skepticism construct, and that elevated risk assessments will not always reflect an actionable understanding of the risks. Understanding professional skepticism as a mindset can advance our knowledge about why apparently skeptical judgments sometimes do not result in skeptical actions that address the identified risks, which can inform remediation efforts.

2.5. Feelings are part of skepticism

Existing professional skepticism research does not explicitly acknowledge the significance of auditors' emotional response to risk on their choice of audit procedures performed. However, because audits are risk based, emotions must be considered to fully understand auditors' underlying skeptical attitudes and their relationship to behaviors. For example, research on the “affect heuristic” indicates that people rely on their feelings when judging the risks and benefits of specific hazards (Finucane, Alhakami, Slovic, & Johnson, 2000; Slovic, Finucane, Peters, & MacGregor, 2002, 2004). In fact, normal emotional reactions are necessary for appropriate decision making in a risky context (Bechara, Tranel, Damasio, & Damasio, 1996; Damasio, 1994). Moreover, time pressure, a condition that characterizes the audit setting, magnifies the propensity for feelings (as opposed to beliefs) to drive behavior (Finucane et al., 2000; Maule & Svenson, 1993). These ideas imply that researchers can gain a more accurate picture of how auditors evaluate and behave in response to risk if they consider auditors' emotional reactions to risk.

Capturing beliefs alone may sometimes be useful in predicting auditors' intention and behavior because beliefs and feelings often contain redundant information and can point to similar actions. For example, low risk assessments are likely normally associated with high comfort. However, this is not always the case. For example, an auditor may have

⁷ Several auditing studies demonstrate that higher quality processing is associated with more appropriate beliefs about risk and intentions to take appropriate action. For example, Griffith et al. (2015b) report that high quality cognitive processing (measured as identification of issues in incidentally presented information) and more even-handed evaluation of evidence led to more appropriately skeptical judgments about a biased management estimate. Kadous and Zhou (*in press*) find that broader and deeper information search and deeper processing lead to more appropriately skeptical judgments about a biased management estimate and a desire to address the issue more urgently. See Griffith, Nolder, and Petty (2018) for additional discussion of the theoretical link between auditors' cognitive processing and the strength of their attitudes and the resulting effect on their behaviors.

⁸ We also expect that auditors' attitudes influence which mindsets are activated in a situation, though this is not a focus of our paper. This is consistent with mindsets being triggered by situational factors, such as risk factors (e.g., Hamilton et al., 2011). Mindsets can be instantiated in response to goals (Wyer & Xu, 2010), so to the extent that personal factors (i.e., individual differences, such as need for cognition or low risk tolerance) or situational factors (e.g., a disliked client) provide auditors with goals, those goals may give rise to more or less skeptical mindsets.

a nagging negative feeling despite beliefs that risks are low. In cases like this, capturing both beliefs and feelings will lead to better understanding and prediction of auditors' intentions and actions.

In addition, the relationship between feelings and beliefs has consequences for designing interventions aimed at changing auditors' attitudes to change their behavior. When beliefs and feelings have consistent valences (i.e., both positive or both negative), attitudes are highly predictive of behavior (Chaiken, Pomerantz, & Giner-Sorolla, 1995; Maio, Esses, & Bell, 2000; Schlegel & DiTecco, 1982). However, inconsistent beliefs and feelings reduce the predictability of the attitude-behavior relationship. This implies that even if auditors have similar training and use the same decision aids, leading to consistent beliefs about the risk of a material misstatement in a given situation, differences in their emotional responses to risks can cause differences in the attitude-behavior link. Moreover, when feelings are at odds with beliefs, feelings tend to guide behavior (Lavine, Huff, Wagner, & Sweeney, 1998). Some research suggests that this relationship reflects that emotionally laden attitudes are more accessible (Giner-Sorolla, 2001). In such situations, attempts to change auditors' behavior are more likely to be successful if they focus on changing emotions (e.g., pointing out penalties) rather than on beliefs (e.g., training). Measuring feelings in addition to beliefs offers insight into these issues and advances our understanding of how to manage auditors' attitudes to encourage desired behaviors.

In sum, our dual conceptualization of professional skepticism as a mindset and an attitude is consistent with prior research and prior models but extends prior conceptualizations in ways that will provide us a more comprehensive view of skepticism and should improve the predictive ability of the professional skepticism construct. Having outlined our conceptualization and discussed its primary features, we next turn to the details of the two components—mindsets and attitudes—and how they can be measured in the context of professional skepticism.

3. Mindset theory and professional skepticism

A mindset is a state of mind, or cognitive orientation that facilitates performance of a particular task (Achtziger & Gollwitzer, 2010; Gollwitzer, 1990). These cognitive orientations are made up of particular judgment criteria and cognitive processes and procedures (Gollwitzer, 1990).⁹ Researchers have identified several distinct sets of mindsets that are characteristic of systematic patterns of cognitive processing (Wyer & Xu, 2010). For example, holistic mindsets engage processes that facilitate big picture thinking, while piecemeal mindsets facilitate solving problems that require reorganization of “parts” of a whole (Higgins & Chaires, 1980). Abstract mindsets facilitate making and evaluating decisions in line with one's principles, while concrete mindsets facilitate attending to immediate problems (Freitas, Gollwitzer, & Trope, 2004; Freitas, Salovey, & Liberman, 2001). Deliberative mindsets facilitate identification of the best course of action while implemental mindsets facilitate efficient completion of a chosen course of action (Gollwitzer, 1990). A key finding of the mindset literature is that decision quality is higher when there is a good match between the decision maker's mindset and the demands of the decision task at hand (Griffith, Kadous, & Young, 2016).

3.1. A skeptical mindset

Auditing standards describe professional skepticism in terms that mirror those used to describe a deliberative mindset, which is characterized by receptivity, openness, or alertness to new information and an objective and unbiased assessment of the merits of the evidence

⁹ Wyer and Xu (2010) define mindset broadly to include motor procedures in addition to cognitive procedures. This idea is less relevant to skepticism, and so we do not discuss it further.

(Gollwitzer, 1990). For example, regulators urge auditors to be alert to the possibility of fraud (IAASB, 2012a; PCAOB, 2010b), management bias (IAASB, 2012a; PCAOB, 2010a), evidence that contradicts other evidence (IAASB, 2012a; PCAOB, 2010c), and information that brings into question the reliability of potential evidence (e.g., IAASB, 2012a). More generally, standards require a critical assessment of audit evidence (IAASB, 2012a; PCAOB, 2006). These characteristics of skeptical thinking (i.e., alertness, openness, objectivity, critical thinking) map well into features of the deliberative mindset.¹⁰

The deliberative mindset is often contrasted with the implemental mindset, which is characterized by focused attention on obviously task-relevant information, closed-mindedness to other information, and biased processing (Gollwitzer, 1990). For example, individuals in a deliberative mindset are more likely to seek out diagnostic information, regardless of whether it confirms or disconfirms their self-assessment than are those in an implemental mindset (Bayer & Gollwitzer, 2005). Individuals in a deliberative mindset attend to a broader set of information, including information that is not clearly goal relevant, and so are better able to recall and use incidental information than are those in an implemental mindset (Fujita et al., 2007; Griffith et al., 2015b). Individuals in a deliberative mindset are also more likely than those in an implemental mindset to consider both sides of an issue, and they take longer to reach a judgment (Henderson, De Liver, & Gollwitzer, 2008), indicating openness to information and suspension of judgment among those in a deliberative mindset. Thus, the deliberative mindset captures many of the essential elements of professional skepticism, including the mechanics behind a “questioning mind,” a “critical evaluation of evidence,” and the auditor’s responsibility to “be alert” to evidence.

In further support of this idea, allegations of insufficient skepticism can be linked to biased processing consistent with an implemental mindset (Griffith et al., 2015b). For example, regulators and other observers accuse auditors of insufficient skepticism when they over-rely on management assertions (e.g., PCAOB, 2008, 2014, 2016; Messier, Kozloski, & Kochetova-Kozloski, 2010). This over-reliance can arise from a process that focuses on evidence consistent with management’s assertions, is closed to information that might contradict those assertions, and overweights information consistent with the assertions relative to its value (Griffith, Hammersley, & Kadous, 2015a). This “check the box” or implemental mindset does not allow for a questioning mind or a critical assessment of the evidence. In summary, the mindset literature highlights the extent to which cognitive processing is driven by one’s frame of mind and the extent to which this processing drives decision outcomes that embody more or less skepticism.

3.2. Cognitive processing measures of professional skepticism

Because mindsets are characterized by systematic patterns of cognitive processing, we can infer auditors’ mindsets from observing their processing behaviors. In this section, we describe specific measures that reflect auditors’ skeptical mindset throughout the audit. To develop these measures, we first draw on several auditor professional judgment

¹⁰ See Griffith et al. (2015b) for a similar argument that the deliberative mindset includes the types of critical thinking that reflect professional skepticism in auditing. We note that other types of mindsets are also potentially conducive to high quality audit judgments, particularly in narrowly defined problem contexts. For example, when auditors must reason through a complex causal chain to develop accurate expectations for account balances, the systems thinking mindset will improve those expectations (Brewster, 2011). We focus our analysis on the deliberative/implemental mindset classification because (1) research on the processing characteristics of these mindsets is well developed, (2) the processing characteristics of the deliberative mindset are associated with high quality judgment across a wide variety of auditor judgment tasks, indicating general applicability of deliberative mindsets to high judgment quality in auditing, and (3) as is laid out in the main text, the specific processing characteristics associated with the deliberative mindset map well into the processes identified as relating to professional skepticism in auditing standards.

frameworks to identify key decision stages or activities (CAQ, 2014; EY, 2012; Ranzilla et al., 2011). Integrating across these frameworks, we identify the key activities as (1) understand the issue(s) (UI), (2) gather the facts (GF), (3) consider alternatives (CA), and (4) perform the analysis (PA) (See Ranzilla et al., 2011; CAQ, 2014; EY, 2012).¹¹ We next examine standards to ascertain what constitutes skeptical execution of each stage. Finally, we apply mindset theory to develop a list of key measures to demonstrate how auditors’ skeptical mindset may be evidenced at each stage of processing.

We present our measures in Table 1. The numbers in the left-most column (e.g., “UI1”, “GF2”) are linked to the text below. Most of the measures we identify have been employed in prior research, though not typically in research on skepticism. Where possible we cite illustrative prior research using the measures. Our intent is not to introduce new measures of processing. Rather, our goal is to provide clarity regarding how auditors’ skeptical mindsets can be evidenced through cognitive processing measures. Our measures are meant to be illustrative, rather than comprehensive. Researchers can build on our framework to develop additional measures.

3.2.1. Understand the issue(s) (UI)

The first step in most auditor decision processes is to develop an understanding of the issue or issues. For example, in conducting analytical procedures or other audit planning procedures and in auditing complex estimates, auditors aim to understand the situation well enough that they can identify where the risks lie. Auditing standards imply that skeptical processing in this stage includes openness and receptivity to management bias, the possibility of fraud, and any other risk cues or situations that warrant further investigation. Auditors’ receptivity to information about risk can be measured with the number of seeded risk cues or other red flags identified in case materials or recalled subsequently in free recall tests (e.g., see Carpenter, 2007; Joe & Vandervelde, 2007; Chen, Trotman, & Zhou, 2015) (UI1).

Sometimes evidence items do not appear risky or problematic in isolation, but the overall pattern of items or conflict among items indicates a possible misstatement (e.g., Griffith, 2018; Griffith et al., 2015b; Hammersley, 2006). In such cases, skeptical processing requires that auditors think deeply enough to connect the individual pieces of evidence so that they can identify the relevant pattern. Thus, skeptical processing involves deep and effortful consideration of the facts to identify potential problem areas.

Deep processing is an effortful process, so researchers can get at it (very roughly) by measuring the time spent considering information (UI2). Researchers can more accurately evaluate depth of processing by assessing the extent to which auditors elaborate on the provided information by measuring relationships (connections) and abstractions (inferences from facts) in free recalls (e.g., Christ, 1993; Griffith, 2018; Hammersley, 2006) (UI3) or by seeding contradictory items or items that require different levels of processing to identify and measuring the extent to which auditors find and use items requiring deeper thinking (e.g., Griffith et al., 2015b; Hammersley et al., 2011; Kadous & Zhou, in press) (UI4).

3.2.2. Gather the facts (GF)

Throughout the audit, auditors gather facts about management’s assertions and collect evidence to serve as support for their audit

¹¹ These stages correspond roughly with cognitive processing stages used in audit research: (1) problem representation, (2) information search, (3) hypothesis generation, and (4) hypothesis evaluation (Bonner, 2008). We acknowledge that it is not always possible to isolate cognitive activities in one step. For example, activities involved in understanding the issue(s) may overlap with those involved in gathering facts. In addition, the stages do not constitute sequential steps. For example, gathering evidence may lead to a new understanding of the issues, considering alternatives may lead an auditor to gather new evidence, and performing analysis may lead to insights that lead back to any of the other stages.

Table 1
Mindset measures.

	Question(s) <i>Principle</i>	Measures
Understand Issue(s) (UI)		
UI1	How receptive to risk factors is the initial consideration? <i>Openness to information</i>	Number of embedded risk cues, red flags, etc. identified; Number of items recalled
UI2	How much effort is applied to developing an understanding? <i>Effortful analysis</i>	Time spent on task
UI3	How deeply is information processed? <i>Deep analysis</i>	Number of inferences made from facts or relationships identified (measured in free recall or explanation of a decision)
UI4	To what extent are seeded issues, contradictions, cues, or patterns of cues discovered? <i>Deep analysis</i>	Number of seeded cues identified (e.g., measured in explanation of a decision); Proportion of seeded cues identified
Gather Facts (GF)		
GF1	How comprehensive/extensive is the search? <i>Extensive search</i>	Number of items examined; Percentage of items examined (if from a list); time spent searching
GF2	How broad is the search? To what extent is the search extended beyond central information? <i>Broad search</i>	Number of items from non-central source identified
GF3	To what extent does the search focus on the most relevant/reliable items? <i>Diagnostic search</i>	Reliability/diagnosticity of items examined; Relative time spent on more reliable/diagnostic items; Reliability/diagnosticity of items examined first
GF4	To what extent is information search targeted versus passive? <i>Targeted search</i>	Correlation between participant's search order and a sequential search
GF5	To what extent does the search consider disconfirming (preference inconsistent) evidence? <i>Open search</i>	Ratio of confirming to disconfirming items examined; Ratio of time spent on confirming versus disconfirming items; nature of first item(s) examined
Consider Alternatives (CA)		
CA1	To what extent did the auditor consider alternative explanations, causes, scenarios, or reasons outside the obvious? <i>Open consideration</i>	Number of fraud hypotheses generated, Number of alternatives considered (listed or coded from text)
CA2	To what extent were the alternatives considered reasonable and unbiased? <i>Depth of consideration</i>	Quality of alternatives considered (relevance, novelty, plausibility, etc.)
Perform Analysis (PA)		
PA1	How biased is information evaluation (i.e., in favor of prior hypothesis or preferences)? <i>Unbiased analysis</i>	Implications of item for a choice or course of action, measured on a bipolar scale (very negative, very positive); Importance of an item to a decision; Ratio of participants' assessment of evidence implications/importance to similar assessment made by other (control) participants
PA2	To what extent does information reliability/diagnosticity affect its weighting? <i>Appropriate weighting</i>	Importance of item for a choice or course of action, measured on a bipolar scale (very negative, very positive); Weight inferred from judgment
PA3	How much effort is applied? <i>Effortful analysis</i>	Time spent on task; choice of a more effortful decision rule/model over a less effortful one; evidence of System II processing
PA4	How deeply is information processed? <i>Deep analysis</i>	Number of inferences made from facts or Number of relationships identified (measured in free recall or explanation of a decision);
PA5	To what extent are seeded issues, contradictions, cues, or patterns of cues discovered? <i>Deep analysis</i>	Number of seeded cues identified (e.g., measured in explanation of a decision); Proportion of seeded cues identified

opinion. Standards that describe regulators' expectations during this stage of processing require auditors to collect sufficient and appropriate (i.e., relevant and reliable) evidence (PCAOB, 2010d; IAASB, 2012a). Sufficient and appropriate evidence includes contradictory or conflicting evidence if discovered (IAASB, 2012a; IAASB, 2017).

Sufficiency of evidence suggests that skeptical information search is reasonably extensive (i.e., the amount of relevant evidence must exceed some threshold). Thus, measures of the number or percentage of available information items examined, as well as measures of time spent searching, reflect skepticism in information search (e.g., Turner, 2001) (GF1).¹² Because it is not always obvious which evidence is relevant (e.g., when testing complex estimates, information that appears

in another part of the audit may be relevant for the valuation), auditors need to be willing to extend their search to these less central areas to ensure they have gathered all the necessary information to properly analyze the collective evidence. This implies that measures of the breadth of search also capture skepticism in information search (e.g., Kadous & Zhou, *in press*) (GF2).

Standards' focus on evidence that is relevant and reliable suggests that skeptical information search should prioritize more diagnostic items over less diagnostic items. This can be examined by measuring relative time spent on the more relevant or reliable items (e.g., Thayer, 2011; Blay, Kadous, & Sawers, 2012) (GF3). Such a focus also implies that skeptical search is targeted, rather than passive. Passive search would likely manifest as a sequential search through the available information. The extent of targeting can be examined by measuring whether the search begins with the highest quality evidence (i.e., time elapsed before getting to the most relevant items, as in Barrick & Spilker, 2003) (GF3) and the extent to which a search pattern diverges from a sequential pattern (e.g., Barrick & Spilker, 2003; Bédard & Mock, 1992; Blay et al., 2012) (GF4).

¹² More evidence is not always better because having too much or the wrong information can reduce judgment quality (see Blay et al., 2012; Mautz & Sharaf, 1961) and is inefficient (Barrick & Spilker, 2003; Bédard & Mock, 1992). However, in the natural audit setting time pressure and deadline pressure appeared to keep the extent of search low, and a common concern among regulators is a lack of sufficient evidence. This leads us to believe that a more skeptical search will typically be a more extensive search, given the relevant baseline.

Standards' requirement that auditors consider contradictory or preference-inconsistent evidence implies that a skeptical search is not a confirmatory search, but one that is open to contradictory or inconsistent information. Researchers can assess this by measuring the ratio of confirming versus disconfirming items examined or the ratio of time spent on confirming versus disconfirming items (e.g., [Cloyd & Spilker, 1999](#); [Kadous, Magro, & Spilker, 2008](#); [Ricchiute, 2010](#); [Thayer, 2011](#); [Zhou, 2017](#)) or the extent to which items on one side or the other are prioritized in search (e.g., [Turner, 2001](#)) (GF5).

3.2.3. Consider alternatives (CA)

As we previously noted, auditors are required to critically assess evidence throughout the audit and to be alert to conditions indicating fraud, management bias, and inconsistencies across evidence. This implies auditors should not simply accept the client's explanation but should consider alternative possibilities. Consideration of alternatives is captured for many tasks in the "gather facts" stage (especially breadth and openness of search) and in the "perform analysis" stage (especially unbiased analysis). That said, firms' judgment frameworks include a separate decision step for considering alternative possibilities ([EY, 2012](#); [Ranzilla et al., 2011](#)), so we include specific measures of it here. Skeptical execution of this step requires receptivity and openness to information about fraud, error, and other alternatives. Researchers can measure this openness via the number of alternatives (fraud hypotheses, error hypotheses, etc.) considered (e.g., [Cianci & Bierstaker, 2009](#)) (CA1). Researchers can measure the depth of consideration by examining the quality of the alternatives considered (e.g., [Green & Trotman, 2003](#); [Luippold & Kida, 2012](#)) (CA2).

3.2.4. Perform analysis (PA)

The auditor must analyze the evidence critically, which requires an unbiased analysis of evidence, both individually and collectively. To measure bias or lack thereof in evidence analysis, researchers can ask participants to rate the importance or implications of an item for a particular decision (e.g., see [Wilks, 2002](#); [Blay, 2005](#); [Ricchiute, 2010](#); [Zhou, 2017](#)) (PA1). These ratings would then be compared with those of other participants or with ratings made by the same participants for different evidence types to detect bias.

Critically analyzing evidence also implies that information is weighted in accordance with the information's diagnosticity and reliability (e.g., [Mautz & Sharaf, 1961](#)). Weight given to information should not depend on the order or format in which the information is presented. Information weighting can be measured directly (but potentially with bias) by asking participants to assess the importance of the item has on their decisions on bipolar scales, or weight can be inferred (indirectly but in an unbiased way) from final judgments in some experimental designs (e.g., [Bamber, Ramsay, & Tubbs, 1997](#); [Kadous, Leiby, & Peecher, 2013](#)) (PA2).

Finally, critically analyzing evidence also implies that auditors need to think deeply and put together pieces of evidence in a truly integrative manner. As we noted earlier, researchers can get at effortful processing by measuring time spent on thinking about the evidence. In addition, they can assess whether auditors choose a more or less effortful strategy (e.g., [Clor-Proell & Maines, 2014](#); [Mocadlo, 2017](#)) (PA3). Researchers can also measure depth of analysis in this decision stage via comparable measures to those listed in the Understanding the Issue(s) stage, by examining inferences and recalls (PA4) or identification of seeded cues and patterns (PA5).

3.3. Summary

In summary, we draw from mindset theory to highlight the idea that an auditor's skeptical state of mind is manifest in, and can be measured by, cognitive processing behaviors. We identify specific features of cognitive processes that relate to professional skepticism and we develop the measures shown in [Table 1](#) to capture them. Researchers can

use these and similar measures to examine concerns surrounding the proper application of professional skepticism and to learn more about auditors' professional skepticism than could be learned from output measures (e.g., risk judgments) alone. Some of the measures are restricted to use in experiments (e.g., identification of seeded errors), but auditors may be able to use or adapt other measures to gain insight into how to document their skeptical mindset for regulators. For example, "questioning" the evidence and "being alert" can be more specifically documented using measures that capture whether the auditor searched for diagnostic evidence, searched for evidence both supporting and opposing management's point of view, weighted evidence according to its diagnosticity, and so on. Moreover, researchers and practitioners can leverage mindset research to develop specific ideas about improving auditor skepticism. We discuss some of these possibilities in [Section 5](#).

4. Attitude theory and professional skepticism

An attitude is "an evaluative integration of cognitions and affects experienced in relation to an object" ([Crano & Prislin, 2006](#)).¹³ People hold attitudes about political candidates, foods, and many other targets in their daily lives.¹⁴ [Eagly and Chaiken \(2005\)](#) assert that understanding the nature of attitudes is a first step to understanding human behavior and addressing social problems. Attitudes towards these objects, people, or events are not observable, but can be inferred from expressions of beliefs (i.e., cognitions) and feelings (i.e., affects) associated with them. Attitudes, in turn, have potential to explain and predict behavior.

4.1. A skeptical attitude

There is a rich literature in social psychology that demonstrates that attitudes are a lens through which individuals make sense of their surroundings and impart consistency in their evaluations of their social surroundings to guide their behavior ([Cacioppo, Petty, & Green, 1989](#); [Fazio, 1989](#); [Greenwald, 1989](#); [Katz, 1960](#); [Pratkanis, 1988, 1989](#); [Smith, Bruner, & White, 1956](#)). Likewise, auditing standards describe professional skepticism as influencing auditors' interpretation of evidence and driving their choice of audit procedures performed throughout the engagement ([IAASB, 2012a](#)). Attitudes are a good fit for professional skepticism in that they capture evaluations of a target and a corresponding behavior, just as professional skepticism does.

Moreover, attitude theory highlights the role that feelings play in forming reactions to targets. Relying on attitude theory allows us to incorporate auditors' emotional responses to the risk that management's assertions are misstated and to the potential insufficiency of audit evidence into our thinking about professional skepticism. Thus, conceptualizing professional skepticism as an attitude provides a theoretical framework for measuring auditors' professional skepticism in terms of both auditors' cognitive and affective evaluative responses. Insight into cognitive and affective responses is important because both are needed to predict auditors' intentions and behaviors, which ultimately determine audit quality.

To identify the target of the professionally skeptical attitude, we note that auditing is defined as "a systematic process of objectively obtaining and evaluating evidence regarding assertions about economic

¹³ Some attitude theorists view beliefs, feelings, intentions, and behaviors as jointly measuring attitudes (e.g., [Rosenberg & Hovland, 1960](#)). Our assumption that beliefs and feelings precede intentions and actions mirrors the approach of [Ajzen and Fishbein \(1980\)](#) in their Theory of Reasoned Action and its successor, the Theory of Planned Behavior ([Ajzen, 2005](#)). Further, some research asserts that beliefs and feelings are causally connected (e.g., see [Festinger \(1957\)](#) on cognitive dissonance or [Slovic, Finucane, Peters, and MacGregor \(2007\)](#) on the affect heuristic). Determining the direction of the causal chain between beliefs and feelings is beyond the scope of this paper.

¹⁴ See [Nolder and Blankenship \(2018\)](#) for a discussion of how the auditing literature compares to that of other disciplines (e.g., diet and immigration) in terms of capitalizing on attitude research to understand and manage individuals' behaviors.

actions and events to ascertain the degree of correspondence between those assertions and established criteria” (Auditing Concepts Committee, 1972). By this definition, the goal of the audit is to conclude whether the financial statements (i.e., management’s assertions) are fairly stated. Auditors achieve this goal by obtaining and evaluating appropriate and sufficient evidence (i.e., the collective product of the audit procedures performed) to support their opinion. Thus, we assert that the primary and secondary targets of the attitude of professional skepticism are the financial statements (i.e., management’s assertions) and the evidence, respectively.

4.2. Attitude measures of professional skepticism

In this section, we apply attitude theory to develop specific measures that can identify auditors’ cognitive and affective evaluative responses associated with management’s assertions and the evidence that reflect a skeptical attitude. We present our measures in Table 2. The numbers in the left-most column (e.g., “B1”, “F2”) are linked to the text below. Many of the belief measures have previously been employed in research on skepticism, though that research employs few measures of feelings. Where possible we cite illustrative prior research using the measures. Our goal in providing these measures is to provide researchers with help in broadening and sharpening their measurement of auditors’ skeptical attitudes, improving their ability to predict auditors’ intended behaviors (for which we also provide measures) and actual behaviors. Our measures are meant to be illustrative, rather than comprehensive. Researchers can build on our framework to develop additional measures.

4.2.1. Beliefs (B)

Based on the definition of auditing, the most important auditor beliefs that measure professional skepticism are beliefs about management’s assertions and about the evidence. These include beliefs about risks of misstatement and beliefs about what constitutes appropriate and sufficient evidence to support auditors’ conclusions regarding the financial statements. This is consistent with Nelson’s (2009) definition of professional skepticism, which indicates that the most important auditor beliefs reflecting their professional skepticism are beliefs about the risk of a material misstatement in the financial statements and auditors’ beliefs about evidence (i.e., “information”) sufficiency and appropriateness.¹⁵ Additional beliefs, such as what constitutes a material misstatement, may also reflect an auditor’s attitude of professional skepticism; however, we focus on the most fundamental beliefs based on auditing standards in our initial development of professional skepticism attitude measures.

For consistency with the attitude literature, the measurement scales associated with beliefs in attitude research reflect some degree of goodness and badness (Banaji & Heiphetz, 2010; Eagly & Chaiken, 2007; Thompson, Kruglanski, & Spiegel, 2000). Hence, scales measuring auditors’ beliefs about risks include anchors such as “not at all risky” and “extremely risky.” Scales measuring auditors’ beliefs about the evidence include anchors that either directly or indirectly indicate evidence sufficiency or appropriateness on the “good” end and insufficiency or inappropriateness on the “bad” end.

Researchers frequently measure auditors’ beliefs about management assertions. For example, fraud risk assessments (e.g., Asare & Wright, 2004; Carpenter, 2007; Simon, 2012) and assessments of the risk of material misstatement (Hammersley, 2006; O’Donnell & Perkins, 2011) are commonly measured beliefs. Researchers also measure other client risks, including business risk (Johnstone, 2000) and inherent risk (Taylor, 2000) (B1). In the literature to date, beliefs about risks of

material misstatement are sometimes referred to as reflecting skepticism (e.g., Fukukawa & Mock, 2011), but are, at other times, are simply referred to as risk assessments (e.g., Piercey, 2011).

In some cases, auditors tend to assess “reasonableness” instead of “risk.” For example, audits of revenue should consider whether the revenue recognition method is reasonable, and audits of estimates result in a conclusion about the reasonableness of the estimated account. Thus, beliefs about the reasonableness or appropriateness of an accounting method (e.g., Hackenbrack & Nelson, 1996; Kadous, Kennedy, & Peecher, 2003) or the reasonableness of an estimated account (e.g., Griffith et al., 2015b) capture beliefs relevant to skepticism (B2).

Belief measures relating to management’s assertions and the evidence are less commonly employed in audit research. Important questions include how appropriate (relevant) a given procedure is for testing an assertion (B3) and the extent to which a given procedure would provide sufficient evidence to test as assertion (B4). A key belief relating to the evidence is whether the evidence is sufficient to make a conclusion (e.g., Rasso, 2015) (B5).

4.2.2. Feelings (F)

The feelings measures that reflect an auditor’s attitude of professional skepticism relate to the targets described above. They include affective responses to the risks associated with potential misstatements and with evidence insufficiency and/or inappropriateness. Relevant affective responses to these risks can include feelings of fear, worry, doubt, anxiety, and comfort (Guénin-Paracini, Malsch, & Paillé, 2014). Comfort plays an especially important role in auditing because each member of the engagement team must reach a level of comfort with the evidence for a successful conclusion to the audit (Pentland, 1993). The choice of scales for affective measures of professional skepticism is straightforward. “Goodness” is represented by labels such as “not at all worried” or “very satisfied,” while “badness” is represented by labels such as “very worried” or “not at all satisfied.”

Researchers do not tend to measure feelings when assessing skepticism, but attitude theory indicates that feelings play an important role in determining behavior (Fazio, Zanna, & Cooper, 1978). Feelings about management’s assertions relevant to skepticism include worry or fear about risk of misstatement (F1), and comfort and satisfaction that a balance (e.g., an estimate) or an accounting method or policy is reasonable (F2). Feelings about the evidence also capture skepticism. For example, worry about the insufficiency of evidence (F3) and satisfaction or comfort about the quality and amount of evidence (F4) likely guide auditors’ evidence-collection intentions and behaviors.

We observe that although existing conceptualizations of professional skepticism do not explicitly discuss feelings, feelings are implicit in some conceptualizations. For example, Glover and Prawitt’s (2014) professional skepticism framework describes auditors’ professional skepticism on a continuum ranging from auditors’ feelings of complete trust to complete doubt. Nelson (2009, p. 4) views a skeptical auditor as “one whose behavior indicates relatively more doubt about the validity of some assertion.” Thus, to the extent that “doubt” represents an affective response to risk, Glover and Prawitt’s (2014) and Nelson (2009)’s frameworks can be viewed as accommodating an affective component of an auditor’s skeptical attitude.

4.2.3. Intentions (I)

Professionally skeptical attitudes are measured by beliefs and feelings about management’s assertions and the evidence, and these attitudes are causally related to auditors’ intentions and actual behaviors. We include a few measures of auditors’ intended behaviors in Table 2 to facilitate researchers’ examination of whether professionally skeptical attitudes manifest in skeptical actions. Auditors’ actual behaviors determine the persuasiveness of the evidence that is collected to support the audit opinion. For example, an auditor who believes that risk is high and who is uncomfortable with existing evidence should gather more persuasive evidence, either by seeking more evidence or higher quality

¹⁵ Nelson (2009, 1) defines professional skepticism as “indicated by auditor judgments and decisions that reflect a heightened assessment of the risk that an assertion is incorrect, conditional on the information available to the auditor”.

Table 2
Attitude and intention measures.

	Question(s)	Target	Scales Anchors	
			Good	Bad
		Attitude Component: Beliefs (B)		
B1	What is the risk that [revenue] is materially misstated?	Management's Assertions	Not at all risky (remote)	Extremely risky (probable)
B2	How reasonable is management's estimate of [the warranty reserve]?	Management's Assertion	Reasonable	Unreasonable
B3	How appropriate is [procedure] for testing management's assertion that [accounts payable is complete]?	Evidence	Appropriate	Inappropriate
B4	When testing management's [valuation assertion regarding inventory], would [procedure] provide sufficient evidence regarding the fair presentation of management's assertion?	Evidence	Sufficient	Insufficient
B5	To what extent are you prepared to conclude that the balance is fairly stated?	Evidence	Completely prepared to conclude (Sufficient)	Not at all prepared to conclude (Insufficient)
		Attitude Component: Feelings (F)		
F1	How worried are you that [revenue] is materially misstated? How fearful are you that there is an undiscovered misstatement in the financial statements?	Management's Assertions	Not at all worried/fearful	Very worried/fearful
F2	How comfortable are you with [management's estimate of uncollectibles]? How satisfied are you that management's [revenue recognition policies] are acceptable?	Management's Assertions	Very comfortable/satisfied	Not at all comfortable/satisfied
F3	How worried are you that the evidence supporting management's assertions is not sufficient to conclude?	Evidence	Not at all worried	Very worried
F4	How satisfied are you with the quantity and quality of evidence you have collected to support your conclusion? How comfortable are you that the evidence is sufficient?	Evidence	Very satisfied/comfortable	Not at all satisfied/comfortable
		Intentions (I)		
I1	Which procedures should be conducted?	N/A	^a	^a
I2	How will you allocate time to the various procedures?	N/A	^a	^a
I3	How much additional testing would you recommend? How many hours of work are needed?	N/A	Extensive testing	Limited testing
I4	How likely is it that you would seek additional evidence and/or explanation from the client?	N/A	Not at all likely	Extremely likely
I5	What percentage of the population do you want to sample?	N/A	0%	100%

^a While these measures do not include a bimodal continuous scale anchored with some degree of favor or disfavor, they do proxy for the auditors' intentions and/or behaviors in performing the audit. After collecting these responses, investigators can transform responses to a continuous scale that reflects how persuasive the evidence is in supporting auditors' opinion regarding the fair presentation of the financial performance of the company (i.e., financial performance of the company (i.e., management's assertions)).

evidence. Therefore, auditors' intended behaviors can be measured on bimodal scales capturing the persuasiveness of additional evidence obtained. The scales would be anchored by “not at all persuasive” and “extremely persuasive”.

Relevant intentions include details of the procedures to be conducted. Researchers have captured these intentions by having auditors select appropriate audit tests from a menu or plan procedures for an audit area (e.g., Asare & Wright, 1997; Glover, Prawitt, Schultz, & Zimbelman, 2003; Hammersley et al., 2011; Hoffman & Zimbelman, 2009) (11). Researchers can also ask auditors how time should be allocated across specific procedures (i.e., procedures varying in diagnosticity, as in Hammersley, 2006) (12). More commonly, intentions are measured as the amount of additional testing that is required (e.g., Glover et al., 2003; Zimbelman, 1997) (13) and the likelihood of seeking additional evidence/or explanation from the client (e.g., Bennett & Hatfield, 2013)¹⁶ (14). Researchers can also capture the comprehensiveness of intended audit work, for example, the sample size as a proportion of population size (15).¹⁷

As the citations demonstrate, these intention measures have been used in prior audit research; however, researchers tend to omit measures of auditors' intentions and actions from their studies of professional skepticism (Hurt et al., 2013). When they are included, measures often focus on budgeted hours, which is a noisy input into evidence quality, rather than on measures that more directly map into the persuasiveness of evidence to be gathered during the audit process (see Hammersley et al., 2011 for a similar argument). Measures of auditors' intended behaviors will be useful to researchers interested in identifying causes of auditors' failure to take skeptical actions and in predicting whether and when auditors' attitude of professional skepticism will result in appropriate actions.

4.3. Summary

In summary, we draw from attitude theory to develop measures of auditors' attitude of professional skepticism, along with auditors' intended behaviors that result from attitudes. The attitude measures explicitly incorporate feelings, which are powerful in determining behavior, as well as beliefs. Including auditors' intended behaviors facilitates examination of auditors' attitude-behavior consistency, a topic of considerable concern to auditors, regulators, and researchers. As we note above, the predictability of the attitude-behavior relationship is a function of attitude strength. Two auditors may express directionally similar beliefs and feelings about the risk of a material misstatement on an audit; however, the strength of these evaluative responses has consequences for behavior. Moreover, to the extent that auditors' cognitive and affective measures diverge, attitude theory will help researchers design effective interventions aimed at changing auditors' beliefs and/or feelings to influence auditors' behaviors to increase audit quality. We discuss some of these possibilities in Section 5.

5. Conclusions and future research

Conceptualizing professional skepticism as both a mindset and an attitude allows for a more complete view of skepticism and implies that both process measures (i.e., cognitive processing) and output measures (i.e., cognitive and affective evaluative measures) are relevant to measuring skepticism. Our mapping of audit standards into the mindset and attitude constructs facilitates a common understanding of what skepticism means across practice and research. In addition, the dual

¹⁶ Bennett and Hatfield used a simulated case in their study and were able to capture the actual, versus intended, behavior of collecting additional necessary evidence from the client.

¹⁷ Additional intentions and actions that do not map directly into evidence collection include reporting audit issues up the audit firm hierarchy (e.g., Griffith et al., 2015b; Kadous & Zhou, in press; Nelson, Proell, & Randel 2016).

conceptualization provides theory-based insights into how we might infer whether an auditor applied professional skepticism in a given situation and into how we might design theory-based interventions to change auditors' mindsets and attitudes to achieve appropriate levels of professional skepticism. In this section, we offer suggestions for future research in these and other important areas.

5.1. Framing of standards

Mindset theory indicates that mindsets can be activated by contextual factors (Gollwitzer, 1990). Moreover, once activated, mindsets persist and can influence subsequent tasks until they are changed (Griffith et al., 2015b; Wyer & Xu, 2010). This implies that mindsets associated with inappropriately skeptical processing can be generated by contextual conditions such as the wording of accounting or auditing standards and the way that audit work is assigned and conducted (e.g., by assigning each auditor a list of procedures to check off) (Griffith et al., 2015a). Similarly, other contextual conditions can increase or decrease the likelihood that auditors engage in appropriately skeptical processing.

In particular, research is needed to explore whether revising the language in standards can activate a skeptical mindset. To illustrate, consider ISA 540, the current global standard that guides audit testing associated with management's fair value estimation. The verbs used to describe audit procedures when auditing fair value estimates seem unlikely to facilitate a skeptical mindset. Auditors shall “obtain”, “review”, “evaluate”, “determine”, “undertake”, “test”, and to a lesser extent “consider”. In contrast, replacing these verbs with “be alert”, “question”, “think about”, “be receptive”, “be open”, and many more instances of “consider” may increase the likelihood of activating a skeptical mindset. Experimental researchers can test this idea in the laboratory to provide evidence on how changes to the language in auditing standards can be revised to induce a skeptical mindset.

Likewise, standards could explicitly require auditors to engage in and document specific deliberative processes. For example, researchers can test whether standards requiring a minimum amount of disconfirming evidence be examined and documented or requiring particular patterns of search be documented would improve auditors' openness to contradictory information and reduce search bias, as well as whether engaging in these processes would instantiate a sticky mindset that would improve evidence evaluation, as well.

5.2. Interventions targeting mindsets

Conceptualizing professional skepticism in terms of mindset theory has implications for researchers exploring possible strategies for inducing a skeptical mindset in auditors. For example, across most firms, relatively senior team members assess the risks and design the audit plan, and they then assign a list of procedures to staff members. Receiving their audit work in this way can lead to an implemental mindset. Hence, the “check-the-box” mentality for which auditors are often criticized might be a function of how audit firms allocate and structure auditors' work (Griffith et al., 2015a). Mindset theory suggests practitioners can change the mindset by changing the framing of the tasks. Griffith et al. (2015b) designed a theory-based intervention to change auditors' mindsets and improve information processing and judgments. Future research can examine other ways to place auditors into an appropriately skeptical mindset. For example, brainstorming sessions such as those used to improve consideration of fraud (e.g., Carpenter, 2007) may be useful in encouraging critical thinking about how to best test an estimate or to conduct other audit work requiring critical thinking. Having partners or managers model critical thinking may also prime a skeptical mindset that activates thoughtful and effortful cognitive processing.

5.3. Interventions targeting the attitude-behavior relationship

Even when auditors' cognitive processing produces appropriately skeptical attitudes, moderating variables (i.e., individual and social factors) can preclude auditors from taking skeptical action. Nolder, Kadous, and Peecher (2018) describe a number of important moderators that interrupt the attitude-behavior relationship. These include auditor characteristics such as experience, knowledge, and personality traits (e.g., self-monitoring and need for cognition), as well as social/situational factors including social norms in the firms, time pressure, and fee pressure. Knowledge of these moderators allows researchers and firms to understand and address problems related to professional skepticism arising from the attitude-intention link.

Nolder et al. (2018) also stress the influence of competing attitudes on auditors' behaviors. In an audit setting, there are at least two types of attitudes in addition to professional skepticism that may drive auditors' behaviors, potentially enhancing or interfering with auditors' skeptical behavior. First, auditors' attitudes toward others (e.g., beliefs and feelings about the client's integrity and likeability or about the regulator's competence) may cause them to be more or less likely to acquiesce to client preferences or more or less likely to adhere to standards. Second, individual auditors' attitudes toward their own perceived control (e.g., authority) to modify the original audit program in light of new information can lead to too few or too many changes to audit procedures to address risks. An understanding of other salient attitudes in the work environment is critical to understanding and changing auditors' behavior.

In summary, the attitude literature provides insights into potential moderators of the relationship between attitudes and behaviors. Researchers can examine whether and under what circumstance these factors cause problematic auditor behavior. They can also use knowledge of potential moderators to inform future research into auditor skepticism and audit quality, for example by using it to design interventions to strengthen the link between professionally skeptical attitudes and auditor behavior, which would improve audit quality.

5.4. Root cause analysis and designing interventions

Finally, the attitude and mindset components of our conceptualization of professional skepticism can aid in determining the root cause of auditing deficiencies. As discussed in the previous section, the attitude conceptualization provides a means for addressing the disconnect between auditors' beliefs about risk and the nature, extent, and timing of audit procedures performed (i.e., behaviors). That is, if auditors' beliefs (or feelings) are not associated with their behavior, we can infer that the behavior likely does not reflect an underlying attitude, but instead, may be associated with individual factors (e.g., traits or ability) or social/situational factors (e.g., audit procedures mandated by the firm or other moderators). In other words, our attitude conceptualization provides a means by which we can identify whether a lack of a professionally skeptical attitude is really the "root cause" of auditing deficiencies or if the cause lies elsewhere.

Root cause analysis is facilitated by researchers measuring attitudes, intentions, and actions. For example, Hammersley et al. (2011) measured both risk assessments (beliefs) and the specific audit procedures to be performed. They found that in conditions in which risk assessments were higher, auditors intended to collect more persuasive evidence, but the additional evidence was not persuasive.¹⁸ One could imagine an inspector viewing auditors as lacking in professional skepticism because they did not, on average, recommend additional work to

¹⁸ In addition to measuring multiple aspects of the attitude of professional skepticism, this finding also required that the experimental instrument be designed such that the researchers could code planned audit procedures as more or less effective (i.e., evidence gained would be more or less persuasive).

address the specific risks at hand. Yet, auditors clearly viewed risk as elevated and intended to do more work, indicating that the attitude of professional skepticism is not the root cause of the insufficient evidence.

In similar settings, Hoffman and Zimbelman (2009) and Simon (2012) improve auditors' skeptical intentions (i.e., their audit programs) by conducting interventions aimed at changing how auditors think (i.e., their mindsets), indicating that inadequate cognitive processing is a root cause of insufficient skeptical intentions and behaviors in the control conditions. Of course, this root cause analysis is further enhanced by measurement of cognitive processes, which can identify how processing falls short. Research measuring skeptical mindsets, skeptical attitudes, and specific audit behaviors allows for better pinpointing of root causes, which can facilitate more effective solutions (e.g., training or revisions to firm methodology or auditing standards).¹⁹

In conclusion, embedding the professional skepticism construct in mindset and attitude theory offers a theoretical framework for organizing, synthesizing, and interpreting professional skepticism research in terms of the relationship between mindsets and cognitive processing, along with the relationships among cognitive processing, attitudes (in terms of beliefs and feelings), intentions, and behaviors. Future studies examining one or more of these relationships have the potential to inform practice about the role of professional skepticism in driving auditors' behaviors. Moreover, the theories provide guidance on changing behavior via mindsets, attitudes, or both. Our dual conceptualization relying on mindset and attitude theories promises to help researchers discover answers to the many questions posed by regulators and practitioners about what skepticism is and how it can be improved. Future professional skepticism research relying on mindset and attitude theory has enormous potential to inform both practice and regulation.

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¹⁹ See Nolder and Palmrose (2018) for a discussion regarding root-cause evidence that is necessary to justify a need for revising auditing standards.

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