Are “Good” Auditors Impacted More by Depletion?
Threats to Valued Auditor Attributes

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Abstract:
Auditing involves activities that psychology research characterizes as requiring self-regulation—such as switching mindsets, complex thinking, and resisting temptations. This line of literature characterizes the phenomenon whereby individuals use self-regulation resources for an action, and then have insufficient resources for a subsequent action requiring self-regulation (as such resources are limited), as depletion. We develop new theory that depletion impairs auditor performance, especially for “good” auditors (those who naturally engage in more effortful processing in complex tasks via their inherent attributes). We conduct two experiments examining how depletion interacts with examples of auditor attributes predictive of more effortful processing—professional identity and trait skepticism. Consistent with predictions, results show that the effects of depletion on performance are amplified at higher levels of the attributes. Specifically, we find that the positive relationships between the auditor attributes and performance on a complex audit task absent depletion (i.e., in the control condition) are eroded when individuals are depleted. Process-model results support our theory that effortful processing mediates the relationships between the attributes and performance and that depletion impairs individuals’ effortful processing, which negatively impacts performance. These findings help explain why “good” auditors sometimes fail to provide effective audits—their performance on complex tasks is limited under depleting conditions.

Keywords: auditor attributes; auditor effectiveness, professional identity; self-regulatory depletion; trait professional skepticism
1. Introduction

Auditors work in a depleting environment—one that demands a great deal of cognitive resources. The audit environment places unique demands on auditors’ cognitive resources, such as requiring complex thinking as well as making difficult decisions over long hours and often under various pressures (e.g., budget, workload, accountability, etc.) (Lopez and Peters 2012; Buchheit, Dalton, Harp, and Hollingsworth 2016). Likewise, the nature of auditing work, such as switching mindsets for different types of audit tasks (e.g., Griffith, Kadous, and Young 2016), engaging in difficult client interactions (e.g., Bobek, Daugherty, and Radtke 2012; Bennett and Hatfield 2013), multi-tasking (Mullis and Hatfield 2016), and resisting temptations to go off task during long work days, also imposes high demands on auditors’ cognitive resources. We expect these environmental and task characteristics demand self-regulatory resources, thereby increasing auditors’ susceptibility to depletion.

While emerging in the auditing literature, depletion is widely recognized in the psychology literature as a phenomenon in which expending self-regulation in one action decreases effort and performance on any subsequent action that requires self-regulation. Individuals have a limited supply of mental resources; thus, when actions involving self-regulation “deplete” those resources, individuals are less willing or able to utilize sufficient resources in subsequent tasks requiring self-regulation. In this paper, we develop theory and provide experimental evidence that depletion has the greatest impact on the performance of “good” auditors—those who naturally engage in more effortful processing via their inherent

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1 Interested readers can refer to Baumeister, Bratslavsky, Muraven, and Tice (1998) or Hirt, Clarkson, and Jia (2016) for additional information on depletion theory and to Hurley (2015) for applications of depletion theory in auditing. Throughout this paper we use the term depletion, however, the depletion literature also refers to this phenomenon as ego depletion, self-regulatory depletion, self-regulation depletion, and limited willpower. In Section 2 we provide an expanded overview of depletion theory.
attributes—during complex audit tasks. Our theoretical model predicts that depletion moderates the positive relationship between auditor attributes predictive of more effortful processing (or simply “attributes”) and consequent performance on complex audit tasks. Specifically, we expect that engaging in effortful processing positively impacts performance, but that it also increases individuals’ susceptibility to depletion because effortful processing requires self-regulatory resources. Therefore, we predict that, as an individual’s level of any attribute predictive of effortful processing in audit tasks increases, the adverse effects of depletion on their task performance are amplified. Likewise, we also predict that effortful processing mediates the joint effect of auditor attributes and depletion on task performance.

We use two auditor attributes to test our theory: professional identity and trait skepticism, which we expect are predictive of effortful processing in audit tasks that are complex relative to an auditor’s knowledge and experience. Professional identity is a feeling that one’s personal identity overlaps with the accounting profession (Bamber and Iyer 2007). We expect high professional identity motivates auditors to engage in more effortful processing to perform well on auditing tasks in order to maintain a positive self-concept. Trait skepticism, an important determinant of professional skepticism, is a stable, inherent propensity to maintain a questioning attitude (Nelson 2009; Hurtt 2010). We expect maintaining this attitude, which involves questioning, scrutinizing evidence, comprehensively searching for knowledge, etc., necessitates effortful processing.

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2 We use the term “effortful processing” to describe higher-order cognitive processing such as controlled processing, deliberate decision-making, active problem solving, or other system 2-type processing as opposed to more passive, intuitive, system 1-type processing. This is consistent with Kahneman’s (2011) “thinking fast” (i.e., system 1) and “thinking slow” (system 2), as well as thinking and reasoning required for complex tasks (Schmeichel et al. 2003). We expect our theory to generalize to any audit task that an auditor would find complex relative to their knowledge and experience (i.e., by virtue of requiring effortful processing).
Over two experiments we examine the joint effect of the auditor attributes and depletion on performance. We use different depletion manipulations in each experiment in order to enhance the generalizability of our results. In each experiment, we manipulate depletion between-participants during an initial, separate activity and we measure participants’ auditor attribute. After the depletion activity, participants complete an auditing task that is complex relative to their knowledge and skill level—a risk assessment task that involves reading a case study and assessing 15 risk factors. We measure the effects of depletion as differences in participants’ average performance accuracy in the audit task.

Experiment 1 includes Masters of Accounting students as staff auditor proxies. We measure participants’ professional identities using a pictorial scale adapted by Bauer (2015) for the accounting profession. We manipulate depletion via a switching mindsets task because auditors are frequently required to switch mindsets during a normal workday (e.g., across tasks or across clients), and prior depletion research finds that switching mindsets, relative to maintaining one mindset, causes depletion (Hamilton et al. 2011). Experiment 2 includes undergraduate business students as staff auditor proxies. We measure participants’ trait skepticism using the Hurtt (2010) scale. We manipulate depletion via a resisting temptations task by varying the availability of internet access during the initial task because audit staff face a multitude of temptations to go off task during a normal workday, especially given the electronic focus of their work environment, and prior depletion studies find that resisting temptation causes depletion (Baumeister et al. 1998).

Results from both experiments support our theoretical model. First, we find significant positive relationships between the auditor attributes and audit task performance absent depletion (i.e., in the control condition), as well as significant negative interactions between the attributes
and depletion on performance indicating that the negative effects of depletion are amplified as an individual’s level of the attribute increases. Second, process-model results support our theory that effortful processing in the audit task mediates the relationships between the attributes and depletion on performance. Specifically, the attributes are positively associated with effortful processing in the control condition, which leads to higher performance. However, the positive relationships are significantly diminished in the depletion condition, which decreases performance. Altogether, the findings are consistent with our theory that “good” auditors, those who engage in more effortful processing in complex audit tasks, are more negatively impacted by depletion.

Our study has regulatory and practical implications. First, our findings provide one explanation as to why “good” auditors sometimes fail to provide effective audits—the depleting environment impairs their ability to engage in effortful processing. Our results echo PCAOB member Hanson’s depletion concern: “One exceptionally troubling issue that I sense is getting worse is the sheer number of hours that audit teams are expected to work…How do you perform basic tasks, much less conduct the more difficult evaluations that require heightened skepticism and objectivity?” (PCAOB 2013a). Second, our study identifies depletion as one potential explanation to help explain why the PCAOB continues to find a high rate of auditing deficiencies related to a perceived “lack of professional skepticism” in the post-SOX environment. Third, results from our process model caution that regulatory pressures to increase auditor effort as a fix for audit failures could ironically harm auditors’ effectiveness in a depleting audit environment.

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3 For example, in its summary reports of inspection results for both large and small audit firms, the PCAOB identifies a lack of professional skepticism as one underlying root cause contributing to audit performance deficiencies (PCAOB 2013b, ii; PCAOB 2008, 20).
Our study also contributes to the auditing literature. While some studies have shown how professional identity and trait skepticism positively impact performance, our study identifies limitations to these valuable auditor attributes when auditors are depleted. In addition, we extend prior literature by explaining why these attributes benefit performance—through increased effortful processing. We also add to research finding benefits of activating a deliberative mindset on auditor performance when auditing complex estimates (Griffith, Hammersley, Kadous, and Young 2015) by identifying a potential cost of switching mindsets—activating depletion effects. This finding is consistent with concurrent research finding that multi-tasking causes impaired auditor performance (Mullis and Hatfield 2016), which could be the result of switching mindsets across tasks. In light of our findings, we encourage future research to examine coping mechanisms to mitigate the harmful effects of depletion on audit effectiveness, which is especially important given auditors are likely unaware of being depleted as there is no obvious ‘feeling’ of depletion (Baumeister and Tierney 2011, 245).

The remainder of the paper is organized as follows. Section 2 discusses background and develops our hypotheses. Sections 3 and 4 discuss our method and results. We conclude in Section 5 and discuss our study’s implications for the auditing profession.

2. Theory and hypotheses development

Background on Self-regulatory Depletion

Self-regulation is a process whereby individuals “seek to exert control over their thoughts, their feeling, their impulses and appetites, and their task performances” (Baumeister et al. 2006, 1773). Self-regulation is necessary for a wide variety of actions that generally involve changing or overriding one’s natural responses (see, for example, Muraven and Baumeister 2000). An individual’s supply of self-regulation at any given time is believed to be limited; thus,
as self-regulatory resources are consumed, a temporary state of resource depletion occurs. As depletion increases, remaining resources are often conserved for future needs (Baumeister et al. 2000), thereby impairing performance on tasks requiring self-regulation until resources are replenished (Baumeister and Vohs 2007).

Research in psychology has shown that depletion can be triggered by many different actions, all of which have a common thread of exerting self-regulation. For example, resisting temptations (Baumeister et al. 1998; Bucciol, Houser, and Piovesan 2013) and regulating emotions (Muraven et al. 1998) trigger depletion because these actions require self-regulation to override natural responses. As another example, Hamilton et al. (2011) find that switching mindsets triggers depletion because this executive function requires more self-regulatory resources relative to maintaining one mindset. Regardless of the trigger, depletion results in similar consequences. Depleted individuals act in a manner that conserves self-regulation resources, generally consistent with lower effort and worse performance. For example, they are more likely to select the status quo or default option as doing so is less effortful (Evans et al. 2011), show less persistence on tasks, i.e., give up more quickly (Baumeister et al. 1998; Muraven et al. 1998), and show worse performance on cognitive tasks (Schmeichel et al. 2003, Schmeichel 2007).

Two examples from the psychology literature illustrate the effects of depletion. Theory suggests that making multiple deliberative choices is depleting because it requires self-regulation to commit to a course of action. In support of this theory, in a field experiment, Vohs et al. (2008) find that individuals who have made more purchases (i.e., deliberative choices) during a shopping trip exhibit worse performance on arithmetic problems than do individuals who made fewer purchases, controlling for time spent shopping. Also in support of this theory, Danziger et
al. (2011) find that as judges make parole decisions throughout the day, they increasingly default to the “less risky” decision of denying parole (i.e., the “cognitively easier” option that requires fewer resources). When resources are replenished after a lunch break, granting parole decisions return to the level consistent with the beginning of the day and then steadily decrease for the remainder of the day.

**Hypotheses Development**

Important to our study, depletion has a greater impact on performance during tasks requiring complex thinking and reasoning as compared to simpler mental tasks. Specifically, Schmeichel et al. (2003) find that depleted individuals performed worse than non-depleted individuals on three tasks requiring complex thinking and reasoning: cognitive extrapolation, thoughtful reading comprehension, and logic and reasoning. In contrast, depletion had no impact on individuals’ performance during simpler mental tasks, such as those involving general knowledge or memorization and recall. The belief is that complex thinking and reasoning requires more self-regulation via greater executive functioning; thus, depleted individuals (who have a deficit of self-regulation resources) are less willing or able to exert effort in such tasks.

Building on this research, we study the effects of depletion on performance on audit tasks that require complex thinking and reasoning (i.e., “complex audit tasks”), but we also predict amplified depletion effects for auditors *predisposed* to engage in greater levels of complex thinking and reasoning (i.e., more “effortful processing”). Specifically, we develop theory (in the following subsection) that certain auditor attributes are positively associated with more effortful processing. In doing so we extend prior research in auditing finding positive relationships between these auditor attributes (e.g., professional identity and trait skepticism) and auditor performance by predicting that *effortful processing* underlies these positive relationships.
Following, we develop theory that more effortful processing amplifies individuals’ susceptibility to harmful effects of depletion, thereby diminishing the positive relationships between the attributes and auditor performance. Our overarching theory is illustrated in Panel A of Figure 1 and states that depletion moderates (i.e., weakens) the positive relationship between auditor attributes predictive of effortful processing and performance.

Insert Figure 1 here

Auditor attributes predictive of effortful processing: professional identity and trait skepticism

*Professional identity* is our first auditor attribute we posit is predictive of effortful processing. Professional identity is defined as the extent to which an auditor’s self-concept (i.e., attributes and values) overlaps with those of the accounting profession. The self-concept is composed of a *personal* identity that reflects an individual’s beliefs about his or her idiosyncratic characteristics (e.g., attributes, abilities, traits) and a *social* identity that reflects an individual’s perceptions of his or her “one-ness” with various groups or classifications (Ashforth and Mael 1989). As opposed to an “all-or-none” phenomenon, the extent to which an individual identifies with a social category can be viewed in terms of degrees (Ashforth and Mael 1989).

Research in auditing posits that auditors can vary in the extent to which they identify with the accounting profession, which develops once they make the initial decision to pursue a degree in accounting and CPA (Bamber and Iyer 2002). As this decision typically is made long before an individual joins an audit firm, *professional* identification is expected to originate before the individual develops an identification with a particular accounting firm, thereby being distinct
from organizational identification (Aranya et al. 1981; Bamber and Iyer 2002).\textsuperscript{4} Research has shown a positive relationship between an auditor’s professional identity and performance on audit tasks involving objectivity (Bamber and Iyer 2007; Bauer 2015).

Theory on identity and self-concept maintenance provides further insight into the mechanism underlying this positive relationship. As an individual’s identification with a task increases, the task’s importance to their self-concept increases (Schlenker et al. 1994; Britt 1999). In turn, individuals are motivated to perform well in the task in order to maintain a positive self-concept (Britt 1999; Britt 2005), generally resulting in greater effort to successfully perform (Britt 2005), especially for difficult tasks (Gendolla 1999). In comparison, a task misaligned with one’s identity is perceived as less important to the self-concept, resulting in lower effort and task performance. Accordingly, as displayed in Panel B of Figure 1, we predict a positive association between auditors’ professional identity and effortful processing (link 1), which we expect then increases performance (link 2).

Trait skepticism is the second auditor attribute we posit is predictive of effortful processing. Trait skepticism is an inherent, stable trait that along with state skepticism (a temporary condition caused by situational factors) comprises auditors’ professional skepticism (Hurtt 2010), defined as “an attitude of a questioning mind and critical assessment of audit evidence” (AU Section 230; PCAOB 2012). Research in auditing has shown a positive relationship between auditors’ trait skepticism and performance on audit tasks requiring professional skepticism (Popova 2013; Hurtt et al. 2012; Quadackers et al. 2014). We extend this

\textsuperscript{4} We note that, while individuals’ accounting-specific skills, knowledge, or experience could contribute to their professional identities, we believe the strength of one’s professional identity (i.e., the degree to which they view their self-concept as overlapping with the values of the audit profession) is distinct from these factors, as it is based on his or her beliefs about his or her attributes and traits. We confirm that identity is unrelated to these factors in a supplemental analysis, and that effects of identity on performance are incremental to effects of these factors.
research by developing theory that the positive relationship between individuals’ trait skepticism and auditor performance is mediated by effortful processing.

Trait skepticism is comprised of six characteristics: a questioning mind, suspension of judgment, search for knowledge, interpersonal understanding, self-esteem, and autonomy (Hurtt 2010). We expect the actions associated with these characteristics involve more effortful processing when completing audit tasks. For example, maintaining “a questioning mind” involves continually questioning audit evidence, such as ongoing questioning of whether evidence is indicative of fraud and continual questioning of his or her own judgments (Hurtt 2010). “Searching for knowledge” includes conducting a comprehensive search (i.e., thoroughly investigating versus seeking information simply to confirm an assumption) and closely scrutinizing evidence and arguments (Hurtt 2010). Finally, “Interpersonal understanding” involves evaluating others’ motivations prior to forming conclusions, which necessitates higher-order reasoning to understand others’ incentives. Thus, we expect the actions of high trait skeptics involve more effortful processing relative to lower trait skeptics—who are less likely to question, search, and evaluate others’ motivations (i.e., more likely to accept claims at face value).

Accordingly, as depicted in Panel B of Figure 1, we predict auditors’ trait skepticism is positively associated with effortful processing (link 1), which we expect benefits performance (link 2). Link 2 is consistent with Kadous and Zhao (2016), who find increases in effortful processing (prompted with intrinsic motivation) lead to higher performance on a complex audit task (i.e., more skeptical actions and judgments).

*Interaction effects of depletion and auditor attributes predictive of effortful processing*
We expect that depletion moderates the relationships between these auditor attributes and effortful processing. Recall that depleted individuals perform worse in tasks involving complex thinking and reasoning than non-depleted individuals (Schmeichel et al. 2003), presumably because they are either unwilling or unable to exert sufficient self-regulation when their resources are depleted (Baumeister et al. 1998). Accordingly, we theorize that depletion impairs an individual’s effortful processing, such that the harmful effects of depletion are amplified as an individual’s level of these attributes (professional identity and trait skepticism) increase. Because we expect individuals higher on these attributes typically engage in more effortful processing (link 1, Panels B and C), we predict a greater susceptibility to depletion effects. In turn, we expect these impediments to effortful processing to impact performance (link 2, Panels B and C).

To summarize, our first overarching hypothesis predicts that, as an individual’s level of any attribute predictive of effortful processing increases, the adverse effects of depletion on performance are amplified, such that the positive relationships between the attributes (e.g., professional identity and trait skepticism) and performance are diminished. Our second hypothesis further predicts that effortful processing mediates the effects predicted in H1.

**HYPOTHESIS 1.** The positive relationships between auditor attributes predictive of effortful processing (professional identity and trait skepticism) and performance on complex auditing tasks are significantly diminished when individuals are depleted.

**HYPOTHESIS 2A(B).** Effortful processing mediates the positive relationship between professional identity (trait skepticism) and performance on complex auditing tasks and the negative interaction effect of depletion and professional identity (trait skepticism) on performance on a complex auditing task.

3. **Method and Design**

**Experimental overview and participants**

We test our predictions in two experiments, in which we manipulate depletion with two different depletion manipulations and include two measured attribute variables as illustrated in
Participants in both experiments perform the same auditing risk assessment task, which provides our dependent measure of performance.

**Insert Figure 2 here**

The experiments are conducted in computer labs over multiple sessions. Because depletion is a physiological effect that potentially varies with the time of the day, we counterbalance session order to have an equal number of sessions in the Depletion and Control conditions occurring at the same time of day. We also collect self-reported measures of factors correlated with depletion effects (e.g., feeling hungry, feeling tired, mood, having a busy day). We observe that including sessions and the factors correlated with depletion as covariates in our analyses has no impact on the inferences of our reported results. At the end of each session, all participants complete a post-experimental questionnaire and receive $20.00 cash compensation.

Experiment 1 includes 100 Masters of Accounting students from a large public university. The mean participant age is 22, and 47.0 percent are female. All of the participants had previously completed at least one auditing course, 90 percent had completed at least one accounting internship with 54 percent having completed an auditing internship, and the mean participant has 4.6 months of accounting work experience. Experiment 2 includes 52 undergraduate business students from a medium-sized public university. The mean participant age is 21, and 48.1 percent are female. Approximately 50 percent are accounting majors (or dual major with accounting), and the mean number of accounting courses completed is 2.9.$^5$

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$^5$ In Experiment 1, gender and months of accounting experience significantly vary across depletion conditions. Including them as covariates in our analyses (untabulated) has no impact on statistical inferences. Other demographic variables in Experiment 1 do not differ across depletion conditions ($p$-values $> 0.10$). In Experiment 2, none of the demographic variables (e.g., age, gender, year in school, accounting and work experience, etc.) differ across depletion conditions ($p$-values $> 0.10$). Thus, we exclude these covariates in our analyses and reported results.
We use student participants because the individual attributes that we study (i.e., professional identity and trait skepticism) are inherent traits that auditors and students both possess, and depletion is a cognitive effect believed to impact all individuals. Importantly, we design our auditing task to be complex, relative to our participants’ knowledge and experience, to allow for the activation of effortful processing, which drives our theoretical predictions. We expect that our theory and results—depletion having a *stronger impact* on auditors higher in attributes predictive of effortful processing—to generalize to practicing auditors completing tasks that are complex relative to their level of knowledge and experience.

**Experimental task**

We developed an auditing case with a related risk assessment task, which we use in both experiments. The auditing case is based on Cases in Strategic-Systems Auditing: Loblaw Companies Ltd. (“Loblaw”) (Greenwood and Salterio 1999). We seeded changes in audit risks from the prior year to the current year (increase, decrease, or no change) for 15 risk factors. The risk factors were selected from International Accounting Standard 315 (IAASB 2009) and PCAOB Auditing Standard Number 12 (PCAOB 2010), which encompass audit risks in four areas: the nature of the entity, industry and regulatory factors, the company’s business risk, and the company’s financial health. The task is designed for staff auditors and captures key features of audit workpapers. As typical in such a task, participants are provided with the prior year risk assessments, and they are asked to assess the current year risk and document their explanations for changes in risk assessments, collected simultaneously. Participants are asked to complete the current year risk assessments based on the current year audit case information that was available to them throughout the entirety of the task.
We take several steps to ensure that the case study and risk assessment task are reasonable, accurate, and realistic for staff auditors. A senior-level auditing professor reviewed the case for reasonableness, length, and comprehension. The case was pilot tested with doctoral students with prior auditing experience. To ensure seeded changes in risk factors had the intended effect, two audit senior managers from a Big 4 firm reviewed the case and assessed the prior year risk ratings along with the direction of change for the current year ratings. They concluded that the risk assessments were accurate and the task is reasonable and consistent with materials they would use in practice. One commented, “This is absolutely something that we would expect a staff auditor to complete.” Finally, in order to ensure our measure of performance is objective, we compared our measure of performance with evaluations from three auditing experts, ex post (i.e., after both experiments were run). That is, one audit partner and two audit senior managers from a Big 4 firm completed the case (without knowing our seeded changes) by providing independent assessments for each of the 15 risk factors, (increase, decrease, or no change). Of the total 45 assessments (i.e., 15 risk factors for three auditors), 41 were consistent with our performance measure (i.e., accuracy), resulting in 91 percent agreement.6

**Dependent variable**

Our dependent variable is performance on the auditing task, measured by participants’ overall accuracy in their risk assessment ratings. For each risk factor, participants are provided with the prior year risk assessment and are asked to rate the current year risk assessment on a seven-point scale, ranging from 1 = “Low” to 4 = “Moderate” to 7 = “High.” Based on the case

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6 Only one of the disagreements was indicated by more than one expert—two of the three experts indicated that one of the “increase” risk factors was a “no change” risk factor. Our results are robust to using three alternate measures of performance, in which we (1) classify a response to this factor of either “no change” or “increase” as correct, (2) classify a response to this factor as “no change” (consistent with the experts), and (3) remove this risk factor from our performance measure (i.e., only include performance for 14 risk factors).
information provided for the current year, 13 of the 15 risk assessments change with respect to risk (increase or decrease) for the current year, and two factors do not change in the current year. To measure performance, we create one independent observation for each participant, calculated as the sum of directionally accurate changes in the current year risk factors (i.e., increase, decrease, or no change from prior year), with possible performance scores ranging from 0 to 15.

**Independent variables**

**Auditor attributes**

In Experiment 1, we measure participants’ professional identity with the accounting profession using a pictorial scale developed by Aron et al. (1992), validated by Tropp and Wright (2001), and then adapted by Bauer (2015) for auditors. Participants view seven images of two overlapping circles (the self and the accounting profession), which range from no overlap (i.e., weakest identity) to nearly overlapping circles (i.e., strongest identity). Scores in our sample range from 2 to 7, with a mean (median) of 4.7 (5.0) and a standard deviation of 1.18, similar to the senior-level auditors in Bauer (2015). In Experiment 2, we measure participants’ trait skepticism (i.e., an inherent, stable trait) using a 30 item psychological scale developed by Hurtt (2010) with higher scale values reflecting higher trait skepticism. Scores in our sample range from 98 to 167 (out of 180), with a mean (median) of 133.5 (134) and a standard deviation of 15.5, similar to student participants in Hurtt (2010). Importantly, mean levels of the attributes do not differ across the Control and Depletion conditions in both experiments (p-values > 0.50).^7

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^7 We perform additional analyses (untabulated) to rule out the possibility that the attributes are picking up differences in participants’ audit-specific skill, knowledge, or experience that could explain our results. In Experiment 1, we find no significant correlations between Professional Identity and (a) participants’ months of accounting work experience, (b) whether they have completed an auditing internship, or (c) participants’ plans to pursue a career in auditing (all p > 0.10). In Experiment 2, we find no significant correlations between Trait Skepticism and the following accounting-related experience measures: (a) year in school, (b) number of accounting classes taken, (c) months of work experience, (d) months of accounting experience, and (e) plans to pursue a career.
Depletion

We follow psychology studies and randomly assign participants to either the Control or Depletion condition in an initial activity (the depletion activity) and then measure performance on a subsequent, separate task (the auditing task). To enhance generalizability, we use different depletion manipulations in each experiment: switching mindsets and resisting temptations.

In Experiment 1, we manipulate depletion via switching mindsets as switching versus maintaining one mindset requires more self-regulation (Hamilton et al. 2011). Participants either switch between abstract and concrete mindsets (Depletion condition) or maintain a consistent mindset (Control condition) when responding to questions about personal goals. Specifically, participants view a goal on the computer screen and are then asked either “why” (i.e., abstract mindset) or “how” (i.e., concrete mindset) they would achieve this goal four times, and for a total of eight goals (or 32 total responses). In the Control (Depletion) condition, participants consistently answer all (switch between answering) “how” or all “why” for the eight goals.

We chose this manipulation as auditors perform tasks eliciting varying types of mindsets (e.g., abstract and concrete; deliberative and implemental) (Griffith et al. 2015). For example, a staff auditor likely would use a deliberative mindset (which involves critical thinking) when completing a complex task, such as testing journal entries, which necessitates evaluating which entries are most risky and developing ways to gain assurance over different audit areas. By

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8 We counterbalance the order in both conditions. The order condition of the goals activity has no impact on the reported results ($p = 0.94$). Importantly, when maintaining one mindset in the Control condition, answering “how” (using a steady concrete mindset) or “why” (using a steady abstract mindset) had no impact on performance on the auditing task and it does not interact with professional identity to influence performance ($p$-values $> 0.50$).
contrast, a staff auditor likely would use an implemental mindset (which involves taking quick action) on a more routine task, such as tying terms of transactions to client documentation.

In Experiment 2, we manipulate depletion via resisting temptation by varying whether participants face the temptation to go off task. Specifically, we either enable (Depletion condition) or disable (Control condition) the Internet during an initial decoding task, adapted from Chow (1983), in which participants use a key to match letters to symbols. We expect when the Internet is enabled (versus disabled) during this task, participants will use relatively more self-regulation resources to resist the temptation to go off task by using the internet for leisurely purposes. Participants in the Control condition were informed that there is no Internet access during the session and access was disabled; participants in the Depletion condition were informed there is access to the Internet and access was enabled but are asked not to access it.\(^9\)

We chose resisting temptation to use the Internet due to the practical importance of such temptations in the audit environment. With increasingly electronic audit procedures, the Internet is a pervasive force in auditors’ everyday lives (Brazel et al. 2004; Dowling 2009). Because we develop a unique manipulation of resisting temptation, we validate the manipulation in a 1×2 between-participants experiment with 28 new participants from the same population used in Experiment 2. We directly follow Schmeichel et al. (2003), and like those authors, find that our manipulation of depletion results in lower performance on analytical GRE questions in both the number of answers correct (\(t = 1.92\); one-tailed \(p = 0.03\)) and proportion of correct answers to the number of questions attempted (\(t = 2.32\); one-tailed \(p = 0.01\)).

\(^9\) 27 of the 29 participants in the Depletion condition reported that they did not access the Internet, confirming that they resisted the temptation. Results are robust to excluding the two individuals who reported using the Internet; however, including participants who gave in to the temptation should bias against our results.
4. Results

Figure 3 visually presents the descriptive statistics of the mean performance by level of the auditor attributes for both the Control and Depletion conditions. Consistent with our hypothesized interactions, in both experiments we observe a positive trend of mean performance with increased attribute levels in the Control condition (absent depletion); however, performance appears to decline with increased attribute levels in the Depletion condition.

Insert Figure 3 here

Test of Hypothesis 1

Hypothesis 1 predicts that the positive relationships between the auditor attributes predictive of effortful processing (professional identity and trait skepticism) and performance on complex audit tasks will be diminished when individuals are depleted. We use OLS regression analyses to test H1. In our regression models for both experiments, the dependent variable is performance on the auditing task; the individual auditor attribute (i.e., Identity or Skepticism) is a continuous independent variable (centered on the mean attribute level); and Depletion is an indicator variable (coded 1 for Depletion conditions; 0 for Control conditions).\(^{10}\)

As reported in Table 1, we find a positive main effect of Identity on performance \((t = 1.81, \text{one-tailed } p = 0.04, \text{Model 1})\), and a negative Identity \(\times\) Depletion effect on performance \((t = -3.13, \text{two-tailed } p < 0.01, \text{Model 1})\) in Experiment 1. Likewise, there is a positive main effect of Skepticism on performance \((t = 2.01, \text{one-tailed } p = 0.02, \text{Model 2})\) and a negative Skepticism \(\times\) Depletion effect on performance \((t = -1.84, \text{two-tailed } p = 0.07, \text{Model 2})\) in Experiment 2.

\(^{10}\) For robustness, we use an alternative dependent measure of performance: the magnitude of change in the current year risk assessments for the ten factors that had an increase in risk (i.e., participants’ sensitivity to heightened risk in the current year). Inferences for hypotheses testing are unchanged using this dependent measure (untabulated).
Results from both experiments support H1. Follow-up simple-effects tests (untabulated) indicate that the positive relationships between the attributes and performance dissipate when individuals are depleted.

*Insert Table 1 here*

**Test of Hypotheses 2**

Hypothesis 2 predicts that *effortful processing* mediates the positive relationships between the auditor attributes and performance on complex audit tasks and the negative interaction effect in H1. We conduct structural equations-based path analyses to test our process model in Panel B of Figure 1. We measure *Effortful processing* as the average number of characters written by participants to explain their assessments for the 15 risk factors. This measure is based on our expectation that effortful processing (i.e., working hard in the task by carefully reading, assessing, and evaluating relevant information to accurately assess the risk factors) is positively correlated with participants’ length of explanation for the current year risk factors because the participants would have more information to document as support for their risk assessment changes. Likewise, we expect participants engaged in relatively lower-levels of

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11 Depletion theory motivates predicting a negative main effect of depletion on performance. In Experiment 2, the main effect of depletion on performance is significant and negative (one-tailed $p = 0.01$), indicating a negative effect of depletion at mean-levels of *Skepticism*. In contrast, the main effect of depletion in Experiment 1 with *Identity* is not significant (one-tailed $p = 0.48$). We expect this result occurs because at lower levels of *Identity*, participants in the *Depletion* condition appear to unexpectedly perform *better* than those in the *Control* condition (see Figure 3). We expect this result is due to the combination of (1) theory that participants with lower identity levels are less susceptible to depletion effects and (2) evidence suggesting that activating two mindsets (instead of one) can benefit performance when the mindsets confer distinct benefits (see Hamilton et al., 2011).

12 Tests of assumptions show that the data is not normally distributed. As recommended by Friedman (1937) and Conover and Iman (1981), we perform our OLS regressions using rank transformations for performance. Results are inferentially consistent with the exception of a weaker *Skepticism × Depletion* effect ($p$-value 0.08 one-tailed). To provide further comfort for testing H1, we perform the Preacher and Hayes (2008) bootstrapping analysis on performance, which is not dependent on the normality assumption, and we find results support the *Attribute × Depletion* effect predicted in H1 in both experiments. Specifically, we find significant negative effects of depletion on performance at higher-levels of the attributes ($p$-values < 0.05), but not at lower-levels of the attributes. Finally, we using rank transformations for *Effortful Processing* and *Performance* in our process model testing and find inferentially identical results for both experiments.
effortful processing may not have carefully read, assessed, or evaluated relevant information leading to shorter explanations and less accurate risk assessments.

Path model results, along with standardized path coefficients, for Experiments 1 and 2 are presented in Panels A and B of Figure 4, respectively. The overall models have good fit as the Tucker-Lewis indices are above the accepted cutoff value of 90 percent (Kline 1998, 131). The goodness of fit is also confirmed with Chi-square tests ($p$-values > 0.5), comparative fit indices of 1.00, and root mean square error of approximations of 0.00.

In Experiment 1, consistent with our hypothesized model, in the *Control* condition (absent depletion) there is a significantly positive relationship between *Identity* and *Effortful Processing* ($p = 0.04$, link 1). In addition, this relationship is significantly weaker (no longer significant) when individuals are depleted, evidenced by significant differences in the path coefficients across the *Control* and *Depletion* conditions for link 1 (Chi-square $p = 0.05$ for both). Also as expected, there is a significantly positive association between *Effortful Processing* and *Performance* ($p = 0.01$, link 2). Collectively, the results support our predictions in H2 (for professional identity) that effortful processing mediates the positive relationship between professional identity and performance as well as the negative interaction effect of depletion and professional identity on performance tested in H1.13

*Insert Figure 4, Panel A here*

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13 Recall that theory states professional identity increases the *perceived importance* of the audit task to the self-concept, which then increases effortful processing. Consistent with the theory, we find (in untabulated results) a significant, positive association between professional identity and perceived importance of the audit task in the *Control* condition measured with participants’ agreement with the following statement: “It was important to me to be accurate in my performance in the auditing task” (on a scale where 1 = Strongly Disagree and 7 = Strongly Agree). We also find a significant, positive association between perceived importance and effortful processing in the audit task in the *Control* condition. Further, including the paths for this variable in our process model (i.e., adding paths from *Identity* to *Perceived Importance* and *Perceived Importance to Effortful Processing*) only enhances our results for H2, providing additional support for the process underlying our theory.
Recall that our hypothesized model also predicts an association between an individual’s level of trait skepticism and the level of their effortful processing in a complex audit task. Consistent with the theory, in the Control condition (absent depletion), there is a significant and positive association between Trait Skepticism and Effortful Processing ($p < 0.06$, link 1). In addition, depletion significantly weakens this association, evidenced by a significant difference in the path coefficients across the Control and Depletion conditions (Chi-square $p < 0.02$). In fact, Trait Skepticism negatively impacts effortful performance in the Depletion condition ($p = 0.04$). As expected, there is a significantly positive relationship between Effortful Processing and Performance ($p < 0.01$, Link 2). The results support our predictions in H2 (for trait skepticism) that effortful processing mediates the positive relationship between trait skepticism and performance as well as the negative interaction effect of depletion and trait skepticism on performance tested in H1.

*Insert Figure 4, Panel B here*

**Supplemental analyses**

A potential alternative explanation for our findings is that the depletion activity induces fatigue (instead of or in addition to depletion) that impacts effortful processing and performance on the auditing task. We perform additional tests attempting to rule out this alternative explanation. First, we examine whether effort in the depletion activity (which we presume could cause fatigue) varies across the Depletion and Control conditions and find no difference in either experiment ($p$-values $> 0.5$, two-tailed tests, untabulated). Next, we include effort in the

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14 For Experiment 1, we measure effort in the depletion activity (a goals task) using three measures: (1) the total number of characters written for each goal (effort extent), (2) the amount of time in seconds to complete the goals activity (effort duration), and (3) the number of characters written per second (effort intensity). For Experiment 2, we measure effort intensity in the depletion activity (a decoding activity) as the number of accurate symbols decoded during the 10 minutes.
depletion activity as a covariate in our regression analyses for performance on the auditing task and observe that all inferences remain unchanged, suggesting effort in the depletion activity (a measure of fatigue) has no impact on our observed results. Finally, we also ensure that our independent variables of interest, the Attributes and the Attribute × Depletion interactions, do not impact amount of effort exerted in the depletion activity ($p$-values > 0.2), thereby ruling out the possibility that the attributes themselves cause fatigue. Overall, we find no evidence that fatigue had any influence on our results in the auditing task.

5. Conclusion

The PCAOB and audit firms alike seek to understand underlying root causes for continued audit deficiencies and failures. In a recent speech, Board Member Jeanette Franzel stresses the need for research to study “the influences of pressures and threats to auditor attributes, mindset and actions” that impact the quality of audits (PCAOB 2013c, emphasis added). Our study answers this call by identifying depletion as such a threat. We provide a theory-based process model and experimental evidence that “good” auditors (those higher in attributes predictive of effortful processing, like stronger professional identity and higher trait skepticism) are impacted by depletion to a greater extent; depletion impedes their ability to engage in this greater effortful processing, causing their performance to drop further than auditors with lower-levels of these attributes.

Our study contributes to audit research and practice. First, we add to emerging research in auditing examining effects of depletion on auditor judgments (Hurley 2015; Mullis and Hatfield 2016). Our study complements Mullis and Hatfield by identifying the process-mechanism underlying depletion effects in complex audit tasks (i.e., effortful processing) and by identifying amplified depletion effects for “good” auditors. In doing so, we identify new limitations of
valued auditor attributes (e.g., professional identity and trait skepticism) when individuals are depleted. The findings are troubling in light of expectations that depletion triggers are likely pervasive in audit environments. In line with this concern, PCAOB member Hanson commented that tight filing deadlines and pressures to reduce hours and fees (i.e., depletion triggers) can inhibit auditor skepticism and objectivity, and he stresses the importance of the auditor’s personality for individual auditor effectiveness (PCAOB 2013a). Our results highlight that, ironically, especially when the auditor has the “right personality” (i.e., stronger professional identity or higher trait skepticism), the benefits of personalities driving greater effortful processing likely are limited in a depleting audit environment.

Our study also responds to regulators’ calls for research to better understand the influence of pressures and threats to auditor attributes that are involved in exercising professional skepticism. Auditor objectivity and skepticism have longstanding prominence as critical inputs for audit effectiveness, yet regulators continue to find deficiencies resulting from lapses in these inputs (PCAOB 2013c). Our study identifies depletion as a new threat to the effectiveness of these auditor attributes and provides one potential explanation as to why “good” auditors (those who naturally engage in more effortful processing) sometimes fall short in audit performance.

We acknowledge there are several limitations to our study that provide opportunities for future research. We use student participants, expecting our results to generalize to practicing auditors who are performing complex tasks relative to their knowledge and experience. Future research could provide unique insights examining depletion effects with practicing audit professionals. For example, research could study whether audit tasks themselves—those containing depletion triggers, such as difficult client interactions in which auditors must suppress emotions, or audits of complex estimates that require extensive deep effortful (i.e., Type 2)
processing—deplete auditors. Research could also examine whether heightened self-awareness with experienced auditors mitigates depletion effects, as indicated from prior psychology research (Alberts, Martijn, De Vries 2011), and whether self-awareness varies among individual auditors or as a result of situational factors (e.g., under time pressure or inspections pressure).

With respect to generalizability of results, we use an audit risk assessment task that requires effortful processing to make more accurate judgments, yielding better performance. Thus, our conclusions should generalize to similar tasks or settings where depletion harms performance because the task is dependent on effortful processing to perform better. For other types of audit tasks, however, depletion could potentially be less of a threat, or even improve auditor judgment. For example, Danziger et al. (2011) finds with practicing judges that, when depleted, they engage in more heuristic processing by defaulting to denying parole. In a similar sense, depleted auditors engaging in heuristic processing could default to more conservative judgments, which could be consistent with higher audit quality.

Finally, a key link in our theoretical model is that auditors higher on attributes predictive of effortful processing (i.e., professional identity and trait skepticism) are more susceptible to depletion effects. We provide support for this theory with process models, in which we measure effortful processing by the length of participants’ explanations for their risk assessment decisions. However, it is possible that our measure could also capture justification effort (i.e., the extent to which participants felt the need to justify their decisions). Nonetheless, this concern is partially mitigated by the fact that we find a positive relation between effortful processing and performance, thereby precluding the possibility that participants performing poorly on the task attempted greater justification of their risk assessment decisions.
REFERENCES


Public Company Accounting Oversight Board (PCAOB). 2013a.Key Note Address by Jay D. Hanson, Board Member, at Baruch College 12th Annual Financial Reporting Conference. Available at: http://pcaobus.org/News/Speech/Pages/05022013_Hanson.aspx.


Figure 1 Theoretical model of the effects of auditor attributes and depletion on performance

Panel A – Overarching Theory*

Auditor Attributes Predictive of Effortful Processing  \[ \rightarrow \]  Depletion  \[ (\neg) \]  Performance on Complex Auditing Tasks  \[ (+) \]

Notes:

* This figure illustrates our overarching theory tested in two experiments. We predict the positive relationships between auditor attributes predictive of effortful processing (professional identity and trait skepticism) and performance on complex auditing tasks are significantly diminished when individuals are depleted.
Panel B – Process-based model*

Notes:

* This figure illustrates our process-based model tested in two experiments of how effortful processing mediates the positive relationships between the auditor attributes (professional identity and trait skepticism) and performance on complex auditing tasks.

† We predict the strength of link 1 is moderated by depletion such that the positive relationships between the auditor attributes (professional identity and trait skepticism) and effortful processing in complex auditing tasks are significantly diminished when individuals are depleted (in the Depletion versus Control condition).
Figure 2—Demonstrates Our Experimental Sequence of Events. In Experiment 1, we measure our attribute of interest—professional identity—one week prior to the experiment. During the experiment, we manipulate depletion in an initial activity via switching mindsets (depletion condition) versus maintaining one mindset (control condition); and measure performance on an auditing risk assessment task in which participants, after reading a case, prepare current year risk assessments for 15 risk factors. In Experiment 2, we manipulate depletion in an initial activity in which we vary whether participants do (do not) resist the temptation to use the internet in the depletion (control) condition; we measure performance using the same auditing task as in Experiment 1; and we measure participants’ trait skepticism after they complete the auditing task.
Figure 3 Mean performance by level of attribute across depletion conditions

Panel A: Experiment 1

Panel B: Experiment 2
**Figure 4** Test of the process for theoretical model

**Panel A: Experiment 1**

- **Link 1**
  - Control: +12.96, $p = 0.04$
  - Depletion: -2.08, $p = 0.35$
  - Diff.: $\chi^2=2.70, p = 0.05$

- **Effortful Processing**

- **Link 2**
  - +0.01, $p = 0.01$

- **Professional Identity**

- **Link 3**
  - Control: +0.38, $p = 0.07$
  - Depletion: -0.64, $p = 0.01$
  - Diff.: $\chi^2=8.31, p < 0.01$

- **Performance on the Complex Auditing Task**
**Figure 4 (Continued)**

**Panel B: Experiment 2**

Figure 4—Process Testing of Mediation Hypothesis. H2 predicts that effortful processing mediates the positive relationship between professional identity (trait skepticism) and performance on a complex auditing task and the negative interaction effect of depletion and professional identity (trait skepticism) on performance on a complex auditing task.

*Depletion* is the treatment variable manipulated at two levels (0 = *Control* condition, 1 = *Depletion* condition).

*Professional Identity* (in Experiment 1) is the extent to which the participant’s personal attributes, qualities, and values align or overlap with the attributes, qualities, and values of the accounting profession (elicited using a seven-point scale with images of two circles [self and the accounting profession]; 1 is a picture with no overlap [weakest identity], and the pictures progressively overlap more, such that 7 is the strongest identity [nearly overlapping]). Scores are mean-centered.

*Trait Skepticism* (in Experiment 2) is measured using the 30-question Hurtt (2010) scale. Higher scores indicate greater trait skepticism. Scores are mean-centered.

*Effortful Processing* is measured as the average number of characters written by participants to explain their assessments for the 15 risk factors.

*Performance* is the count of a participant’s number of directionally accurate changes in the current year risk assessment for 15 risk factors. Scores range from 0 – 15, with higher responses indicative of better performance.
**Professional Identity**
The figure in Panel A shows the results of tests of our mediation hypothesis using professional identity. The number of observations is 100. The path analysis simultaneously tests the relationships among our variables. The standardized path coefficient and corresponding $p$-value (one-tailed) are shown next to each path. The overall goodness of fit is measured through the Tucker-Lewis index (149 percent), which measures the proportion of improvement of the fit of the model over a null model. The goodness of fit is also confirmed with a Chi-square test ($p = 0.86$), a comparative fit index (1.00), and a root mean square error of approximation (0.00).

**Trait Skepticism**
The figure in Panel B shows the results of our tests of our mediation hypothesis using trait skepticism. The number of observations is 52. The path analysis simultaneously tests the relationships among our variables. The standardized path coefficient and corresponding $p$-value (one-tailed) are shown next to each path. The overall goodness of fit is measured through the Tucker-Lewis index (126 percent), which measures the proportion of improvement of the fit of the model over a null model. The goodness of fit is also confirmed with a Chi-square test ($p = 0.57$), a comparative fit index (1.00), and a root mean square error of approximation (0.00).
### TABLE 1
OLS regressions of Performance

<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>Predicted Sign</th>
<th>Model 1</th>
<th>Model 2</th>
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<tbody>
<tr>
<td>Intercept</td>
<td>?</td>
<td>36.07</td>
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<tr>
<td></td>
<td>(&lt;0.01)</td>
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<td></td>
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<tr>
<td>DEPLETION</td>
<td>-</td>
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<td>-2.33</td>
</tr>
<tr>
<td></td>
<td>(0.48)†</td>
<td></td>
<td>(0.01)†</td>
</tr>
<tr>
<td>IDENTITY</td>
<td>+</td>
<td>1.81</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.04)†</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SKEPTICISM</td>
<td>+</td>
<td></td>
<td>2.01</td>
</tr>
<tr>
<td></td>
<td>(0.02)†</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IDENTITY × DEPLETION</td>
<td>-</td>
<td>-3.13</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(&lt;0.01)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SKEPTICISM × DEPLETION</td>
<td>-</td>
<td></td>
<td>-1.84</td>
</tr>
<tr>
<td></td>
<td>(0.07)</td>
<td></td>
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</tr>
</tbody>
</table>

F statistic 3.46 3.30
p-value 0.02 0.03
Adjusted R² 0.05 0.12
No. of Observations 100 52

*Depletion* is the treatment variable manipulated at two levels (0 = *Control* condition, 1 = *Depletion* condition). In Experiment 1, participants in the *Control* (*Depletion*) condition maintain one mindset (switch mindsets) during an initial activity. In Experiment 2, participants in the *Control* (*Depletion*) condition do not resist (resist) the temptation to use the Internet in an initial activity.

*Identity* is a participant’s response (in Experiment 1) to the post-experimental question “Select the picture below that best describes how your personal attributes, qualities, and values align or overlap with the attributes, qualities, and values of the accounting profession” (recorded on a seven-point scale, whereby participants select one of seven possible images of two circles [self and the accounting profession]: 1 is a picture with no overlap [weakest identity], and the pictures progressively overlap more, such that 7 is the strongest identity [nearly overlapping]). Responses are mean-centered.

*Skepticism* is the sum of a participant’s responses (in Experiment 2) to a series of 30, seven point Likert-scale questions designed by Hurtt (2010) to measure trait skepticism. Higher scores indicate greater trait skepticism. Scores are mean-centered.

*Performance* is the sum of a participant’s number of directionally accurate changes in the current year risk assessment. As there are 15 risk factors, this variable is on a scale from 0 – 15, with higher responses indicative of better performance.

Model 1 is comprised as follows: $\beta_0 + \beta_1 (Depletion) + \beta_2 (Identity) + \beta_3 (Depletion \times Identity)$

Model 2 is comprised as follows: $\beta_0 + \beta_1 (Depletion) + \beta_2 (Skepticism) + \beta_3 (Depletion \times Skepticism)$

† One-tailed p-value for directional prediction. All other p-values are two-tailed.