A Habit Strength-Based Explanation for Auditors’ Use of Simple Cognitive Processes for Complex Tasks

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We experimentally examine whether audit seniors’ use of simple cognitive processes for a complex task is affected by the strength of habits that they developed as staff. A habit is a mental association between a behavior and a specific context. We propose that, for seniors with stronger habits to use simple processes, the typical audit room context automatically activates those processes, making it harder to select the processes that are more effective for a complex task. As predicted, we find that seniors with stronger habits identify fewer issues with a complex estimate than seniors with weaker habits when in the typical context. Seniors with stronger habits perform better in an alternative context that does not activate the simple processes, while those with weaker habits do not. Additional analyses validate that habit strength underlies our results and explore how the audit setting influences the development and enactment of habitual behaviors.

JEL codes: G10, M40, M41, M42, D80, D91

Keywords: habits, cognitive processing, accounting estimates, audit quality, financial reporting quality, goodwill impairment

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I. INTRODUCTION

Accounting estimates are susceptible to misstatement due to management bias, making effective auditing of estimates critical for financial reporting quality (Bratten, Gaynor, McDaniel, Montague, and Sierra 2013; Cannon and Bedard 2017; Griffith, Hammersley, and Kadous 2015a). However, inspection reports cite deficiencies in audits of estimates, particularly in evaluations of underlying assumptions (IFIAR 2017; IFIAR 2019). These reports and a growing body of research (e.g., Austin, Hammersley, and Ricci 2020; Griffith, Hammersley, Kadous, and Young 2015b; Griffith 2018; Griffith, Kadous, and Young 2020; Joe, Wu, and Zimmerman 2020; Kadous and Zhou 2019) suggest that these deficiencies are caused by auditors’ use of simple cognitive processes, such as superficial processing, which impairs their ability to perform the task. Yet, we know little about why this is the case. We examine whether the extent to which seniors use simple cognitive processes when performing this complex task is affected by the strength of habits that they developed as staff auditors.

A habit is an association in memory between a behavior and a specific, stable context in which that behavior is enacted. The association develops as the person repeats the behavior in the context and concurrently experiences rewards (e.g., Wood and Rünger 2016). Here, “behavior” refers to a physical or cognitive activity, and “context” refers to one’s surroundings, including the place and other people who are present. For example, research finds that people who frequently eat and enjoy popcorn while attending movies in a theater can develop an “eat popcorn at a movie theater” habit (Neal, Wood, Wu, and Kurlander 2011). Likewise, people who speak loudly while attending sporting events in a stadium can develop a “speak loudly at a stadium” habit (Neal, Wood, Labrecque, and Lally 2012). Importantly, while these behaviors originally occur to satisfy a particular goal (i.e., to satiate hunger or to be heard), with repetition
within a stable context and associated rewards, they can become tied to the context rather than occurring in response to a current goal or task demand. For example, a person with strong habits may speak loudly at a sports stadium even when it is quiet simply because she is *in the context*.

We propose that staff auditors develop habits to use simple cognitive processes when they are in a typical audit room (hereafter, “habits”). Staff auditors work under conditions conducive to formation of such habits. First, staff likely repeatedly use simple cognitive processes (i.e., superficial, confirmatory, and piecemeal processes) because their work includes simple tasks such as vouching prices from sales invoices to a price list. For these tasks, simple processes are effective and particularly efficient. Second, staff may feel rewarded for using these processes. For example, they may value the praise they receive from superiors for completing their work quite efficiently (Nelson and Proell 2018). Finally, they likely repeatedly use, and feel rewarded for using, simple processes in a context that is fairly stable over time and across clients (i.e., the typical conference room at a client site housing multiple team members).

Habits are hard to break (e.g., Wood and Neal 2016), implying that staff who develop simple process habits may carry them forward when promoted to senior. However, we expect these carried forward habits will vary in *strength*, based on the extent to which seniors, as staff, used the simple processes and felt rewarded for doing so. Because people with stronger (versus weaker) habits have stronger context-behavior associations in memory, experiencing the context is more likely to activate the behavior in memory for them, prompting them to enact it. This occurs *even when* people are faced with a different task for which the behavior is undesirable (Wood and Rünger 2016). For example, Neal et al. (2011) show that people who have a strong “eat popcorn at a movie theater” habit eat just as much stale popcorn as fresh when in a theater context, despite disliking the stale popcorn, whereas people with weaker habits eat less stale
popcorn. Thus, habit theory implies that seniors with stronger simple process habits will be more likely to have the simple processes activated and to use them when auditing a complex estimate when in the typical audit room context, despite being less effective for the task—they impair auditors’ ability to identify issues underlying the estimate (e.g., Griffith et al. 2015b).

Accordingly, our primary prediction is that, in the typical audit room context, audit seniors with stronger simple process habits will identify fewer issues with the assumptions underlying an estimate.

An alternative context (one that alters elements of the typical context) can prevent the automatic activation of habitual behaviors, allowing people instead to act in line with task demands (e.g., Wood, Tam, and Witt 2005). For example, research finds that moviegoers with strong popcorn-eating habits, when placed in a meeting room context, do not eat stale popcorn “out of habit,” but they allow the tastiness of the popcorn to guide their behavior (Neal et al. 2011). Similarly, people with strong habits to speak loudly in stadiums do not speak loudly when in a kitchen context (Neal et al. 2012). Overall, habit theory implies that seniors with stronger habits, when placed in an alternative audit room context, will be less likely to use the simple processes for the complex task. Thus, we predict they will identify more issues in the alternative context than in the typical context. By contrast, seniors with weaker habits are less likely to react to an alternative context, as they are more likely to act based on task demands. Together, these expectations imply an interaction between habit strength and context, our second prediction.

We acknowledge that our application of the habit strength construct to auditing is exploratory. While most of the habits literature examines physical habits in everyday life, our proposed habit is cognitive in nature, and also is situated in a professional setting. These factors may make it both less and more likely that people override habits that, at some point, become
undesirable. First, while all habits have a cognitive component and operate through similar mechanisms, mental habits such as mind wandering (e.g., Zedelius, Gross, and Schooler 2018) and rumination (e.g., Watkins, Owens, and Cook 2018) have minimal physical manifestations that can provide sensory feedback. Such sensory feedback (e.g., hearing one’s loud voice in a quiet stadium) can alert people to override a behavior that is undesirable for a given situation. Second, our habit relates to professionals who have strong incentives for effective task performance, and this could make it more likely that unwanted habits are overridden. Third, auditors gain knowledge through professional experience, and knowledge also could override the negative effects of strongly habitual cognitive processing.

We test our predictions in a 2 x 2 between-participants experiment with 128 experienced audit seniors from two large audit firms. Auditors evaluate assumptions underlying a fair value estimate in a goodwill impairment case. We embed in the case issues reflective of management bias, the identification of which is impeded by the use of simple cognitive processes. Thus, our dependent measure is the number of issues related to assumptions that auditors identify.

We measure our first independent variable, habit strength, using an implicit measure that directly captures the strength of the association in memory between the typical audit room context and the simple processes (see Rebar, Gardner, Rhodes, and Verplanken 2018). Specifically, this reaction-time measure captures how fast auditors, after being primed with a photo of the typical audit room context, complete word fragments related to the simple processes (relative to control fragments). We use a median split to classify auditors as having stronger or weaker habits. We manipulate context by randomly assigning auditors to imagine working in the typical or an alternative context when auditing the estimate. Participants in the typical context view a photo of a typical audit room that incorporates cues such as conference room furniture,
technology, office supplies, snacks, drinks, and evidence of team members. This context is
designed to activate auditors’ habits with differential probability, depending on habit strength.
Those in the alternative context view the same audit room, but with key cues altered; habits that
were formed in the typical context should not be activated by this context.

Results support our predictions. In the typical context, seniors who have stronger habits
identify significantly fewer issues with the assumptions underlying the estimate than do seniors
with weaker habits. We also find the predicted interaction between habit strength and context. In
support of habits being at play, seniors with stronger habits identify significantly more issues in
the alternative versus typical context, whereas those with weaker habits do not. An interesting
aspect of our findings is that seniors with weaker habits identify marginally fewer issues in the
alternative context, suggesting that future research focusing on these auditors may be valuable.

We conduct additional analyses to validate that habit strength drives our results and to
explore how the audit setting influences the development and enactment of habitual behaviors.
First, we find that our habit strength measure is predicted by theoretical determinants of habit
strength. Specifically, the extent to which seniors, as staff, repeated the simple processes and felt
rewarded for doing so predicts habit strength. We further find that repetition of the processes
depends on exposure to simple tasks. However, and possibly unique to the audit setting, auditors’
effectiveness preferences (as proxied by professional identity) reduce this relationship,
highlighting that some staff choose not to use the processes when performing simple tasks.
Second, consistent with habit theory, we find that some auditors with stronger habits override the
negative effect of habit strength by exerting self-discipline. Third, although auditors experience
more thoughts of pressures (e.g., stress, time constraints) in the typical versus alternative context,
these additional effects of context do not explain our findings. Finally, while knowledge, as
proxied by self-reported comfort with auditing goodwill and months of general experience, has a positive effect on issue identification, it does not allow auditors to overcome the negative effects of strong simple process habits. Overall, our findings provide strong evidence that habit strength can explain auditors’ use of simple processes where more complex processes would be more effective.

Conceiving of habits as an underlying cause of auditors’ use of simple processes for complex tasks may illuminate why deficiencies in audits of estimates persist and provide new insights into solutions. Habits are “hardwired” in memory and, when strong, are resistant to informational interventions (Verplanken and Wood 2016), such as training or revisions to standards. Our research suggests that preventing strong simple process habits from developing in the first place may be more effective than solutions aimed at helping auditors overcome them later. Because auditors work in conditions conducive to habit formation, firms might consider fostering development of complex process habits in audit staff. Alternatively, firms could attempt to develop in staff mental associations between task type (simple versus complex) and cognitive processes, so that task type activates those processes instead. While both solutions likely entail significant costs in the short run, those costs may be less daunting than the cost of audit deficiencies arising from auditors’ use of simple processes. Moreover, they may ease staff’s transition to performance of more complex tasks upon promotion to senior.

This paper contributes to the accounting literature by introducing the habit construct. Because the audit setting is conducive to habit formation (i.e., auditors repeatedly perform specific types of tasks in a stable and commonly experienced environment), it is possible that other potentially problematic auditor decision behaviors, including those previously attributed to lack of professional skepticism, may be habitual. Moreover, habits may affect decision behaviors
in other accounting settings. For example, junior analysts who repeatedly perform simple tasks such as updating spreadsheets with forecasted earnings information to reflect actual financial statement numbers may similarly develop and carry over simple processing habits when they are promoted.

Our work contributes to research beyond accounting in at least two ways. First, the habits literature has focused primarily on physical habits, only recently beginning to examine mental habits. We extend theory and provide evidence that use of specific cognitive processes can be habitual. Second, our findings point to the promise of applying habits theory to professional settings. Like auditing, other professional settings may be conducive to habit formation in that professionals frequently repeat behaviors in a stable context with rewards. Yet, there is little research on habits in such settings (for exceptions, see Potthoff et al. 2019 on habits of healthcare professionals). Our examination of habitual behavior in the professional audit setting highlights potential effects of rich settings and decision maker knowledge, suggesting new avenues for future research. Moreover, prior research into healthcare professionals’ habits, for example, may suffer from alternative explanations due to the use of correlational designs and self-reported measures (Potthoff et al. 2019; Presseau et al. 2014). Our use of a controlled experiment involving a context manipulation and an implicit measure of habit strength could serve as a guide for future research on habits in a professional setting.

The rest of the paper is organized as follows. Section 2 provides theory and hypotheses. Sections 3 and 4 describe the design and results of the experiment. Section 5 concludes.

**II. BACKGROUND AND HYPOTHESIS DEVELOPMENT**

In this section, we first develop theory that simple cognitive processes (superficial, confirmatory, and piecemeal processing) allow for effective and efficient completion of the
simple tasks that staff frequently perform. Drawing from psychology theory on habits, we then argue that repetition of the simple processes in the typical audit room context, with rewards, can lead staff to develop habits of varying strength to use these processes. For seniors carrying forward stronger (versus weaker) habits, the typical context is more likely to activate use of those processes, even if they are less effective for the complex tasks they now perform. Thus, we predict that, in the typical audit room context, auditors with stronger habits will identify fewer issues with an estimate’s assumptions, relative to auditors with weaker habits.

Simple Tasks Performed by Staff Auditors and Appropriate Cognitive Processes

Staff auditors’ work typically consists mostly of relatively simple tasks (Power 2003; Westermann, Bedard, and Earley 2015; Westermann, Cohen, and Trompeter 2019). Simple tasks have a small number of unambiguous information cues that can be evaluated independently (Bonner 1994). We propose that some staff will use superficial, confirmatory, and piecemeal processes for simple tasks because these processes are effective for such tasks and are more efficient than their complex counterparts.

Superficial processing involves focusing on obvious, surface features of information cues and is sufficient for simple tasks given their unambiguous cues. For example, for the simple task of vouching sales prices, auditors can glance quickly at the price list to see if invoice prices are correct. Deeper processing, which entails analyzing meaning and implications (Ajzen and Sexton 1999; Fonseca, Blascovich, and Garcia-Marques 2014), would be inefficient. Confirmatory processing involves searching for evidence supporting, and/or interpreting evidence to be consistent with, what one expects or desires to see; it also is sufficient for simple tasks given their unambiguous cues. For example, identifying incorrect prices in the vouching task requires

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1 Seniors in our study reported spending a median of 70 percent of their time as staff doing simple tasks such as the vouching example that follows. An informal survey of ten current staff auditors indicates a median of 80 percent.
only noting mismatches between invoices and the price list. Nonconfirmatory processing, which entails seeking and interpreting contradictory information (e.g., Kunda 1990), would be inefficient. *Piecemeal* processing involves bringing one or a few cues into working memory, evaluating them, then “closing them out” by removing them from working memory (e.g., Anderson 1981); it generally is sufficient for the part of simple tasks that is performed by staff. Any needed integration typically is performed later by software or a senior. For the vouching task, staff compare the prices for one invoice to the price list, record any mismatches, and move to the next invoice, knowing that evaluation of the entire sample will be done later. Integrative processing requires returning to earlier cues with each new cue (e.g., Anderson 1981) and would be inefficient.

**Simple Cognitive Processes as Habits**

A habit is an association in memory between a specific behavior and a stable context in which that behavior is enacted. “Behavior” can refer to either a physical or cognitive activity, and “context” refers to one’s environment, including the place and people who may be present (Wood and Rünger 2016; Wood et al. 2005). The habit association develops and strengthens as people repeat and experience rewards for the behavior in the stable context (Wood and Rünger 2016).² In turn, habit *strength* affects the probability the behavior is activated (and subsequently enacted) when a person experiences the context. We propose that auditors can develop habits to use simple cognitive processes that are activated, with differential probability based on strength, when they experience the typical audit room context. We assume that staff experience the typical context as stable because auditors work in a similar context, even when their clients change.³

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² Mental associations between items of various sorts, for example, the concepts “birthday” and “cake,” generally develop as those items are experienced together (Collins and Loftus 1975; McNamara 1992).
³ Consistent with this assumption, participants in our study report spending a median of 70 percent of their time working in a context like our typical audit context.
Therefore, we propose that auditors’ habit strength is a function of the extent of repetition of the simple processes and rewards experienced for their use.

Initially, a given behavior occurs in response to a goal, the achievement of which is rewarded. For example, at first, a person may speak loudly in a sports stadium in order to be heard (Neal et al. 2012). Similarly, at first, staff may use simple processes to perform simple tasks in an audit room because they feel rewarded for so doing, for example, through positive reinforcement for being efficient. Over time, however, with rewarded repetition in a stable context, behaviors can become more strongly linked to the context than to the initial goal. In essence, behavioral control shifts to context, such that a behavior is automatically and unconsciously activated by the context rather than by task demands and the related anticipation of rewards (Verplanken 2018; Wood and Neal 2007). For example, people who repeatedly speak loudly in a sports stadium can develop strong habits that are activated by elements of the context (e.g., stadium seating) rather than by the need to speak loudly (Neal et al. 2012).

While the habits literature generally examines physical behaviors, an emerging stream of research examines habits that relate primarily to mental, rather than physical, behaviors.\(^4\) Specifically, researchers have examined habits related to mind wandering (e.g., Zedelius et al. 2018), studying (e.g., Galla and Duckworth 2015; Stojanovic, Grund, and Fries 2020), ruminating (e.g., Watkins et al. 2018), worrying (Verplanken and Fisher 2014), and negative self-thinking (Verplanken, Friborg, Wang, Traimow, and Woolf 2007; Verplanken and Tangelder 2011). We extend these studies to propose that staff can develop habits related to their cognitive processing of information. Specifically, we expect that staff who repeatedly use simple

\(^4\) Habits, whether physical or mental, have a critical cognitive component. A habitual behavior is initiated because the concept of the behavior (e.g., “eat popcorn” or “ruminate”) is activated in memory when people experience the context (Wood and Rünger 2016; Neal et al. 2012).
processes to complete simple tasks in the typical audit room context can develop *simple process habits*, such that elements of the typical context (e.g., a conference table, multiple computers, snacks) automatically activate use of these processes. In turn, activation of these processes makes it more difficult for auditors, when performing tasks requiring alternative processes for effective performance, to select the processes that are more appropriate.

**Effect of Habit Strength on Evaluation of Assumptions in Typical Context**

*Habit strength* is the strength of the context-behavior association in memory, here the typical audit room context and the use of simple processes. Stronger habits are formed with greater rewarded repetition in the context. Simple processes likely lead to rewards because the processes are sufficiently effective and particularly efficient for the simple tasks that staff tend to perform. Most audit teams face time and deadline pressures (Bobek, Daugherty, and Radtke 2012; Brown, Gissel, and Neely 2016; Westermann et al. 2019), such that superiors tend to reduce budgeted hours where possible, which likely is easiest in the lower risk areas where staff tend to work (e.g., Bierstaker and Wright 2001, 2005; Houston 1999). Thus, staff may use simple processes to satisfy their superiors’ preferences to meet budgets while also being effective (e.g., Bagley 2010), receiving positive reinforcement for so doing (e.g., Nelson and Proell 2018). Importantly, however, repetition and rewards vary across staff, creating variation in habit strength. Staff also may vary in how much they feel *rewarded*. For example, staff with a high need for approval may more highly value praise received from superiors (Kelley 1984; Malone and Roberts 1996).

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5 Habits can form quickly (Gardner and Lally 2018). For example, participants’ median days (repetitions) for exercise habit formation range from 66-154 (Lally, van Jaarsveld, Potts, and Wardle 2010; Fournier, d’Arripe-Longueville, and Radel 2017). Audit staff have the potential to repeat simple processes 150 times in less than four months based on conservative assumptions of two simple tasks per day and a five-day workweek.
Because habits are hard to break (Wood and Neal 2016), we expect that staff will carry forward these habits of varying strength when promoted to senior. Importantly, auditors tend to stay in the typical audit room context when they are promoted from staff to senior. In turn, seniors with stronger simple process habits are more likely to have the simple processes triggered by this context because they have a stronger link between this context and the simple processes in memory. Because inhibiting a strongly habitual response requires a great deal of self-discipline (e.g., Wood 2017), we predict that seniors with stronger habits are likely to stick with the simple processes when in the typical context, irrespective of current task demands. When these processes are less effective for the task at hand and seniors are not able to override the habits to allow task demands to take precedence, their performance will suffer.

A robust stream of research supports that simple processes are less effective for auditing an estimate and that at least some seniors use simple processes for this task (Austin et al. 2020; Griffith et al. 2015b; Griffith 2018; Griffith et al. 2020; Joe et al. 2020; Kadous and Zhou 2019). Using simple processes impedes performance in the estimates task because it is complex. Unlike simple audit tasks, it involves ambiguous cues, such as predictions and qualitative information, that require interpretation and scrutiny to detect bias. The estimates task also contains cues that have implications for other cues, including those that support one assumption but contradict others. Thus, superficial and piecemeal processing can cause auditors to miss evidence indicative of problems. Confirmatory processing can lead auditors to fail to identify contradictory evidence or to “explain it away.”

Seniors with stronger habits to use simple processes are therefore likely to perform worse at the estimates task than are those with weaker habits. That is, the typical context is less likely to activate the simple processes for auditors with weaker habits. That habit strength predicts the
enactment of behavior that is inconsistent with current task demands is supported by psychology research. For example, Neal et al. (2011) find that people who have a strong “eat popcorn at the movie theater” habit eat the same amount of stale as fresh popcorn when in a theater context, despite that they dislike the stale popcorn, whereas people with weaker habits eat less stale than fresh popcorn. Likewise, mind wandering habits can cause people to engage in mind wandering when it is detrimental, such as when they need to concentrate on a task (see Zedelius et al. 2018). In all, we predict that auditors with weaker simple process habits will perform better than auditors with stronger habits in the typical context. As mentioned earlier, we capture the use of simple processes using the issues auditors identify with the assumptions underlying an estimate. Stated formally:

\[ H1: \text{In the typical audit room context, auditors with stronger habits will identify fewer issues in assumptions than will auditors with weaker habits.} \]

**How Context Moderates the Effect of Habit Strength**

One way in which psychology research shows evidence of habits is by demonstrating that people classified as having stronger habits behave less habitually when placed in an alternative context (e.g., Neal et al. 2011; Neal et al. 2012). An alternative context is theorized to disrupt effects of strong habits because it alters key context cues from the typical context that trigger habitual behaviors (e.g., Wood and Neal 2009). Since those cues are no longer present to activate the behavior in memory, people are free to consider which action is suitable given task demands (Verplanken, Roy, and Whitmarsh 2018). Revisiting Neal et al. (2011), people with stronger popcorn-eating habits who are given stale popcorn in a meeting room context eat less stale than fresh popcorn, and in fact, similar amounts of stale popcorn as people with weaker habits. Following this research, we predict that seniors with stronger habits will be less apt to use the simple processes “out of habit” in the alternative context, and instead can select processes that
are well suited for the task. As a consequence, we predict that auditors with stronger habits will identify more issues in the alternative context. By contrast, we expect auditors with weaker habits are less likely to react to context because they more likely are processing based on task demands regardless of context. Collectively, our predictions imply the following interaction hypothesis:

\[ H2: \text{Auditors with stronger habits will identify more issues in assumptions in the alternative audit room context than in the typical audit room context, while auditors with weaker habits will not.} \]

We develop our hypotheses from habit theory, but we acknowledge that important features of the professional audit setting may limit the applicability of this theory to the setting. First, although some seniors may have strong habits to use simple processes that could negatively affect their performance of complex tasks, they also have strong incentives to perform well. For example, auditors are highly motivated to avoid deficiencies in external inspections (Johnson, Keune, and Winchel 2019) and internal reviews (Houston and Stefaniak 2013). These incentives could prompt auditors to override unwanted habits. Indeed, the prior literature often examines tasks for which the enactment of inappropriate strong habits leads to benign consequences (e.g., momentary discomfort at the taste of stale popcorn or speaking unnecessarily loudly in a quiet stadium), and people may be less motivated to override their habits in these settings. These incentives could lead auditors with strong habits to exert self-discipline to override their habits, such that our hypotheses would not be supported. Further, by providing exposure to tasks, experience can lead both to the development of processing habits and the acquisition of task-specific knowledge, and it is unclear whether knowledge and processing habits interact and, if so, how.
Despite these potential mitigating factors, we expect our hypotheses to obtain because there are formidable barriers to overcoming strong habits. First, overriding habits requires awareness that one is engaging in an undesirable behavior. Cognitive processing provides little sensory feedback, making this condition difficult to meet. That is, it may not be salient to auditors which cognitive processes they are using (Griffith, Kadous, and Young 2016). Second, overriding strong habits using self-discipline requires a great deal of effort (e.g., Wood 2017), and many auditors may be unwilling or unable to exert such effort. Consistent with this, recent research with healthcare professionals, who also face incentives to override unwanted habits, documents that undesirable habitual behaviors such as those related to prescribing antibiotics persist in the field (see Potthoff, McCleary, Sniehotta, and Presseau 2018; Potthoff et al. 2019).

III. METHOD

Participants

Participants are 128 experienced senior auditors (mean experience of 40.3 months) from two large audit firms. Study administration was facilitated by the Center for Audit Quality, with participants completing the study during firm training sessions. The estimates task requires participants to evaluate management’s assumptions related to a goodwill impairment test. Seniors typically perform this task in practice (Griffith et al. 2015a).

Design and Procedures

Our study employs a 2 x 2 between-participants design. We measure simple process habit strength, classifying auditors as having stronger or weaker habits using a median split. We manipulate context by randomly assigning auditors to the typical audit room or an alternative

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6. Firm significantly affects the dependent variable, but it does not interact with the independent variables. Results of hypothesis tests including firm as a control are significant at the same critical levels as reported.
7. We obtained Institutional Review Board approval for the study.
audit room that removes many cues from the typical room. We manipulate context not to
examine its effects per se but to validate that habit strength is driving our results, based on theory
that the typical (alternative) context will (will not) activate simple process habits developed in
the typical context. Observing theory-consistent effects of context also supports the validity of
our habit strength measure (see Rebar et al. 2018).

The study proceeds as follows. Auditors first view a photo of their assigned context and
write a paragraph to reinforce the manipulation. They then complete the estimates task, including
listing any issues with the assumptions. Next, they answer post-experimental questions. Finally,
all participants view a photo of the typical context when completing the habit strength measure.

We use the typical context here because this is the context in which staff spend most of their time
and, thus, likely develop habits. Use of the typical context for both the manipulation (to activate
habits with differential probability based on strength) and during measurement of habit strength
is consistent with prior research (e.g., Neal et al. 2011; Neal et al. 2012).

**Simple Process Habit Strength**

We measure habit strength using a reaction-time measure. Implicit measures are
advantageous for capturing the strength of mental associations (De Houwer, Teige-Mocigemba,
Spruyt, and Moors 2009), since strength affects not only the probability, *but also the speed*, of
activation of the second item when the first item is activated. Because habits are defined as
mental associations between a context and behavior, this measure directly captures habit strength
(Labrecque and Wood 2015; Mazar and Wood 2018; Rebar et al. 2018). While other measures
such as the frequency of past behavior in a stable context (Mazar and Wood 2018) capture single
determinants of habit strength, reaction times capture the resulting association in memory, which
incorporates all determinants, including experienced rewards. Other measures capture outcomes
of habit strength, such as whether a behavior feels automatic (Verplanken and Orbell 2003). Our measure captures automaticity using speed, overcoming limitations of outcome-based measures, such as that automaticity can resist conscious reflection (Gardner 2015; Hagger, Rebar, Mullan, Lipp, and Chatzisarantis 2015; Rebar et al. 2018) and does not capture the context-dependency of habits.8

Our habit strength measure assesses the speed of auditors’ recognition of words reflective of the simple processes after experiencing the context in which we expect most have developed their processing habits (i.e., the typical audit room). This general context-behavior reaction time approach has been used in psychology studies. For example, Neal et al. (2012) assess the speed of participants’ recognition of words reflecting running after viewing words reflecting the typical context in which they run (e.g., “gym”). Adriaanse, Gollwitzer, De Ridder, Wit, and Kroese (2011) assess the speed of participants’ recognition of words reflecting habitual snacks after being primed with the word “home” and drinks after being primed with the word “bar.” Implicit measures also have been used to capture the strength of habits related to transportation (Danner, Aarts, and de Vries 2008) and hand hygiene (Hargadon 2017).

We implement our measurement procedures as follows. Near the end of the study, we prime (i.e., activate in memory, see, e.g., Doyen, Klein, Simons, and Cleerman 2014) the typical context by having all auditors complete a one-minute “spot the difference” exercise involving two photos: the typical room and the same room with five small differences created using Photoshop. We then collect reaction times by having auditors complete word fragments that

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8 Psychology research has successfully used self-reports of automaticity, including for the mental habits of negative self-thinking (Verplanken et al. 2007; Verplanken and Tangelder 2011) and worrying (Verplanken and Fisher 2014) to proxy for habit strength. However, we believe audit seniors would be reluctant to report automaticity of the simple processes on their current tasks due to social desirability issues; implicit measures are recommended when social desirability bias is a concern (Verplanken and Orbell 2003; Gardner and Tang 2014). We also expect that auditors lack metacognitive access to the nature of their cognitive processes. Future research may be able to use self-reported measures for other types of auditor habits that do not introduce these challenges.
reflect the simple processes while the typical context remains activated (the photo remains displayed). We instruct auditors to type the entire word represented by each fragment as quickly as possible (see Figure 1, Panel A), tracking completion time in milliseconds. The simple process words (e.g., scan, glance) are shown in Figure 1, Panel B, and were chosen based on interviews with four seniors. Auditors for whom the simple processes are strongly habitual should, ceteris paribus, more quickly complete the related fragments. However, because reaction times also can be affected by idiosyncratic factors such as typing or reading speed, we subtract reaction times to non-audit control words (as in Neal et al. 2012) (e.g., bark; see Panel B). That is, we calculate the difference between each auditor’s average completion time for the simple process fragments and average completion time for the control fragments, then classify auditors with faster (slower) completion times relative to the median as having stronger (weaker) habits.

Audit Room Context

Our second independent variable is audit room context, which we manipulate using a photo. This approach is consistent with the habits literature. For example, Neal et al. (2012) “place” participants in a stadium context using a picture of a prototypical sports stadium. Hargadon (2017) uses photos of prototypical hand-washing contexts (e.g., a sink with soapy water) to examine hand hygiene habits. As in these studies, participants in our typical context view a photo of a staged, prototypical audit room (Figure 2, Panel A). Following prior research (Hargadon 2017), we elicited elements of what seniors consider the “typical audit room” in the

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9 We measure habit strength after manipulating context to prevent hypothesis guessing. We do not expect the earlier manipulation to affect the habit strength measure because we take this measure after auditors’ memory for context-related behaviors in the estimates task has been cleared by answering post-experimental questions. Consistent with this, context condition is not associated with habit strength ($p > 0.500$). We observe skewness for some fragment reaction times; thus, we transform each reaction time by taking its reciprocal (see Whelan 2008).

10 Reaction times for the simple process word fragments load on one factor (eigenvalue = 4.99) and have a Cronbach’s alpha of 0.88, consistent with their reliably capturing the single construct of simple process habit strength. Reaction times for the control words load on two factors. Multi-dimensionality is to be expected as these words are not thematically related.
above-mentioned interviews. We included the commonly mentioned elements of a conference
table and chairs, laptops, a printer, office supplies, snacks, coffee cups, and water bottles. Our
alternative context (Panel B) omits several cues while maintaining a realistic working
environment. We staged the two contexts in a conference room of a participating firm’s office,
and a research assistant photographed the rooms. After viewing the pictures, auditors in the
typical (alternative) context condition are given the instructions shown in Panel C (D) of Figure
2. They are asked to “describe what you have imagined in 5-7 sentences,” to make them feel like
they are in the room (MacInnis and Price 1987) and, thus, activate the context in memory. Once
the context is activated, the probability with which the habitual behavior is activated when doing
the estimates task should (should not) vary with habit strength in the typical (alternative) context.

Task, Dependent Variables, and Other Measures

Estimates Task

The task requires that auditors evaluate management’s assumptions underlying an
estimate of goodwill as part of the client’s step-one analysis of an impairment test and is adapted
from Kadous and Zhou (2019). The task includes background information, analysis, and
evidence related to management’s assumptions. The client uses a discounted cash flow model to
estimate the fair value of the reporting unit, which indicates that it passes the impairment test.
The task includes sections for three key assumptions: five-year projections of revenue, operating

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11 Neal et al. (2012) place participants in an alternative context using a picture of a prototypical kitchen (i.e., an
entirely different context than a sports stadium). However, because we examine professionals’ performance of a task
that is part of their job, we needed to establish an alternative context that omitted some cues of the typical context
but also maintained realism. To ensure that we achieved equivalent realism across contexts, we asked participants
the extent to which they imagined themselves in the room and found doing so natural. We confirm that there is no
difference in these responses across contexts (smallest two-tailed \( p = 0.467 \)) or for auditors with stronger versus
weaker habits (smallest two-tailed \( p = 0.638 \)). Additionally, because lower responses may reflect participants
finding the context quite unrealistic or having another idiosyncratic reaction, we confirm that our results replicate
when excluding data from participants responding below the midpoint on these questions.
expenses, and capital expenditures. We embed seven issues that, as in the real-world task, are less likely to be identified if auditors use simple cognitive processes (see the Appendix).

**Dependent Variable and Other Measures**

Because our focus is on how habit strength affects cognitive processing in the estimates task, our dependent variable is the number of embedded issues a participant identifies (*Issues Identified*). We ask participants to “list any specific concerns” they have about the estimate based on their evaluation, and we match these to the seven embedded issues. Auditors also complete post-experimental questions to capture determinants of habit strength, as well as potential moderators and noise variables.

**IV. RESULTS**

**Tests of Hypotheses**

Values for *Issues Identified* range from zero to six of the seven embedded issues. Descriptive statistics are tabulated in Table 1, Panel A. We estimate an Analysis of Variance (ANOVA) model with *Issues Identified* as the dependent variable and independent variables indicating whether the participant’s *Habit Strength* is stronger or weaker and whether the assigned *Context* is typical or alternative (see Panel B).

H1 predicts that, within the *typical context*, auditors with stronger habits will identify fewer issues than auditors with weaker habits. Simple effects analyses are displayed in Panel C of Table 1. In support of H1, there is a significant negative effect of *Habit Strength on Issues*

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12 An author and a doctoral student, both with auditing experience and blind to experimental condition, independently coded participants’ listings for the presence of each embedded issue and reconciled any differences. Raw agreement was 98% and Cohen’s Kappa is 0.92, which is significantly greater than chance ($p < 0.001$). We use the reconciled coding for our dependent variable.

13 The data meet the ANOVA assumptions. However, because our dependent variable involves count data, we verify that our results hold using a negative binomial regression model.
Identified (one-tailed $p = 0.014$) in the typical context. In this context, seniors with stronger habits identify fewer issues than those with weaker habits (means $= 1.09$ vs. $1.91$).

H2 predicts an interaction whereby auditors with stronger habits will identify more issues when in the alternative versus typical context, while auditors with weaker habits will not. In support of H2, the interaction between Habit Strength and Context is significant (two-tailed $p = 0.011$) (Table 1, Panel B).\(^{14}\) As shown in Panel C, among auditors classified as having high Habit Strength, there is a positive simple effect of Context on Issues Identified (one-tailed $p = 0.024$) (means $= 1.09$ and $1.83$). Performance of auditors with stronger habits in the alternative context is indistinguishable from that of auditors with weaker habits in the typical context (untabulated, two-tailed $p = 0.868$), suggesting that their behavior is no longer guided by simple process habits. Turning to auditors with weaker habits, we observe a marginally significant negative simple effect of Context (two-tailed $p = 0.096$) (means $= 1.91$ vs. $1.28$).\(^{15,16}\)

The negative effect of context for auditors with weaker habits was not predicted and is inconsistent with these auditors choosing processing mostly based on task demands. However, it is possible that a change in context can have negative consequences when it disrupts the

\(^{14}\) We also examine auditors’ Reasonableness Assessments (rated likelihood that the fair value is reasonable on a scale from 0-10) and Actions (no current action vs. immediate action) in (untabulated) path models. Model results show that our independent variables affect Issues Identified, which then affects Reasonableness Assessment (i.e., more issues lead to a lower reasonableness assessment), which then negatively affects Action.\(^{15}\)

Analysis (untabulated) using a continuous Habit Strength measure also yields a significant Context X Habit Strength interaction (two-tailed $p = 0.022$). The Johnson-Neyman technique identifies two statistically significant inflection points. The negative effect of Context observed for auditors with weaker habits in tests of H2 is significant for Habit Strength scores ranging from the minimum of -0.033 to -0.008. The effect of Context is insignificant until a Habit Strength score of 0.039, at which point the observed positive effect of Context for auditors with stronger habits becomes significant, and then strengthens, persisting to the maximum of 0.089. This supports the theoretical prediction and demonstrates that our interaction is not dependent on our use of the median split.\(^{16}\)

\(^{15}\) We confirm that results for hypotheses tests are significant at the same critical levels if we drop or reclassify the one observation with the median measure of habit strength or drop the five observations closest to the median. Further, inferences from hypotheses tests are robust to dropping an outlier observation from an auditor who identified six of the seven issues (falling three standard deviations above the mean). When this observation is dropped, the marginally significant, negative simple effect of Context for auditors with weaker habits becomes insignificant (two-tailed $p = 0.180$).
activation of people’s *beneficial* habits, that is, they can become “unmoored” in the alternative context (Wood 2019). Consequently, this finding raises the possibility that at least some auditors with weaker simple process habits could have habits to use processes that are beneficial for performance of the estimates task. That is, they could have habits to use *complex processes* and, as such, are negatively affected by the alternative context because their complex process habits that were formed in the typical context are not activated.\(^\text{17}\) Overall, results support our hypotheses and provide evidence that auditors’ simple process habits guide their judgments in a complex task. They also highlight the value of future research exploring whether some auditors with weaker simple process habits have complex process habits.

**Habits in the Professional Audit Setting**

The habits we study differ from those typically studied in the psychology literature in that the former occur in a professional setting. Therefore, we conduct additional analyses to further strengthen our inferences that simple process habits are at work in our study and to illuminate how habits operate in our setting. We first examine determinants of habit strength. This analysis provides insight into whether auditors’ simple process habits arise through the same mechanisms as previously studied habits and whether there also are audit-specific determinants. Second, people with strong unwanted habits often can overcome the effects of their habits by applying self-discipline. We examine whether this is true of auditors with stronger simple process habits. Third, we explore the possibility that auditors infer differential pressures from the typical vs.

\(^\text{17}\) We did not measure complex process habits, so our related evidence is indirect. However, if complex process habits are at work, we would expect to see auditors who have more experience working in contexts like the alternative context to *not* be negatively affected by being placed in this context, as their complex process habits would be activated here. Reflecting this, a regression model (untabulated) among auditors with weaker habits reveals a marginally significant, positive interaction between *Context* and auditors’ self-reported percentage of time spent working in contexts like the alternative context (one-tailed *p* = 0.059). The Johnson-Neyman technique identifies a statistically significant inflection point whereby the effect of *Context* is significant and negative from 0 to 31 percent, after which point it becomes insignificant.
alternative context to examine whether such inferences can explain or influence our findings. This analysis is important because professional contexts may be more imbued with meaning than the starker contexts examined in psychology. Finally, because experience provides opportunities both to develop processing habits and to acquire knowledge, we explore how experience and habits jointly influence behavior.

Determinants of Simple Process Habit Strength

Our theory proposes that auditors build habits of varying strength as staff. Assuming a stable context, habit strength generally increases with rewarded repetition of behavior (Mazar and Wood 2018). We use a structural equations model to examine determinants of habit strength (see Figure 3). We measure Repetition with four questions capturing seniors’ use of approaches to simple tasks, as staff, that reflect use of the simple processes. These questions are akin to those used in psychology research to measure habit strength using repetition of past behavior (e.g., Neal et al. 2011; Neal et al. 2012). We capture Rewards using auditors’ agreement (from 1 “Strongly Disagree” to 7 “Strongly Agree”) that, as staff making day-to-day decisions on their engagements, they generally chose the option they thought their audit team would approve of.

We also measure audit-specific antecedents of Repetition. The first is Simple Task Exposure, measured by the percentage of time that auditors report having worked on simple versus complex audit tasks as staff; simple tasks provide opportunities for using the simple

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18 The questions (on a scale from 1 “Never Used This Approach” to 9 “Always Used This Approach”) were: (1) “When reviewing terms of a transaction or item, closely examined the details (e.g., checked additional details outside of just the key terms)” (reverse-scored), (2) “When performing an audit procedure, considered how my findings within this procedure related to each other (e.g., if there were issues with multiple invoices in the sample, I thought about whether the same problem could be causing the issues)” (reverse-scored), (3) “When checking invoice terms, searched to see that there was evidence that agreed to what I was looking for (e.g., if I was looking for a dollar amount of ‘38,’ looked on the invoice to see if there was a ‘38’ anywhere),” and (4) “When evaluating the findings of audit procedures, considered results from each procedure separately (i.e., did not think about connections among results).” Two additional questions (seeking a reasonable explanation for exceptions and quickly moving through work) did not load on the latent factor, and are not included.

Electronic copy available at: https://ssrn.com/abstract=3302949
processes. The second is personal \textit{Effectiveness Preferences}, which could lead staff to choose to use complex processes even for simple tasks. We use professional identity as a proxy for effectiveness preferences, as prior research finds that stronger professional identity predicts a focus on audit effectiveness (Bamber and Iyer 2007; Bauer 2015).

Standard measures show good model fit ($\chi^2_{(22)} = 24.57$, $p = 0.318$; CFI = 1.00; RMSEA = 0.03). The four indicators of \textit{Repetition} load on one latent factor (largest one-tailed $p = 0.047$). As expected, \textit{Repetition} positively affects \textit{Habit Strength} (one-tailed $p = 0.029$), as does \textit{Rewards} (one-tailed $p = 0.003$). Turning to antecedents of \textit{Repetition}, there is a positive, marginally significant effect of \textit{Simple Task Exposure} (one-tailed $p = 0.060$); completing more simple tasks leads to greater repetition of simple processes. However, there is a negative \textit{Simple Task Exposure} X \textit{Effectiveness Preferences} interaction (one-tailed $p = 0.033$), indicating that this relationship is less pronounced for auditors with higher effectiveness preferences. That the general mechanisms posited by habit theory predict our habit strength measure validates the measure. In demonstrating how professional identity indirectly affects habit strength, the findings also provide insight into unique determinants of habit strength in a professional setting.

\textit{Moderating Effect of Self-Discipline}

Second, our theory development highlighted that incentives for good performance on complex tasks could prompt at least a subset of auditors with stronger habits to exert self-discipline to override their habits within the typical context. Accordingly, we examine whether \textit{Self-Discipline} (auditors’ agreement on a 7-point scale that they exerted self-discipline during the estimates task, using a median split) moderates the effects of habit strength. We conduct an ANOVA with the subsample of participants in the typical context, \textit{Habit Strength} and \textit{Self-Discipline} as independent variables, and \textit{Issues Identified} as the dependent variable. Table 2,
Panel A reports the results. The Habit Strength X Self-Discipline interaction is significant (one-tailed \( p = 0.043 \)). Simple effects analyses (see Panel B) reveal that the negative effect of Habit Strength is significant at low Self-Discipline (one-tailed \( p = 0.003 \)); here, seniors with stronger habits identify fewer issues than seniors with weaker habits (untabulated, means = 0.50 vs. 2.06). However, the effect of Habit Strength is not significant at high Self-Discipline (one-tailed \( p = 0.312 \)) (untabulated, means = 1.50 vs. 1.75). Further, the performance of seniors with stronger habits who exert high self-discipline is indistinguishable from that of seniors with weaker habits who exert low self-discipline (untabulated, two-tailed \( p = 0.282 \)).

Additional Effects of Context

Third, the audit room context likely is more imbued with meaning than contexts used in psychology research. Our typical context may cause auditors to think about pressures they face when in such a room such as stress and time constraints, which in turn, may lead to the use of the simple processes. It is possible that, in removing cues relevant to activating habits, the alternative context also removes thoughts of these pressures. To explore whether differences in perceived pressures could explain our reported results, we create a Pressures measure by factor analyzing auditors’ thoughts about stress (i.e., due to clutter or being cramped), interruptions, busy season, and time constraints from the paragraphs they wrote during the context manipulation.\(^{19}\) We estimate a model using the Preacher and Hayes (2007) moderated-mediation technique, with Context, Habit Strength, and the interaction term as independent variables, Issues Identified as the dependent variable, and Pressures as the mediator. The model also allows for direct effects

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\(^{19}\) Two coders assessed the paragraphs for whether the auditor showed thoughts of each of these pressures (e.g., “I am feeling stressed”), showed thoughts contradicting the pressure (e.g., “I am feeling relaxed”), or did not mention the pressure, as well as thoughts about the client coming in and supervising staff. These thoughts load on one factor (eigenvalue = 2.00; all loadings > 0.50). We do not include thoughts related to the client and supervision in our measure because neither loaded on the primary factor. The coding was split up across two different pairs of coders. Cohen’s Kappa for each pair was 0.46 and 0.88, which are both significantly greater than chance (\( p < 0.001 \)). Coding differences were reconciled.
of Context, Habit Strength, and the interaction term for Issues Identified, enabling examination of whether habit strength continues to be an explanation for our findings when controlling for differences in pressures.

Table 3 reports the results. As shown in Panel A, Context negatively affects Pressures \( (p < 0.001) \), suggesting that auditors infer fewer pressures in the alternative versus typical context. However, the Context X Habit Strength interaction does not significantly affect Pressures (two-tailed \( p = 0.604 \)). These findings suggest that, while the typical context may invoke more thoughts of pressures, these thoughts do not occur differentially for auditors with stronger versus weaker habits. Further (see Panel B), Pressures does not mediate the effect of Habit Strength on Issues Identified within either context, does not mediate the effect of Context for auditors with stronger or weaker habits, and does not mediate the Context X Habit Strength interaction (all confidence intervals include zero). Therefore, thoughts of pressures cannot explain our findings.

Most important (see Panel A) the direct effect of Context X Habit Strength on Issues Identified is significant (two-tailed \( p = 0.013 \)), indicating that our results are robust to controlling for effects of Pressures.\(^{20,21}\)

Interplay of Experience and Habits

Finally, auditors’ professional experience can provide opportunities to acquire task-specific knowledge. Because both appropriate knowledge and processing are important to task performance in professional settings (Bonner and Pennington 1991), we explore whether knowledge can overcome the effect of auditors’ use of processes that are less effective for the

\(^{20}\) We create an alternate measure of Pressures using auditors’ answers to post-experimental questions eliciting their thoughts while imagining themselves working in the context, specifically about stress, interruptions, busy season, feeling cramped, and multi-tasking. Results are inferentially identical for this measure.

\(^{21}\) We also considered whether our habit strength measure could be capturing a general concern about pressures. Analyses do not support this idea. Our findings do not replicate if we substitute Pressures (using a median split) for Habit Strength. Further, Simple Process Repetition and Rewards do not predict Pressures.
task at hand. For example, with experience, auditors acquire knowledge of patterns related to complex estimates, such as combinations of specific assumptions that would indicate aggressiveness, that facilitates effective performance on this task (e.g., Griffith 2018). Table 4, Panels A, B, and C report results of three ANOVAs, each with one of three experience-based proxies for knowledge and Habit Strength as independent variables and Issues Identified as the dependent variable. Consistent with knowledge being important to identifying issues with the estimate, auditors’ Comfort with Goodwill and Months of Experience at least marginally positively affect Issues Identified (one-tailed $p = 0.041$ and 0.096, respectively). However, auditors’ Number of Goodwill Audits does not ($p > 0.500$). Importantly, none of the knowledge proxies appear to reduce the habit strength effect (interaction $p$’s $> 0.500$). The literature on habits of healthcare professionals likewise has not documented evidence of knowledge or experience moderating the effects of habits (see Potthoff et al. 2019).

Together these findings from additional analyses focusing on the professional setting provide valuable insights. Our identification of theory-consistent determinants of habit strength and finding that auditors’ self-discipline moderates the habit strength effect strengthen our inference that habit strength is the construct captured by our measure. Our findings of audit-specific determinants and our investigation of context and experience effects provide insight into how habits manifest in the professional audit setting. Collectively, the findings suggest that habits can develop and affect on-the-job performance in this rich professional context.

**V. DISCUSSION AND CONCLUSIONS**

This paper examines simple process habit strength as a potential reason why some audit seniors use simple processes for complex tasks, including audits of estimates, despite that those processes are less effective for these tasks. Using a reaction-time measure of habit strength and
manipulating imagined context, we show that, in the typical audit room context, seniors with stronger habits identify fewer issues with a complex estimate than do seniors with weaker habits. Moreover, seniors with stronger habits who are placed in an alternative context identify more issues, while auditors with weaker habits do not. The observed interaction is consistent with theory and supports that habit strength is the causal construct. We further strengthen this inference by reporting evidence of theory-consistent determinants of habit strength, reporting evidence that a subset of auditors override strong habits by exerting self-discipline, and ruling out that other effects of context underlie our findings.

Prior research and PCAOB inspection reports have attributed difficulties in audits of complex accounts to auditors’ use of simple processes. Our study provides evidence that the strength of habits to use simple processes may be a root cause and provides new insight into potential solutions. Habits are “hardwired” in memory and, when strong, are resistant to informational interventions (Verplanken and Wood 2016), such as training or revisions to standards. For example, the requirement both in judgment frameworks and the standard on auditing estimates (PCAOB 2019) to search for contradictory evidence may be ineffective for seniors with stronger habits; although they likely would comply, their habits could lead them to explain away such information (e.g., Verplanken 2018).

Instead, psychology theory suggests that effective interventions must alter context or be targeted toward overcoming the effects of the habits. With respect to altering context, auditors generally work in a stable context that enables communication with their clients, such that context change may be infeasible. Moreover, a new (but stable) context likewise could promote the development of simple process habits. Finally, while auditors may naturally experience a context change under unusual circumstances, such as was recently the case due to a pandemic,
any benefit of disrupted unwanted simple process habits would only be temporary. When auditors return to client sites after such a disruption, their habits developed in the typical audit room context likely could come back into play due to the enduring nature of habits (Wood 2019).

Regarding overcoming the effects of habits, while our finding regarding self-discipline could appear promising insofar as incentives could be applied in the field to promote self-discipline, we do not view this strategy as viable for audits of estimates. First, auditors already are highly incentivized to avoid deficiencies (e.g., Johnson et al. 2019) yet, as noted, deficiencies persist (IFIAR 2019). Second, overcoming strong habits using self-discipline would be difficult to sustain in practice. Auditors, particularly seniors, face many factors that deplete their cognitive resources, such as multi-tasking and long hours (e.g., Hurley 2015). Exerting self-discipline to override strong habits is particularly difficult when a person’s cognitive resources are depleted (Itzhakov, Uziel, and Wood 2018). Our results also suggest that it may not be possible to overcome the effects of strong simple process habits with task-specific knowledge, at least the level of such knowledge that is possessed by the experienced seniors in our study.

Therefore, a more promising possibility may be reducing the likelihood that staff develop strong habits to use the simple processes in the first place. Because staff auditors work in conditions that are conducive to habit formation, a solution could be to foster development of complex process habits, for example, by “pushing down” more complex tasks, rewarding staff for use of complex processes (even for simple tasks), and/or priming professional identity. While it may seem that complex processes could be incompatible with the effortless nature of habits (i.e., a “Type 1” process; see Wood 2017), research finds that habits related to complex behaviors can form in that the initiation of the sequence of steps involved in the complex behavior occurs automatically (Gardner and Lally 2018). Complex process habits also would be
adaptive when staff are promoted to senior and their task mix shifts to include more complex
tasks. However, the approach of fostering complex process habits also introduces challenges.
Considerable inefficiencies could result from using complex processes where they are not
needed, yet firms may consider these costs less daunting than the cost of audit deficiencies
arising from auditors’ use of simple processes on complex tasks.

Alternatively, firms may consider training staff to recognize tasks as simple versus
complex and adapt their cognitive processing to the type of task. Our determinants analysis
shows that staff encounter both simple and complex tasks. If they were trained and encouraged to
use simple processes for simple tasks and complex processes for complex tasks, they may be
able to develop stronger memory associations between the type of task and cognitive processes
than between context and cognitive processes. Indeed, research with tax professionals suggests
this may be possible (Magro 1999, 2005). This approach would allow firms to maintain the
efficiency benefits related to simple processes while reducing the likelihood of staff developing
strong habits that, while adaptive for the tasks they perform as staff, become unsuitable when
they are promoted to senior.

Our study is the first to examine habits in accounting and contributes to the auditing
literature by demonstrating the importance of habit strength to auditor performance of a critical
task. Our work also may contribute to the literature on auditor skepticism (see Nelson 2009;
Nolder and Kadous 2018) by providing an alternative view, i.e., that problems attributed to lack
of skepticism could arise from habits. Future research could explore how strong habits to use
simple processes could impede audit seniors in other critical audit tasks that require complex
processing. Future research also could explore whether seniors develop other types of habits,
such as those related to coaching or reviewing. Such habits could be beneficial or harmful to
audit quality. As one idea, in light of research finding that depletion from multi-tasking impedes effective reviewing (Mullis and Hatfield 2018), research could examine whether some seniors have habits for effective reviewing, and, if so, whether such habits inoculate them from these harmful depletion effects.

Our work also has implications for research on auditor mindsets (Griffith et al. 2015b). Mindsets are defined as the set of judgment criteria and cognitive processes and procedures that produce a disposition or readiness to respond in a certain manner (Gollwitzer 1990; Hamilton, Vohs, Sellier, and Meyvis 2011; Griffith et al. 2015b). Mindsets typically are thought of as arising in response to a decision making goal, but, once instantiated, persist to subsequent decision tasks. To the extent that the simple cognitive processes that we examine map into a “simple process mindset,” our examination may demonstrate that mindsets can be habitual. That is, the typical context might instantiate a “simple process mindset,” but only for auditors with stronger mental connections between the context and the simple processes. The interaction of habit strength with context suggests that habit is the causal mechanism.

Finally, our work offers methodological insights. Our study provides a methodology for measuring cognitive processing habits. Given the ubiquitous nature of habits, we expect researchers in auditing and other areas of accounting could adapt and use our measure. Moreover, our findings suggesting that at least some auditor cognitive processing behaviors are habitual and are affected by context highlight the importance of the common methodological practice of asking auditors to imagine themselves in a real audit role when beginning the study. Alternatively, researchers could consider priming a typical audit setting.

Our study has limitations that offer ideas for future research. First, while our tests of hypotheses and additional analyses all support the inference that simple process habits are a
cause of poor performance of complex tasks, we observe one unpredicted result: the performance of auditors with weaker habits is marginally lower in the alternative, versus typical, context. This finding is inconsistent with our expectation that these auditors process mostly based on task demands irrespective of context. One possibility is that these auditors are using complex process habits and become “unmoored” when placed in the alternative context because their habits are not activated (Wood 2019). Future research is needed to test this possibility.

Second, experience can provide opportunities for repeating behavior as well as for acquiring knowledge. While our supplemental analyses begin to examine this interplay between experience and habits, our study is not designed to examine experience or knowledge effects. As our goal was to isolate simple process habits in a population of seniors who perform complex tasks, we chose as participants senior auditors with a limited range of experience and we did not measure knowledge directly. Future research could employ a sample of auditors with a broader range of experience, and also measure directly the factors affected by experience – repetition of tasks and knowledge. Such research then could examine how long simple process habits persist, how and when they decay, and whether higher levels of knowledge can overcome the effects of simple process habits.
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FIGURE 1
Simple Process Habit Strength Measure

Panel A:

Instructions:
On the following screens, you will see a series of word fragments. The number of blanks indicates the number of missing letters.

For example, if there is one blank visible, this means there is one letter missing. As another example, if there are three blanks visible, this means there are three letters missing.

Please type the word (the entire word, not just the missing letters) as quickly as possible and then hit the arrow to continue to the next word fragment. As an example to get you started, view the two word fragments below:

WO __ D
__ __ AGMEN __

As soon as you figure out the word, you would type the word in the textbox below the word fragment. For example, once you realized the first word was “WORD,” you would type “WORD” in the textbox. As another example, once you realized the second word was “FRAGMENT,” you would type “FRAGMENT” in the textbox.

Please remember to type in the word and hit the arrow button as quickly as possible. Please click the arrow below to begin.

Panel B:

<table>
<thead>
<tr>
<th>CONTROL WORD FRAGMENTS</th>
<th>SIMPLE PROCESS WORD FRAGMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>B __ RK (BARK)</td>
<td>CHE __ __ LIST (CHECKLIST)</td>
</tr>
<tr>
<td>__ HOC __ __ ATE (CHOCOLATE)</td>
<td>GLAN __ E (GLANCE)</td>
</tr>
<tr>
<td>FANC __ (FANCY )</td>
<td>INSPE __ __ (INSPECT)</td>
</tr>
<tr>
<td>MAGAZ __ __ ES (MAGAZINES)</td>
<td>PROC __ __ D (PROCEED)</td>
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<tr>
<td>MA __ SHMA __ __ OW (MARSHMALLOW)</td>
<td>__ __ ASONABLE (REASONABLE)</td>
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<tr>
<td>PAINT __ __ USH (PAINTBRUSH)</td>
<td>SC __ N (SCAN)</td>
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<tr>
<td>__ __ TERMELO N (WATERMELON)</td>
<td>__ KIM (SKIM)</td>
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<tr>
<td></td>
<td>SPREA __ __ __ EET (SPREADSHEET)</td>
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<td></td>
<td>VE __ __ FY (VERIFY)</td>
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</tbody>
</table>

Panel A displays the instructions that participants read prior to completing the word fragments. Panel B displays the word fragments that we use to measure Habit Strength. We calculate the average of each auditor’s completion times for the simple process fragments minus the average of each auditor’s completion times for the control (i.e., non-audit related) word fragments. We transform each reaction time by taking the reciprocal, which is a transformation commonly used in psychology studies using reaction-time measures to adjust for skewness (see Whelan 2008). We then classify auditors with completion times faster (slower) than the median as having stronger (weaker) simple process habits.
FIGURE 2
Audit Room Context Manipulation

Panel A: Typical Audit Room Context

Panel B: Alternative Audit Room Context
Panel C: *Instructions Read by Participants in the Typical Audit Room Context:*

- Please imagine that you are working in this audit room today.
- You are working in here all day, and your intern and three staff are also all here today.
- Look around and take in the room. Imagine how the day would progress as you are working in this room.

*For example:*
- Imagine yourself sitting in the chair (yours is the gray one to the far right) and your staff and intern sitting in the other chairs.
- Imagine yourself using your laptop and other tools/supplies as you are doing your audit work.
- Imagine what might be happening throughout the day as you do your work in this room.

*Please describe what you have imagined in 5-7 sentences in the box below.*

Panel D: *Instructions Read by Participants in the Alternative Audit Room Context:*

- Please imagine that you are working in this audit room today.
- You are working by yourself in here all day, as your intern and three staff are all at a full day training in the local office today.
- Look around and take in the room. Imagine how the day would progress as you are working in this room.

*For example:*
- Imagine yourself sitting in the chair.
- Imagine yourself using your laptop and other tools/supplies as you are doing your audit work.
- Imagine what might be happening throughout the day as you do your work in this room.

*Please describe what you have imagined in 5-7 sentences in the box below.*
The above structural equations model examines determinants of auditors’ simple process habit strength. The chi-squared test for this model reveals good fit ($\chi^2(22) = 24.57$, $p = 0.318$), as do other standard measures (CFI = 1.00; RMSEA = 0.03). Figure 1 defines Habit Strength. We measure Simple Task Exposure (mean-centered) using auditors’ self-reported percentage of time spent as a staff working on simple (versus complex) audit tasks (from 0 to 100 percent, in increments of 10). We measure Effectiveness Preferences (mean-centered) using the professional identity measure from Bauer (2015). We measure Repetition with four questions that elicit the extent to which (when the seniors were staff and performing simple tasks), they used approaches that are indicative of the simple processes (on a scale from 1 “Never Used This Approach” to 9 “Always Used This Approach.”). Simple Process Indicator 1 is “When reviewing terms of a transaction or item, closely examined the details (e.g., checked additional details outside of just the key terms)” (reverse-scored). Simple Process Indicator 2 is “When performing an audit procedure, considered how my findings within this procedure related to each other (e.g., if there were issues with multiple invoices in the sample, I thought about whether the same problem could be causing the issues)” (reverse-scored). Simple Process Indicator 3 is “When checking invoice terms, searched to see that there was evidence that agreed to what I was looking for (e.g., if I was looking for a dollar amount of ‘38,’ looked on the invoice to see if there was a ‘38’ anywhere.” Simple Process Indicator 4 is “When evaluating the findings of audit procedures, considered results from each procedure separately (i.e., did not think about connections among results).” We measure Rewards using auditors’ agreement (on a scale from 1 “Strongly Disagree” to 7 “Strongly Agree”) that, when staff, and making day-to-day decisions on their engagements, they generally chose the option that they thought their audit team members would approve of. P-values are one-tailed for directional predictions.
TABLE 1: Auditor Performance (Issues Identified) by Simple Process Habit Strength and Context

Panel A: Descriptive Statistics

<table>
<thead>
<tr>
<th>Context</th>
<th>Simple Process Habit Strength</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Stronger Habits</td>
<td>Weaker Habits</td>
<td></td>
</tr>
<tr>
<td>Typical Audit Room</td>
<td>1.09 (1.19) n=34</td>
<td>1.91 (1.84) n=32</td>
<td></td>
</tr>
<tr>
<td>Alternative Audit Room</td>
<td>1.83 (1.58) n=30</td>
<td>1.28 (1.30) n=32</td>
<td></td>
</tr>
</tbody>
</table>

Panel B: Analysis of Variance

<table>
<thead>
<tr>
<th>Dependent Variable: Issues Identified</th>
<th>df</th>
<th>SS</th>
<th>MS</th>
<th>F-statistic</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Habit Strength</td>
<td>1</td>
<td>0.57</td>
<td>0.57</td>
<td>0.25</td>
<td>0.615</td>
</tr>
<tr>
<td>Context</td>
<td>1</td>
<td>0.12</td>
<td>0.12</td>
<td>0.05</td>
<td>0.820</td>
</tr>
<tr>
<td>Habit Strength X Context</td>
<td>1</td>
<td>14.99</td>
<td>14.99</td>
<td>6.73</td>
<td>0.011</td>
</tr>
<tr>
<td><em>Error</em></td>
<td></td>
<td>124</td>
<td>276.09</td>
<td>2.23</td>
<td></td>
</tr>
</tbody>
</table>

Panel C: Simple Effects Comparisons

<table>
<thead>
<tr>
<th></th>
<th>df</th>
<th>t-statistic</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Context for Auditors with Stronger Habits</td>
<td>124</td>
<td>1.99</td>
<td>0.024*</td>
</tr>
<tr>
<td>Context for Auditors with Weaker Habits</td>
<td>124</td>
<td>-1.68</td>
<td>0.096</td>
</tr>
<tr>
<td>Habit Strength in the Typical Context</td>
<td>124</td>
<td>-2.23</td>
<td>0.014*</td>
</tr>
<tr>
<td>Habit Strength in the Alternative Context</td>
<td>124</td>
<td>1.46</td>
<td>0.148</td>
</tr>
</tbody>
</table>

We conduct an ANOVA to test our hypotheses. Independent variables are defined in the notes to Figures 1 and 2. The dependent variable is Issues Identified, which is the total number of issues with an estimate’s assumptions, out of seven embedded issues, that the auditor identifies in the goodwill impairment case. Descriptive statistics are reported in Panel A. Panel C reports our test of H1, that is, the simple effect of Habit Strength on Issues Identified, considering the typical audit room context. Panel B and Panel C report our test of H2, including the interaction between Habit Strength and Context on Issues Identified, as well as the simple effect of Context for auditors with stronger and weaker habits. P-values with * are one-tailed, and all other p-values are two-tailed.
TABLE 2: Moderating Effects of Self-Discipline within the Typical Context

Panel A:

Analysis of Variance

<table>
<thead>
<tr>
<th>Dependent Variable: Issues Identified</th>
<th>df</th>
<th>SS</th>
<th>MS</th>
<th>F-statistic</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Habit Strength</td>
<td>1</td>
<td>13.33</td>
<td>13.33</td>
<td>5.80</td>
<td>0.010*</td>
</tr>
<tr>
<td>Self-Discipline</td>
<td>1</td>
<td>1.92</td>
<td>1.92</td>
<td>0.84</td>
<td>0.364</td>
</tr>
<tr>
<td>Habit Strength X Self-Discipline</td>
<td>1</td>
<td>6.99</td>
<td>6.99</td>
<td>3.04</td>
<td>0.043*</td>
</tr>
<tr>
<td>Error</td>
<td>62</td>
<td>142.44</td>
<td>2.30</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Panel B:

Simple Effects Comparisons

<table>
<thead>
<tr>
<th>Habit Strength for Low Self-Discipline</th>
<th>df</th>
<th>t-statistic</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>62</td>
<td>-2.82</td>
<td>0.003*</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Habit Strength for High Self-Discipline</th>
<th>df</th>
<th>t-statistic</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>62</td>
<td>-0.49</td>
<td>0.312*</td>
</tr>
</tbody>
</table>

We conduct an ANOVA within the typical context to examine whether self-discipline moderates the negative effect of habit strength in this context. The dependent variable is Issues Identified, which is defined in the notes to Table 1. Habit Strength is defined in the notes to Figure 1. Self-Discipline is measured as auditors’ agreement on a 7-point scale that they exerted self-discipline while working on the goodwill task and split at the median. Panel A reports results of the ANOVA testing for whether self-discipline moderates the effect of habit strength. Panel B reports simple effects comparisons. P-values with * are one-tailed, and all other p-values are two-tailed.
TABLE 3: Thoughts About Pressures in Response to Context

Panel A: Moderated-Mediation Model with Pressures Mediator Based on Auditors’ Written Paragraphs

Effects of Independent Variables on Pressures Mediator within Model

<table>
<thead>
<tr>
<th>Dependent Variable: Pressures</th>
<th>df</th>
<th>Coeff.</th>
<th>Std. Error</th>
<th>t-statistic</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>124</td>
<td>0.64</td>
<td>0.14</td>
<td>4.40</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Context</td>
<td>124</td>
<td>-1.25</td>
<td>0.20</td>
<td>-6.10</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Habit Strength</td>
<td>124</td>
<td>-0.13</td>
<td>0.20</td>
<td>-0.67</td>
<td>0.507</td>
</tr>
<tr>
<td>Context X Habit Strength</td>
<td>124</td>
<td>0.15</td>
<td>0.29</td>
<td>0.52</td>
<td>0.604</td>
</tr>
</tbody>
</table>

Complete Model (including Direct Effect)

<table>
<thead>
<tr>
<th>Dependent Variable: Issues Identified</th>
<th>df</th>
<th>Coeff.</th>
<th>Std. Error</th>
<th>t-statistic</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>124</td>
<td>1.74</td>
<td>0.28</td>
<td>6.16</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Context</td>
<td>124</td>
<td>-0.29</td>
<td>0.42</td>
<td>-0.68</td>
<td>0.495</td>
</tr>
<tr>
<td>Habit Strength</td>
<td>124</td>
<td>-0.78</td>
<td>0.37</td>
<td>-2.14</td>
<td>0.035</td>
</tr>
<tr>
<td>Context X Habit Strength</td>
<td>124</td>
<td>1.33</td>
<td>0.53</td>
<td>2.53</td>
<td>0.013</td>
</tr>
<tr>
<td>Pressures</td>
<td>124</td>
<td>0.27</td>
<td>0.16</td>
<td>1.66</td>
<td>0.100</td>
</tr>
</tbody>
</table>

Panel B: Tests for Mediation and Moderation

Test for Whether Pressures Mediates Simple Effects

| Confident Interval                      | Context for Auditors with Stronger Habits | (-0.64, 0.04) |
|                                        | Context for Auditors with Weaker Habits  | (-0.76, 0.04) |
|                                        | Habit Strength in the Typical Context    | (-0.20, 0.04) |
|                                        | Habit Strength in the Alternative Context| (-0.10, 0.10) |

Test for Whether Pressures Mediates Overall Interaction

| Confident Interval                      | Context X Habit Strength            | (-0.08, 0.24) |

We conduct an analysis using the Preacher and Hayes (2007) moderated-mediation technique to test whether auditors’ thoughts about pressures, specifically stress (i.e., due to clutter and being cramped), interruptions, time constraints, and busy season, mediate the results for our tests of hypotheses. We code auditors’ written paragraphs as part of the context manipulation based on whether they mentioned the presence of the pressure, the absence of the pressure, or did not mention the pressure. The four pressures load on one factor (eigen-value = 2.00; all loadings > 0.50). We use the factor score as our Pressures mediator measure. The model’s dependent variable is Issues Identified, which is defined in the notes to Table 1. Habit Strength is defined in the notes to Figure 1. Context is defined in the notes to Figure 2. Panel A displays the effects of the independent variables on the potential mediator of Pressures in the model and the complete model, which includes the direct effect. Panel B displays tests for mediation and moderated-mediation.
TABLE 4: Moderating Effects of Experience-Based Proxies for Knowledge within the Typical Context

Panel A: Analysis of Variance

<table>
<thead>
<tr>
<th>Dependent Variable: Issues Identified</th>
<th>df</th>
<th>SS</th>
<th>MS</th>
<th>F-statistic</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Habit Strength</td>
<td>1</td>
<td>10.84</td>
<td>10.84</td>
<td>4.67</td>
<td>0.018*</td>
</tr>
<tr>
<td>Comfort with Goodwill</td>
<td>1</td>
<td>7.27</td>
<td>7.27</td>
<td>3.13</td>
<td>0.041*</td>
</tr>
<tr>
<td>Habit Strength X Comfort with Goodwill</td>
<td>1</td>
<td>0.21</td>
<td>0.21</td>
<td>0.09</td>
<td>0.766</td>
</tr>
<tr>
<td><strong>Error</strong></td>
<td>62</td>
<td>143.89</td>
<td>2.32</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Panel B: Analysis of Variance

<table>
<thead>
<tr>
<th>Dependent Variable: Issues Identified</th>
<th>df</th>
<th>SS</th>
<th>MS</th>
<th>F-statistic</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Habit Strength</td>
<td>1</td>
<td>9.97</td>
<td>9.97</td>
<td>4.20</td>
<td>0.023*</td>
</tr>
<tr>
<td>Months Experience</td>
<td>1</td>
<td>4.15</td>
<td>4.15</td>
<td>1.75</td>
<td>0.096*</td>
</tr>
<tr>
<td>Habit Strength X Months Experience</td>
<td>1</td>
<td>0.14</td>
<td>0.14</td>
<td>0.06</td>
<td>0.811</td>
</tr>
<tr>
<td><strong>Error</strong></td>
<td>62</td>
<td>147.22</td>
<td>2.38</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Panel C: Analysis of Variance

<table>
<thead>
<tr>
<th>Dependent Variable: Issues Identified</th>
<th>df</th>
<th>SS</th>
<th>MS</th>
<th>F-statistic</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Habit Strength</td>
<td>1</td>
<td>9.59</td>
<td>9.59</td>
<td>4.02</td>
<td>0.025*</td>
</tr>
<tr>
<td>Number of Goodwill Audits</td>
<td>1</td>
<td>0.60</td>
<td>0.60</td>
<td>0.25</td>
<td>0.619</td>
</tr>
<tr>
<td>Habit Strength X Number of Goodwill Audits</td>
<td>1</td>
<td>0.86</td>
<td>0.86</td>
<td>0.36</td>
<td>0.551</td>
</tr>
<tr>
<td><strong>Error</strong></td>
<td>61</td>
<td>145.53</td>
<td>2.39</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

We conduct ANOVAs within the typical context to examine whether auditors’ experience-based proxies for knowledge moderate the negative effect of habit strength in this context. The dependent variable is Issues Identified, which is defined in the notes to Table 1. Habit Strength is defined in the notes to Figure 1. Comfort with Goodwill is measured as auditors’ self-reported comfort with auditing goodwill on a 9-point scale. Months of Experience is measured as auditors’ self-reported number of months of audit work experience. Number of Goodwill Audits is measured as auditors’ self-reported number of goodwill audits on which they have worked. One participant did not complete the Number of Goodwill Audits measure. Panels A, B, and C display the ANOVA testing for whether each measure of experience (using median splits) moderates the effect of habit strength. P-values with * are one-tailed, and all other p-values are two-tailed.
## APPENDIX – EMBEDDED ISSUES IN GOODWILL IMPAIRMENT CASE

<table>
<thead>
<tr>
<th>Assumption</th>
<th>Description of the issue</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revenue projections</td>
<td>The company consistently over-projected growth in the past, which casts doubt on the accuracy of the current projections</td>
</tr>
<tr>
<td>Revenue projections</td>
<td>The projected revenue growth of Product C is not guaranteed due to uncertainties (a new competing product, delays in production, and/or reliance on synergies with existing product lines)</td>
</tr>
<tr>
<td>Revenue projections</td>
<td>There is an outlier in the benchmarking analysis for the projected revenue growth rate, so while the client’s rate is below the peer average, it would not be if this outlier were excluded</td>
</tr>
<tr>
<td>Revenue projections</td>
<td>Projected revenue growth is inconsistent with the overall market/economy/industry outlook</td>
</tr>
<tr>
<td>Operating expense projections</td>
<td>The company plans to increase sales staff by 10 percent in the next three years, resulting in a significant increase in employment expense. This is not factored into the client’s operating expense assumption</td>
</tr>
<tr>
<td>Capital expenditures projections</td>
<td>The company is building a new $14 million office building, which is not included in the capital expenditures forecast.</td>
</tr>
<tr>
<td>Capital expenditures projections</td>
<td>The company’s forecasted capital expenditures exhibit slower growth than industry analysts’ projections.</td>
</tr>
</tbody>
</table>