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Ethical decision-making interrupted:

Can cognitive tools improve decision-making following an interruption?

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Abstract

This study examined the effects of interruptions and the use of cognitive decision-making tools on ethical decision-making. Participants completed a structured cognitive tool, an unstructured decision-making technique, or no decision-making technique, and half of the participants were interrupted during the decision-making task, whereas half were allowed to complete the decision-making task without interruption. Results revealed that 1) participants who completed the structured cognitive tool (ACED-IT map) performed better on a number of markers of ethical decision-making, 2) interruptions reduced participants' plan quality, and 3) participants who were interrupted, and who completed the structured cognitive tool exhibited perceptions that suggested that they felt better prepared to handle the ethical dilemma. These results could have important implications for professionals in jobs that experience frequent interruptions, particularly those in management positions.

KEYWORDS: ethical decision-making, interruptions, cognitive tool, expressive writing

Introduction

Interruptions are often inevitable and occur many times in daily life (Ratwani & Trafton, 2010). Interruptions at work can disrupt progress on tasks and result in costly mistakes (Brumby, Cox, Back, & Gould, 2013; Nicholas & Cohen, 2016). Despite people's attempts to complete both the primary tasks and the secondary, interrupting, tasks (Monk, Trafton, & Boehm-Davis, 2008), interruptions are generally considered to be disruptive and to cause both increased stress and performance decrements (e.g., Lu, Wickens, Prinet, Hutchins, Sarter, & Sebok, 2013; Tams, Thatcher, Grover, & Pak, 2015). With the increased use of technology in work settings, interruptions are only becoming more common. Indeed, some have referred to today's current environment as an "Interruption Age" (Tams, Thatcher, Grover, & Pak, 2015).

Many researchers agree that interruptions are disrupting and can negatively influence behavior and performance on many different types of tasks (Nicholas & Cohen, 2016). Several primary tasks have been examined in the interruption literature, varying in complexity and length of tasks, but few studies have examined the effects of interruptions on decision-making tasks (Nicholas & Cohen, 2016). Furthermore, the effects of interruptions have not been studied in the context of ethical decision-making.

Ethical decision-making is critical for the success of many professionals (Zeni, Buckley, Mumford & Griffith, 2016; Stenmark et al, 2011). Good ethical decision-making is associated with a number of positive outcomes for organizations, including less turnover and more consumer trust (Zeni, Buckley, Mumford & Griffith, 2016). Ethical decision-making is also important because even seemingly minor, "gray", unethical decisions can impact the organization, and result in more serious unethical decisions (Stenmark et al, 2011). Unethical behaviors resulting from unethical decisions can cost organizations billions of dollars each year (Beu, Buckley & Harvey, 2003). Given how important sound ethical decision-

making is for organizations, and given how prevalent interruptions are in everyday life, it is worth examining how interruptions can impact ethical decision-making.

Many occupations, such as managers in almost any field, experience a work day that is fragmented by many interruptions (e.g., Mintzberg 1973; Seshadri & Shapira, 2001). Furthermore, managers must make multiple decisions that involve ethical issues on a regular basis (Stenmark & Mumford, 2011). Thus, the present study examined ethical decision-making in the context of an interruption. More importantly, finding an intervention that can improve ethical decision-making when the decision-maker has been interrupted, would be valuable to employees and organizations. Therefore, the present study also examined different cognitive decision-making tools to determine if they can help to reduce any negative impacts of interruptions on ethical decision-making.

Interruptions

An interruption occurs when there is a break in concentration during a primary task, by a secondary task, and there is an intention to return to the primary task (Katidioti, Borst, & Taagen, 2014; Nicholas & Cohen, 2016). To understand interruptions, the "interruption paradigm", which consists of three distinct phases, has been proposed. The first phase involves the shift in attention from the primary task to the secondary task. In the second phase, individuals decide whether to perform the interrupting task at the same time as the primary task, or to completely shift attention to the interrupting task. The third shift occurs when the interrupting task is completed and the primary task again becomes the main focus (Ratwani & Trafton, 2010).

In addition to the three phases of an interruption there are two lags that occur during the course of an interruption: the interruption lag and the resumption lag (Katidioti, Borst, & Taagen, 2014; Trafton et al., 2003). The interruption lag is the break in time between the interruption and the interrupting task, and the resumption lag occurs after the secondary task is completed, and the primary task is resumed. The time lost during the resumption lag is thought to create errors in task performance,

and switching tasks, even for a short period of time, can have these effects (Katidioti, Borst, & Taagen, 2014). Much of the research on interruptions demonstrates that interruptions are disrupting, and can negatively impact performance and behavior (Nicholas & Cohen, 2016).

Altmann and Trafton's, (2002) memory for goals theory (Katidioti, Borst, & Taagen, 2014; Monk, Trafton, & Boehm-Davis, 2008; Ratwani & Trafton, 2010) describes how interruptions affect cognition. This theory explains how memory is used to retrieve suspended goals. Simply defined, a goal is the thought of completing a task that can involve either mental or physical action. In the case of an interruption, the goal of completing the primary task must be set aside in order to focus on the interrupting task (Altmann & Trafton, 2002). The extent to which that goal can be remembered and retrieved can play a role in the effects of the resumption lag on errors in performance (Katidioti, Borst, & Taagen, 2014.) The longer the "train of thought" is stopped, the more time the memory of the goal has to decay. Train of thought is conceptualized as one's place in the time course sequence that has to be remembered when completing tasks or steps in a sequence (Altmann, Trafton, & Hambrick, 2014). In the time course, decay sets in during the interruption lag, and the goal must be remembered after the resumption lag, and when the primary task is resumed (Katidioti, Borst, & Taagen, 2014.)

The memory for goals framework is important for understanding how interruptions can impact task performance (Monk, Trafton, & Boehm-Davis, 2008). When an interruption occurs, the person must shift focus to the interruption task; when the attention is shifted, the goal of the primary task is suspended and starts to decay. The goal decays faster if the interruption uses the person's cognitive resources, preventing them from rehearsing the goal in their mind (Monk, Trafton, & Boehm-Davis, 2008). In other words, goals suspended for longer periods of time will decay more and become harder to retrieve.

The role of cognitive load in interruptions is not entirely clear. Lodinger and Delucia (2019) manipulated camera views in order to produce different levels of cognitive demands on the participant

in order to influence the resumption lag of a visual motor task. They found that participants who had higher cognitive demands experienced longer resumptions lags after being interrupted. The findings of this study are consistent with memory for goals theory because interruptions that imposed a greater cognitive demand resulted in a longer resumption lag than interrupting tasks with less cognitive demands. The primary task can be more easily remembered if the interrupting task is less cognitively demanding. When a person attempts to hold more information in memory, the cognitive load increases and performance can be impaired (Labonte, Tremblay, & Vachon, 2019). Another study examining the effects of interruptions for dynamic work situations such as driving and air traffic control, however, found that performance on the task did not decrease with increased cognitive load. However the authors speculate that these results may have occurred because the primary task was easy to remember, and if the primary task was more complex or if there was uncertainty in the decision made, the results could be different (Labonte, Tremblay, & Vachon, 2019).

When interruptions occur, errors can increase, and important task objectives can be disregarded or repeated (Brumby, Cox, Back, & Gould, 2013). Indeed, interruptions can negatively affect many aspects of performance. For example, Bailey and Konstan (2006) found that when participants were interrupted while completing computer tasks, they took more time to finish the primary task, made more errors, and became annoyed and anxious, as compared to the participants who were not interrupted.

Interruptions have been shown to result in longer time for task completion, making worse decisions and committing more errors, as well as increasing frustration, annoyance and anxiety (Lee & Duffy, 2014). However, the type of task as well as the type of interruption can influence the extent of the interruptions' effects on performance. Lee and Duffy (2014) compared performance on cognitive tasks (solving math word problems) and skill tasks (copying sentences) following interruptions. They measured performance as time taken to complete the task, and errors made on the tasks. The results

showed that participants were more likely to make errors in skill tasks after experiencing interruptions, and participants were more likely to take more time to complete the tasks in cognitive tasks. Overall results indicated that interruptions affected performance more on cognitive primary tasks than on skill primary tasks, when time was the measurement of performance. However, when wrong answers and typo rates were indicators of performance, skill tasks produced more error rates than cognitive tasks. In other words, those in the skill tasks took less time but produced more errors following an interruption, and those in the cognitive tasks who took more time but produced fewer errors. The memory load and longer resumption and interruption lags were thought to be the cause of taking more time for cognitive tasks while increased cognitive load could be responsible for errors in cognitive tasks. The interruptions for skill tasks were thought to be detrimental because of dividing attention between primary and interruption tasks, as well as from task similarity (Lee & Duffy, 2014).

Interruptions can impact limited working memory and can have an effect on remembering to complete a future task (Mamykina et al., 2017). Depending on the nature and purpose of the interruption, however, an interruption can sometimes be beneficial. An interruption can be beneficial if the purpose of the interruption is to prevent an error or communicate important information (Mamykina et al., 2017). For example, one study examined the nature of interruptions for doctors and nurses working in a clinical setting by classifying and documenting different types of interruptions, their purpose, and how frequently they occurred. In this particular work setting, interruptions occur frequently and are difficult to avoid but often necessary for the job. Frequent interruptions often have negative consequences such as a reduction in quality of patient care. Interruptions were seen as beneficial, however, when patient information needed to be communicated (Mamykina et al., 2017). Another study that classified the role of interruptions in organizational daily life in order to help workers manage their daily activities and time at work (Jett & George, 2003) found that interruptions can have both positive and negative consequences depending on type of interruption and work condition. For

example, an intrusion, an interruption in which a person must expectantly stop his work and attend to the interruption, is mostly seen as negative because it takes time away from the primary task and creates more work responsibilities. However intrusions can be seen as positive if there is an exchange of important information or feedback. In addition breaks can be negative interruptions if they cause the person to procrastinate, but they can also be helpful in relieving stress and fatigue. Overall, it is up to the individual to understand the function and type of interruptions experienced at work (Jett & George, 2003).

Interruptions and Decision-making

Previous studies of interruptions have examined interruptions in a number of different primary tasks, but there is limited research on interruptions on decision-making tasks (Nicholas & Cohen, 2016). The research that exists, however, demonstrates that interruptions during such complex tasks can have negative results. For example, Speier, Valacich, and Vessey (1999) examined decision accuracy and time, and they found that for complex decisions, interruptions results in both less accurate decisions and longer time to make those decisions. Nicolas and Cohen (2016) measured how interruptions influenced performance on a decision-making task with process and outcome measures. They examined how the participants gathered information from the tasks (process) and their overall performance on the tasks (outcome). While interruptions did not affect participants' performance in terms of decision quality, they did influence participants' cognitive processes in making the decision. Specifically, interruptions increased the amount of time and effort participants spent completing the task. Additionally, following the interruption, participants had to partially "restart" the task. Finally, in a study of participants' financial decision-making, Kupor, Liu, and Amir (2018) found that interruptions increased risky decision-making. They attributed an increase in risky decisions to the affective consequences of interruptions. The research on decision-making and interruptions suggests that interruptions are likely to have similar negative consequences on ethical decision-making.

Ethical Decision-making

Generally, ethical decision-making involves moral and legal decisions that the broader society deems acceptable (Beu, Buckley & Harvey, 2003). Also, decisions involving ethical issues can result in significant harmful or beneficial outcomes based on the decision that is made (Zeni, Buckley, Mumford & Griffith, 2016). Ethical decision-making is a complex process that involves a number of complex cognitive processes (Beu, Buckley & Harvey, 2003; Stenmark et al., 2011). First, solving an ethical problem often requires gathering a great deal of information. The information gathering process, however, can be limited by cognitive biases and heuristics (Zeni, Buckley, Mumford & Griffith, 2016). Furthermore, ethical decision-making involves forecasting and sensemaking (Mumford et al., 2006). Forecasting occurs when individuals predict the future outcomes of a problem based on what is observed from the present situation (Stenmark et al., 2011). Forecasting helps with analyzing potential consequences of a decision. Sensemaking involves cognitive processes that are used to understand a situation (Stenmark et al., 2011) and to decide on possible actions (Zeni, Buckley, Mumford & Griffith, 2016). Making an effective decision involves considering many aspects of the problem such as causes, outcomes, and actions (Stenmark et al., 2011). Ethical decision-making also involves self-reflection, looking inward at one's obligations and relationships and similar experiences one has encountered in the past (Antes et al., 2012; Martin et al., 2011; Mumford et al., 2006).

It is important to examine how interruptions can impact ethical decision-making because of how prevalent interruptions are in daily life, and because of the evidence that demonstrates that interruptions can negatively impact behavior, performance, and decisions (Nicholas & Cohen, 2016). It has been demonstrated that interruptions influence cognitive processes including memory and information gathering, which suggests that interruptions are likely to influence ethical decision-making (Monk, Trafton, & Boehm-Davis, 2008; Nicholas & Cohen, 2016). Indeed, the research by Kupor, Liu, and Amir (2018) which demonstrated that interruptions increased risky decisions certainly has direct

implications for how interruptions might influence ethical decision-making; riskier decisions may result in less ethical solutions. Much of the research on interruptions suggests that interruptions negatively impact performance. The research by Nicholas and Cohen (2016), however, indicates that while the cognitive process involved in decision-making was impacted by interruptions, decision performance was not impacted. Therefore, it is unclear how exactly interruptions may influence ethical decisions.

Furthermore, due to the complexity of the ethical decision-making process, both cognitive elements of ethical decision-making and perceptions involved in ethical decision-making were examined in the present study. Specifically, participants' perceptions of moral intensity were measured. Moral intensity refers to the degree of moral imperative in a situation, due to the actual ethical issue (Jones, 1991). Jones indicated that previous models of ethical decision-making neglected to include elements concerning characteristics of the issue, so he developed this model of ethical decision-making that included attributes of the problem situation itself; his model is considered issue-contingent. Jones (1991) argues that moral intensity influences every component of EDM and behavior (including the four components of Rest's (1986) model: awareness, judgment, intention and behavior). Moral intensity, as proposed by Rest, consists of six dimensions. Magnitude of consequences (MC) is an assessment of the total amount of harm resulting from the act in question. Social Consensus (SC) is an evaluation of how likely people are to agree on the ethical/unethical nature of an act. Probability of Effect (PE) is the likelihood that the act in question will actually take place and the probability that the act will cause harm. Temporal Immediacy (TI) is an assessment of how soon outcomes due to the act will take place. Proximity (PX) refers to the extent that the decision-maker feels involved with the people who will be affected by the act. Concentration of Effect (CE) is an evaluation of the magnitude of harm, in relation to the number of people affected (McMahon & Harvey, 2007). Jones suggests that problems with a high degree of moral intensity (e.g., greater MC, greater PE, etc.) are more likely to be recognized as an ethical issue. Furthermore, Jones suggests that high levels of moral intensity are related to better, more

moral/ethical, intentions. Indeed, Singhapakdi, Vitell, and Kraft (1996) found that the dimensions are related to both ethical perception and ethical intentions. Thus, the present study measured participants' perceptions of moral intensity, as these perceptions have been demonstrated to be involved with relevant EDM processes (ethical problem recognition and behavioral intentions). Perceptions that a problem has ethical implications are affected by situational elements of the problem, and whether or not a person perceives a problem to have ethical implications can affect their decisions and behavior (Leitsch, 2004; McMahon & Harvey, 2006; Singhapakdi, Vitell & Kraft, 1996; Sweeney & Costello, 2009). It is possible that interruptions may influence the way a person perceives a problem. Thus, the following research questions are proposed:

RQ1: How will interruptions influence the cognitive processes involved in ethical decision-making?

RQ2: How will interruptions influence the perceptions involved in solving an ethical problem?

The present study sought not only to examine the role that interruptions may play in thinking through an ethical dilemma, but also to examine whether using different cognitive decision-making techniques might help reduce any negative effects of interruptions on ethical decision-making.

Cognitive Tools

Because the negative effects of interruptions is held to be caused by disruptions in memory, and derailed trains of thought caused by the interrupting task (e.g., Altmann & Trafton, 2002; Trafton, Altmann, & Brock, 2005), interventions that help people remember their train of thought in order to more effectively resume their primary task could potentially reduce the negative effects of interruptions. Trafton, Altmann, and Brock (2005) examined how cues in the environment can help people remember their actions prior to an interruption. They found that cues improved how quickly participants were able to resume their primary task following an interruption. Specifically they found that 1) any cue was better than no cue at all, and 2) more specific cues were better than subtle cues.

Research by Bai, Jones, Moss, and Doane (2014) and Drews and Musters (2015) further highlights the importance of memory in performance following an interruption. These researchers concluded that participants with better working memory capacity responded better when interrupted than participants with lower working memory capacity. Additionally, these studies highlighted the importance of using effective strategies in dealing with interruptions. Strategies that help in aiding memory can improve performance following an interruption.

One potential intervention that might help people overcome the obstacles associated with interruptions in decision-making tasks is cognitive tools. Cognitive tools are interventions that help people to think more meaningfully about problems and to generate and consider the implications of plans and forecasts of problem solutions (Kreitler, Stenmark, Rodarte, & DuMond, 2014; Stenmark & Kreitler, 2017). Cognitive tools have been studied in research on decision-making tasks, such as decisions about life changes and ethical decision-making (e.g., Kreitler, 2011; Kreitler, Dansereau, Barth, & Ito, 2009; Kreitler, Stenmark, Rodarte, & DuMond, 2014). These tools, while designed to help people in making more effective decisions, might also help people to retain their train of thought following an interruption in a decision-making task. Cognitive tools have not been studied in an interruption context, therefore the following research questions are proposed:

RQ3: Does the use of a cognitive tool result in post-interruption differences in the cognitive processes involved in ethical decision-making?

RQ4: Does the use of a cognitive tool result in post-interruption differences in the perceptions involved in solving an ethical problem?

Cognitive Techniques

Two cognitive techniques were compared in the present study, along with a non-relevant control task group. One technique (ACED-IT) is highly structured, and the other technique (expressive writing) is highly unstructured. The use of a structured technique and an unstructured technique allows

for the comparison of the cognitive processes involved in the structured tool, as compared to the cognitive processes involved in a more "natural", unstructured technique. Additionally, it is possible that the effect of interruptions on ethical decision-making differs, depending on whether the participants are provided with the structure of a tool such as the ACED-IT, as compared to being allowed to determine on their own how to analyze the problem, as is the case with expressive writing.

ACED-IT. This tool is a structured map (Kreitler et al., 2009; 2012; 2012; 2014) in which participants fill in the blanks eliciting specific information related to the problem currently being solved (see Figure 1). ACED-IT stands for Assess, Create, Evaluate, Decide, Implement, and Test. ACED-IT was developed based on theories of ethical decision stages (Toren & Wagner, 2010; Robbins & Judge, 2007) and multiple perspective taking (Atha-Weldon & Dansereau, 2006; Hall & Davis, 2007). The stages of ethical decision-making that are covered by the ACED-IT are defining the issue, generating options, evaluating the options, selecting the best option, and acting on the decision (Robbins & Judge, 2007). Additional perspectives on the problem are integrated by incorporating a "Decision Team", by which students imagine and consider the advice of familiar people (Atha-Weldon & Dansereau, 2006), in order to generate potential solutions to the problem. Then, participants evaluate the solutions that they generated based on common ethical perspectives, including Virtue, Rights, Justice/Fairness, Common Good, and Utilitarian (Velasquez et al., 1988). After evaluating the potential solutions, participants select one. Last, participants turn to the back of the form and describe the decision they would make, including the steps needed to implement the solution, potential barriers to implementation, and solutions to the barriers. Then they forecast how the situation would unfold following implementation of the decision.

Expressive writing. Expressive writing has been examined as a therapeutic method for people to examine their thoughts and feelings about personal events they have experienced (Pennebaker, 1997). While expressive writing as a therapeutic technique has been around for over 20 years, it has only recently been examined with regard to its potential use as an intervention to aid in ethical decision-

making. In recent research examining expressive writing in a decision-making context, Kreitler, Repasky, Travis, Dansereau, and Barth (2012) found that expressive writing can help people to make decisions, and it could even have some advantages over the structured ACED-IT map with regard to decision-making. Additionally, this, less structured technique may exhibit different results with regard to helping people recover their decision-making task following an interruption, which would not be found with the use of a more structured task.

Method

The present study adapted the methodology and measurement from a previous study of ethical decision-making (Stenmark & Kreitler, 2019).

Participants

One hundred and three undergraduate university students (69 females, 34 males; average age=20.26, SD=4.37) from a mid-sized public university in the southwest participated. Participants volunteered for this research as an optional means of fulfilling a course requirement or to receive extra credit for a class.

Materials

ACED-IT. The ACED-IT form is a structured decision-making map (Kreitler et al., 2009; 2012; 2012; 2014) that uses a graphic structure which participants use to organization information that they think about as they work through a problem (see Figure 1). To begin, participants are prompted to describe the problem situation, practical issues at play in the situation, and individuals who may be impacted by the problem. Participants also use the space on the front of the ACED-IT form to identify people in their own lives that they would ask for advice in the situation; this is called a “decision team”. Once the decision team has been organized, participants imagine the advice they would receive from the decision team to generate up to six possible solutions to the problem. Next participants evaluate each potential solution on a scale of 0 to 3 (0 = not at all, 3 = very much so), based on ethical criteria

(e.g., “It protects the rights of those involved”). Participants are instructed to exclude solutions with the lower scores and consider the solutions that are rated the highest. Once the participants select the solution that they have deemed as optimal, they continue to the back side of the form to think through the steps that would be involved with implementing the solution.

Expressive writing. The expressive writing task involved participants’ writing out their thoughts about the problem situation. Participants received a sheet of paper, and they were directed to write about the problem for at least 15 minutes. The specific directions provided to participants were as follows, adapted from Pennebaker (1997) and Kreitler and colleagues (2012):

> Please use the space below to write your thoughts about the problem. You should write for at least 15 minutes.

Non-relevant comparison task. Participants who completed no cognitive decision-making technique instead completed a subset of questions from a planning skills questionnaire (Mumford & colleagues, unpublished). This measure was chosen because it is similar in cognitive complexity to the decision-making techniques in the other conditions, but it does not involve actually thinking about the experimental task’s problem scenario. A description of the measure can be found in Osburn and Mumford (2006) and Marta, Leritz, and Mumford (2005). To complete the planning skills questionnaire, participants must respond to questions over a series of vignettes. The present study used a subset of the measure which covered two vignettes in which organizations are responding to difficulties. Each vignette is followed by five multiple choice questions about elements of the problem situation, such as the causes of the problem and the restrictions faced by the organization in addressing the problem. Participants select the response option that they consider to be the most applicable to the problem situation. They select up to four response options from a set of eight options. Example questions include, “What were the key factors in Chili’s success during economic uncertainty?”.

Measurement

Manipulation Check. In order to determine if the interruption manipulation resulted in participants' perceiving that they were interrupted in the decision-making task, participants answered 2 questions regarding interruptions. These questions were, "To what extent did you notice an interruption of the main decision-making task?" and "If you were interrupted, to what extent were you bothered by the interruption in the main decision-making task?". These 2 questions were separated by other questions in the demographic questionnaire, so that they would be considered separately, and participants would not just automatically answer the same to both questions. Participants rated these questions on a scale from 1 (Not at all) to 5 (Very much so). Participants' ratings on these two questions were averaged in order to serve as their manipulation check score.

Moral Intensity. Participants' perceptions of ethical situations was measured using the 9-item Perceived Moral Intensity Scales (PMIS) adapted from Sweeney and Costello (2009). The PMIS measures participants' perceptions of the moral intensity of a separate problem scenario, containing a business dilemma. The scenario culminates in the main character behaving in an ethically uncertain way. Participants read through the scenario and rated questions regarding the existence of the dimensions of moral intensity on a scale of 1 (strongly disagree) to 7 (strongly agree; e.g., Most people would agree that Tom's action is wrong). Each item on the PMIS scale represents one of the 6 dimensions of moral intensity (Jones, 1991): magnitude of consequences, social consensus, probability of effect, temporal immediacy, proximity, and concentration of effect. Additionally, the PMIS scale contains one item each for the following three dimensions: ethical dilemma identification, ethical judgment, and ethical intentions. The PMIS scenario that was used in this study involves the main character having questions about prohibited expenses on a coworker's expense reports. He contemplates telling the company Audit Committee about the expenses. The questionable action described at the end is that the main character does not report the expense to the committee. For the full scenario, see Sweeney and Costello (2009).

Experimental Task

Decision-making task stimulus scenario. The stimulus scenario that all participants completed was developed by the first author. It was originally one of a set of eight ethical problems facing a hypothetical leader in a hypothetical technology firm. The problems were originally designed to address each of four primary domains of research misconduct, as identified by Mumford, et al. (2006): data management, study conduct, business practice, and professional practices. The original study contained two problems for each of the four domains (Stenmark et al., 2011). Subsequent studies examined one problem from each domain (Stenmark, 2013), and other studies by the authors have examined only one problem, in order to minimize participant fatigue, as participants in the ACED-IT condition must fill out a lengthy form for each problem (Stenmark & Kreitler, 2017). The single problem scenario that was selected was the problem that was found to be most engaging by participants, as exhibited by the engagement of their responses to the problems. This problem is reflective of the data management dimension of research misconduct, as that is the domain that undergraduate students have the most experience with and best understanding of (see Appendix for the decision scenario). Participants in the ACED-IT group tend to take about 15 minutes, on average, to consider and make their final decision by completing the ACED-IT form. This is equivalent to the amount of time the expressive writing participants write about the problem and make their decision, and the amount of time that participants in the non-relevant task take to complete the non-relevant task and describe their final decision.

Content-Coding. Following the completion of their respective cognitive technique (or comparison task), all participants were prompted to write about their decisions regarding the primary decision scenario. Participants were first asked what decision they would make and why. This field was coded for ethicality. Next, participants were asked to describe 1) the steps that would be required to implement the decision solution, 2) what problems could be faced when implementing the decision, and 3) solutions to any potential problems. These fields were coded for plan quality. Finally, participants

were asked to predict the potential consequences of decision implementation. This field was coded for forecast quality. Four Masters students in I/O psychology evaluated the written information supplied by participants as they solved the problem. The judges participated in a 10-hour frame-of-reference content-coding training program before completing the content-coding task. Interrater reliabilities for plan quality, forecast quality, and ethicality were .80, .79, and .92, respectively.

Decision ethicality was coded based on participants' descriptions of their preferred solution and why they proposed that solution. Ethicality was defined based on the presence of three markers of ethicality in participants' responses: 1) regard for the welfare of others, 2) attendance to personal responsibilities, and 3) adherence to/knowledge of social obligations. Regard for the welfare of others involved decisions reflecting the consideration of the well-being of other people, such as benefitting others, even at the expense of personal welfare. Attendance to personal responsibilities involved decisions which indicated participants were acting in a way that is responsible, and acknowledging the effects of their actions, while avoiding bias. Finally, adherence to/knowledge of social obligations involved decisions which acknowledged the role of cultural norms and standards, while also respecting rules and guidelines for their social role in the scenario. Coders considered these three markers in order to make the ethicality judgment. The interrater reliability for ethicality was .85.

Plan quality was coded based on the subdimensions of detail, complexity, and criticality of the information participants wrote about the steps, problems, and solutions involved in decision implementation, on a scale of 1 (low) to 5 (high). Detail, complexity, and criticality were averaged in order to form the overall dimension of plan quality. These subdimension definitions were adapted from previous research on ethical decision-making (Stenmark et al., 2010; 2011; 2013). Detail involved how comprehensive participants were in discussing the elements of the problem situation. Complexity involved whether participants' responses were reflective of multifaceted, related elements of the problem. Criticality involved whether participants' responses considered the most significant elements

of the problem situation. The interrater reliabilities for detail, complexity, and criticality of the plans were .80, .80, and .79, respectively. These subdimensions' intercorrelations ranged from .81 to .91, which confirms that averaging them to form one overall dimension of plan quality was appropriate.

Forecast quality was coded based on the response material in which participants predicted the potential consequences of decision implementation. As with plan quality, forecast quality was an aggregation of ratings of forecast detail, complexity, and criticality of the information in this response field. Detail, complexity, and criticality were defined with the same parameters as described previously in the definitions of these subdimensions for the plan response fields. Intercorrelations among the subdimensions ranged from.77 to .89, thus averaging them to form one overall dimension of forecast quality was appropriate. The interrater reliabilities found for forecast detail, complexity, and criticality were .78, .80, and .78, respectively.

Procedure

Each participant was randomly assigned to one of three different groups: ACED-IT (n=35), Expressive Writing (n=35), and a Control group (n= 33). The study was conducted in a lab setting with up to 6 participants at a time. Participants were instructed to sit at desk and follow the instructions on the computer. After signing an informed consent form, all participants read about a problem in a vignette. The vignette, which has been used in previous research on ethical decision-making (e.g., Stenmark, et al., 2011; Stenmark, 2013), details a business dilemma intended to be representative of dilemmas experienced in the workplace. Specifically, the participant is asked to play the role of a manager in a hypothetical technology firm that is developing a new mobile device. Participants received a hypothetical email from one of the other characters in the organization, which details a problem with the data from testing the new mobile device, called the Platinum.

Participants in the ACED-IT condition were instructed to complete the map as if they were in the main character's position in the vignette. Participants in the expressive writing condition were

instructed to write their thoughts about the problem for at least 15 minutes. Participants in the control condition completed an unrelated questionnaire after reading the problem in the vignette.

Half of the participants experienced an interruption (n = 51), and half did not experience an interruption (n = 52). For the non-interruption group, participants were able to perform the experimental or control task without the interruption task being introduced at all. Ten minutes into completion of the experimental task, all participants in the interruption group were instructed to stop what they were doing, regardless of the status of the progress on the primary task they were currently engaged in. They were then given two pages of simple multiplication problems to work on, and not told how long this task would last. After five minutes, the participants were instructed to stop working on the math problems. Their worksheets were then taken up, and they were instructed to continue working on the original task they were assigned prior to the math exercise. After completing their respective tasks, participants completed the measure of perceived moral intensity, followed by demographic and post-task questionnaires. See Figure 2 for a graphic depiction of order of activities and the design of the manipulations.

Results

Manipulation Check

Responses to the manipulation check questions were compared for participants in the interruption and no interruption conditions. Results indicated that participants in the interruption condition ($M = 4.57$, $SD = 1.91$) expressed that they noticed and were significantly affected by the interruption ($t = 2.94$, $p < .01$), as compared to participants in the no interruption condition ($M = 3.44$, $SD = 1.97$). This indicates that the manipulation did, indeed, have the intended result; participants who experienced an interruption noticed it and perceived that they were affected by it.

Content-Coded Dimensions

The examination of the cognitive processes involved in ethical decision-making was our primary focus in this project. A 3 (ACED-IT vs. Expressive Writing vs. Control) x 2 (Interruption vs. No Interruption) MANOVA was conducted on the content-coded dimensions (see Table 1) in order to examine Research Questions 1 and 3. The multivariate test revealed a significant main effect for cognitive technique, ($F (14, 180) = 2.23$, $p < .05$), while the multivariate effects for interruption and the interaction were not significant ($F (7, 89) = 1.27$, $p > .05$, and $F (14, 178) = .89$, $p > .05$, respectively). Significant univariate main effects for cognitive technique were obtained for Number of Steps Identified ($F (2, 96) = 6.26$, $p < .01$), Number of Problems Identified ($F (2, 96) = 7.68$, $p < .01$), and Plan Quality ($F (2, 96) = 6.69$, $p < .02$). Number of Solutions Identified approached significance ($F (2, 96) = 2.87$), $p = .06$; see Table 2). A significant univariate main effect for interruption was obtained for plan quality ($F (2, 96) = 6.29$, $p < .05$), such that participants who were interrupted ($M = 2.28$, $SD = .01$) had significantly worse plans than participants who were not interrupted ($M = 2.60$, $SD = .01$; see Table 3).

LSD post hoc tests revealed that there were significant differences among the cognitive technique groups in terms of the number of steps identified, number of problems identified, number of solutions identified, and plan quality. The ACED-IT group identified significantly more steps to implementing the problem ($M = 2.64$, $SD = .15$) than the control group ($M = 1.88$, $SD = .15$). The ACED-IT group identified significantly more problems, or barriers to solution implementation ($M = 2.62$, $SD = .14$) than the expressive writing group ($M = 2.09$, $SD = .14$) and the control group ($M = 1.89$, $SD = .14$). The ACED-IT group identified significantly more solutions to the barriers to implementation ($M = 2.20$, $SD = .13$) than the expressive writing group ($M = 1.80$, $SD = .14$) and the control group ($M = 1.80$, $SD = .14$). Finally, the ACED-IT group's plans ($M = 2.66$, $SD = .11$) and the expressive writing group's plans ($M = 2.52$, $SD = .11$) were rated as significantly higher quality than the control group's plans ($M = 2.13$, $SD = .11$).

PMIS Dimensions

The examination of the perceptions of ethical problems was a more exploratory avenue of investigation in this project. A 3 (ACED-IT vs. Expressive Writing vs. Control) x 2 (Interruption vs. No Interruption) MANOVA was conducted on the dimensions of the PMIS instrument: ethical dilemma identification, ethical judgement, ethical intentions, magnitude of consequences, social consequences, probability of effect, temporal immediacy, proximity, and concentration of effects (see Table 4) in order to examine Research Questions 2 and 4. The multivariate tests for cognitive technique, interruption, and the interaction were not significant ($F (18, 176) = .95$, $p > .05$; $F (9, 88) = .85$, $p > .05$; and $F (18, 176) = 1.11$, $p > .05$, respectively).

Because of the exploratory nature of the investigation of the perceptions involved in ethical dilemmas, univariate results were examined to determine if there are any areas worthy of follow-up in future research. Indeed, the univariate results revealed some significant findings. For cognitive technique, the identification of the ethical dilemma was significant, $F (2, 102) = 3.09$, $p = .05$, such that participants in the expressive writing condition were most likely to identify the problem situation as having ethical implications (See Table 5).

For the interaction between cognitive technique and interruption, magnitude of consequences was significant, $F (2, 102) = 3.67$, $p < .05$, such that participants in the ACED-IT group who experienced an interruption perceived the greatest magnitude of consequences ($M = 2.53$, $SD = .36$), while participants in the control group, who did not experience an interruption, perceived the least magnitude of consequences ($M = 3.63$, $SD = .37$; this variable is reverse-scored). Additionally, for the interaction, temporal immediacy was significant, $F (2, 102) = 3.57$, $p < .05$, such that participants in the ACED-IT group who experienced an interruption perceived the greatest temporal immediacy ($M = 2.47$, $SD = .34$), but participants in the expressive writing group who experienced an interruption perceived the least temporal immediacy ($M = 3.69$, $SD = .35$; this variable is reverse-scored; See Table 6). See Table 7 for the

group means and standard deviations. See Table 8 for a correlation matrix demonstrating the relationships among the DVs.

Discussion

The present study examined the potential effects of interruptions and different cognitive decision-making techniques on ethical decision-making. The findings of the present study have implications for understanding the dynamics of interruptions and the implementation of cognitive tools designed to improve ethical decision-making. Based on the results of this study, we can conclude that cognitive techniques, interruptions, and the interaction of cognitive techniques with interruptions, may affect the way people think about ethical problems.

First, participants who completed a cognitive technique to aid in decision-making did, indeed, engage in better decision-making processes, including identifying more steps involved to solve the problem, more barriers to implementing the solution, more solutions to those barriers, and generating better-quality plans. For most of these outcomes, the ACED-IT group was superior to both the expressive writing group and the control group. For some outcomes, both the ACED-IT group and the expressive writing group were superior to the control group, who did not complete any sort of cognitive technique. These results are consistent with previous research that has demonstrated that using some sort of cognitive tool (in particular, the ACED-IT map) is an effective intervention for improving decision-making processes (e.g., Kreitler, Stenmark, DuMond, & Rodarte, 2014; Stenmark & Kreitler, 2017).

Additionally, the findings of the present study indicated that interruptions did not have an effect on the overall quality of the forecasts or ethicality of the decisions. This could be due to limitations of the study. For example, it is possible that the artificial nature of a laboratory study is not sensitive enough to detect differences in the quality of the decisions being made by participants who are interrupted, as compared to those who are not interrupted. Real-world decisions with actual consequences for decision-makers may be more likely to be negatively impacted by interruptions. The

non-significant results on these cognitive outcomes involved in ethical decision-making, however, are consistent with the findings of Nicholas and Cohen (2016). In their study, the *outcomes* of decisions were not influenced by interruptions. The *process*, however, that participants used to make decisions, was negatively influenced by interruptions.

The findings on forecast quality and decision ethicality should be further explored in future research, however, in light of the univariate findings that interruptions did have an effect on the quality of participants' plans as they worked through the ethical dilemma. An examination of the components of plan quality (plan detail, complexity, and criticality), indicate that the differences were driven by differences in detail and complexity, but not criticality. Thus, participants who were interrupted had plans that were less detailed and less complex, but the criticality of the elements participants identified did not seem to be affected by an interruption. This finding is consistent with Nicholas and Cohen's (2016) finding that participants used less information in making their decisions when they were interrupted. The present findings that participants' perceptions of the ethical dilemma were influenced by interruptions, whereas the quality of the overall decision was not, also makes sense in light of that research.

Indeed, a number of differences among groups in the dimensions of perceptions of moral intensity were observed. With respect to the cognitive technique used to work through the ethical problem, ethical identification was highest in participants who completed the expressive writing task, as compared to the participants who completed the ACED-IT map or participants in the control group, regardless of interruptions. This means that participants who engaged in expressive writing were the most likely to recognize the ethical implications of the problem situation. This finding could reflect the idea that being able to structure your thoughts, as you process an ethical problem, as opposed to being compelled to organize your thoughts onto a pre-existing structure, may be more beneficial in allowing people to recognize the ethical implications of a problem.

Expressive writing has been studied extensively as a therapeutic technique (see Travagin, Margola, & Revenson, 2015 for a recent meta-analysis). It has been studied much less frequently in terms of decision-making tool. Research that has examined expressive writing as a decision-making tool, however, has demonstrated that the technique can aid decision-making (Kreitler, Repasky, Travis, Dansereau, & Barth, 2012). Research on expressive writing as a therapy tool can help inform why expressive writing might help people make decisions. There are a number of theories which have been proposed to explain how expressive writing helps people in therapy, including cognitive-processing theory. Cognitive-processing theory is said to play a role in expressive writing as people are able to examine a problem situation and appraise important elements, such as causes and effects, in order to help them to appraise the situation and solve problems (Frattaroli, 2006). Expressive writing allows the participants to make sense of a problem situation and determine how it fits in with their self-schema. Thus, in the present study, expressive writing process, in particular, likely resulted in an increase in ethical identification because it allowed participants to focus their thoughts on the problem elements that were most salient to them, thus they had a more personally vested interest in the decision-making process. That personal interest may have helped them to see the ethical implications of the problem.

Ethical decision-making is a complex cognitive processes, which involves several key strategies and subprocesses (Mumford et al., 2006). Decision-makers must identify a number of important elements of the problem situation in order to develop an effective and ethical solution to the problem, including the causes of the problem, the consequences of potential solution implementation, the people who will be affected by the problem, and the goals at play (Stenmark, 2013; Stenmark et al., 2011, Thiel et al., 2013). Thus, any decision-making technique that allows the decision-maker to think through the problem situation thoroughly is likely to aid the decision process and allow the decision-maker to recognize the ethical implications of the situation.

With respect to the interaction between cognitive technique and interruptions, participants in the highly structured ACED-IT group, who experienced an interruption, perceived the highest magnitude of consequences, while those in the control group, who did not experience an interruption, perceived the lowest magnitude of consequences. Magnitude of consequences is defined as the amount of harm (or benefits) befalling the victims of the moral dilemma in question. Therefore, participants who were interrupted, who completed the ACED-IT map, perceived the greatest potential harm as occurring. This finding is consistent with past research on the ACED-IT map has demonstrated that participants who complete the ACED-IT experience greater perceptions of harm in an ethical situation (e.g., Kreitler, Stenmark, DuMond, Rodarte, 2014). The present study, however, examined the effects of the ACED-IT map in the context of an interruption, and it was those participants, who both completed the ACED-IT *and* experienced an interruption, whose perceptions of the magnitude of consequences was increased. It may be that participants in the ACED-IT condition who were interrupted were better able to retain their train of thought following the interruption, and thus they were able to think through the problem more thoroughly than participants in the other groups, and therefore recognize the potential harm resulting from the ethical situation.

Additionally, with respect to the interaction between cognitive technique and interruptions, participants in the ACED-IT group who experienced an interruption perceived the greatest temporal immediacy while participants in the expressive writing group who experienced an interruption perceived the least temporal immediacy. Temporal immediacy is defined as the length of time between the present and the onset of consequences of the act in question. Thus, participants who completed the structured ACED-IT map, who experienced an interruption, perceived consequences as occurring sooner than any other group; while those in the unstructured writing group that were interrupted perceived consequences to be the furthest away in time.

With regard to both of these significant interactions, the ACED-IT map very likely served as a cue to help participants remember their place in the decision-making process, which could aid their ethical decision-making. Trafton, Altmann, and Brock (2005) emphasized the value of cues in resuming a task following an interruption. The ACED-IT participants who were interrupted may also have slightly repeated some of their ACED-IT processing, following the interruption. Nicholas and Cohen (2016) noted this occurrence during interruptions of decision-making tasks. In this study, repeating some of their pre-interruption processing could have resulted in an increase in sensitivity to the potential harms and time constraints at play in an ethical dilemma. While the expressive writing task would be likely to serve as a memory cue to the problem-solving process following an interruption, the structure of the ACED-IT map makes it a more specific memory cue, and while any cue is helpful in aiding memory following an interruption, a specific memory cue is superior (Trafton, Altmann, & Brock, 2005); this could explain why the ACED-IT resulted in more sensitivity to ethical issues in the present study.

Finally, with regard to the expressive writing group's perceptions of temporal immediacy being the furthest away in time, research by Brumby, Cox, Back, and Gould (2013) might inform this occurrence. They studied trade-offs that participants make in determining how long to spend recovering and resuming a task following an interruption. They determined that when participants perceived high costs associated with making errors, they took longer to resume the task, following an interruption. While the temporal immediacy dimension is not an exact analog to resuming a task following an interruption, it is possible that participants in the expressive writing condition who were interrupted may have felt that more time was needed to reflect on the situation, and thus they perceived the consequences as happening further in the hypothetical future, in order to allow themselves more time for reflection, in order to avoid the costs of making a decision-making error. Indeed, Nicholas and Cohen (2016) determined that an interruption in a decision-making task resulted in participants' requiring more time in order to make a decision.

Additionally, expressive writing as a technique provides people with a way to confront their emotions, thoughts, and feelings in a safe way, and they can go back and self-reflect later to allow for the recovery of the emotions before resolving the issue (Lepore, 1997). Expressive writing allows for people to reflect on life-altering experiences, emotions, and intrusive thoughts (Craft, Davis, & Paulson, 2013; Lepore, 1997). This "safe space" provided by expressive writing is likely to allow people write about a potentially upsetting event in an ethical dilemma and to work through the problem in a cognitive environment without the risk of failure that comes with future action. It is possible that this dynamic within expressive writing allows the participant to feel as if they have more time to solve the problem.

Limitations of this Study

First, the task involved in this study was a low-fidelity simulation of a complex and realistic ethical problem. Past research (e.g., Dailey & Mumford, 2005; Marcy & Mumford, 2007) suggests that tasks such as this engage student participants and are perceived as relevant. However, studying the effects of interruptions and cognitive decision-making tools in real-world settings should be undertaken in order to determine the generalizability of this study's findings. A related limitation is that college students comprised the sample for this study. It is likely that young adults use similar cognitive processes during ethical decision-making as older adults, however, future studies would do well to study these issues in older adults, using actual problems they face in their jobs. In addition, another limitation that could influence the generalizability of the study is that only one ethical decision making task was presented. Future studies could present participants with more tasks in order to increase the generalizability of the findings.

Furthermore, real world interruptions could be related to other parts of the job. The interruption in the present study presented a task that was independent of the ethical dilemma. Future studies could examine interruptions related to the ethical decision-making task and compare the effects

of related and unrelated interruptions on attention and processing. Third, in the present study all the participants were interrupted at the same time during the task. Bailey and Konstan (2006) examined the question of the timing of an interruption by using interruptions that occurred either during or between the primary tasks. They found that interruptions were more disruptive when participants were interrupted during the primary task than when they were between primary tasks. Additionally, when a person is close to achieving the primary tasks to complete the goal, they are less likely to be influenced by an interruption (Jhang, & Lynch, 2014). Thus, future studies should vary time on the task before the interruption because the point at which an interruption occurs during the task can produce different outcomes on decision-making.

Additionally, the lack of a significant multivariate main effect could be due to low power in the study. While sample sizes were adequate, a more powerful procedure could help illuminate the univariate findings obtained in the present study. For example, using a real-world task with real consequences could make the interruption more salient and the manipulation more powerful. Examining the significant results at the univariate level in this study, however, can be meaningful, as these results can provide information about valuable areas for future research. While it is possible that the task used in the study was not immersive enough to result in a significant effect of interruptions on the cognitive processes involved in ethical decision-making, it is also possible that interruptions may, in fact, not affect some of cognitive processes involved in ethical decision-making. If that is, indeed, the case, that could be good news for people in jobs that experience a lot of interruptions. Future research should examine this issue more in order to determine what tasks and processes interruptions affect and what they do not affect.

Moreover, there are a few methodological limitations of the present study, that should also be noted. First, the comparison task, as a task unrelated to the main decision-making task, could be interpreted as an interruption. Future studies of this phenomenon should include a true control group

with no cognitive tool and no interruption to address this limitation. A related limitation regards the time participants spent on the decision-making task. Participants spent 15 minutes on the decision-making task, but it is possible that their decisions were made before those 15 minutes had elapsed. Thus, participants who were "interrupted" after 10 minutes on task may not have had their decision-making process interrupted at all. This could potentially explain the limited effects of the interruption. Finally, the present study compared one structured cognitive tool and one unstructured cognitive technique. While only one example of each was included, the findings comparing the two techniques will help to inform future research on and development of decision-making tools and interventions.

Additionally, neither intelligence nor expertise were examined in the present study. The authors have measured intelligence in previous, similar studies of ethical decision-making (e.g., Stenmark et al., 2010), but intelligence has not correlated with the DVs in this past research, therefore, intelligence was not measured here. A related variable, expertise, might be of value for future research examining ethical decision-making an interruptions. Given previous research on the role of self-efficacy in recovering from an interruption (Tams, Thatcher, & Grover, 2018; Tams, Thatcher, Grover, & Pak, 2015), the amount of experience or expertise that a person has in a task may very well relate to how well the person can remember his or her place in the task and resume working on the task seamlessly following an interruption.

Practical Implications and Future Directions

The present study has a number of practical implications. First, findings from the present study and previous research on the ACED-IT map demonstrated that it is an effective tool for aiding ethical decision-making (e.g., Kreitler, Stenmark, DuMond, & Rodarte, 2014). The results of the present study indicate that decision-making tools, such as the ACED-IT map and expressive writing, may not only help people to make better decisions, but such tools may also serve as effective cues to help people regain their train of thought if they are interrupted during the course of making a decision (Trafton, Almann, &

Brock, 2005). Therefore, providing instruction on such tools, and providing access to specific tools, such as the ACED-IT map, could be part of effective organizational interventions to improve both ethical decision-making and to aid employees who experience frequent interruptions. Such an intervention might be especially helpful in training programs targeting managers in organizations. Managers' work is often fragmented and based on responding to events as they occur; thus managers experience frequent interruptions (e.g., Mintzberg 1973). Seshadri and Shapira (2001) proposed a number of ways that managers deal with the many interruptions they face in a given workday. In particular, they noted the importance of how managers allocate their attention as they solve multiple problems throughout the day. Cognitive tools, such as the ACED-IT map would be likely to help managers to direct their attention to the most critical aspects of an ethical problem, even in the event of an interruption during the decision-making process.

Indeed, the present research could provide guidance and recommendations for managers and other people who experience interruptions in the course of their daily work. Both expressive writing and the ACED-IT form had beneficial effects that mitigated the negative effects of interruptions. Thus, it appears that systematic analysis of the problem can be an important practice for people to engage in, in order to help them keep their train of thought and remember their place as they work through ethical problems. More specifically, the results of this study suggest that people should work through their ethical problems using such systematic analysis before taking action, in order to improve their chances of making the best decision. Indeed, if a person knows that they have some tough decisions to make, the findings of this study indicate that they should use a systematic decision-making technique to aid the process. Both of the techniques examined in this study involve writing about a problem. Writing in and of itself can be a way to problem solve (Flower & Hayes, 1977). Writing is an intellectual performance that is highly goal-oriented (Flower & Hayes, 1977). Writing is a way to get thoughts out

and onto paper and allows us the space to help us find a new idea or concept, or to find a solution (Flower & Hayes, 1977; Lepore, 1997).

Whether a person benefits more from using the expressive writing technique or from the ACED-IT form may vary based on personality and other contextual variables like time constraints. For example, there is evidence that extraverts respond more favorably to the ACED-IT than introverts (Kreitler, Dansereau, Barth, & Ito, 2014). Additionally, when people have more time to think through a problem, they may benefit more from the more open-ended expressive writing technique than the ACED-IT. Future studies should examine the contexts that are best suited to the use of these systematic techniques and how to maximize their beneficial effects.

In addition to examining cognitive tools and interruptions in real-world ethical decision-making contexts, as mentioned earlier, future research should also examine other variables that might be at play in the dynamics of the ethical decision-making process. For example, one way that cognitive tools may improve ethical decision-making could be through their effects on self-efficacy. Indeed, research by Stenmark, Miller, Redfearn, and Kreitler (unpublished manuscript) indicates that the ACED-IT map could moderate negative effects of threats to self-efficacy. Such effects on self-efficacy of cognitive tools would also be relevant in the context of interruptions. Conard and Marsh (2016) determined that participants' self-efficacy on a task was more predictive of their performance than whether or not they were interrupted, suggesting that self-efficacy can serve as a barrier to reductions in performance due to interruptions. Other research by Tams and colleagues (Tams, Thatcher, & Grover, 2018; Tams, Thatcher, Grover, & Pak, 2015) indicates that self-efficacy can reduce the negative impact of interruptions on performance.

Finally, while the present study was not designed to examine Haidt's Social Intuitionist theory of moral judgment and Greene's rebuttal of that theory (e.g., Paxton, Ugar, & Greene, 2012), it is possible that similar studies could examine this issue and help inform the dynamics of moral judgment. Thus,

future studies could use methodologies similar to the present study to inform the debate on how (or, indeed, whether) cognitive processes are involved in moral judgment.

In conclusion, the results of this study suggest that when participants are utilizing a cognitive tool, such as the ACED-IT, their decision-making process is not entirely derailed by an interruption, and they may even exhibit higher confidence in their ability to face the problem than individuals who are not interrupted, or who are using a different decision-making approach. In a world full of ethical dilemmas, it is crucial to understand how individuals process ethical decisions and how additional factors impact the decision-making process, especially in the workplace. Understanding what leads to the most ethical decision can lead to the most desirable and acceptable outcomes.

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Table 1

3 (Cognitive Technique) x 2 (Interruption) Multiple Analysis of Variance for Content-Coded Dimensions

Effect	*df*	*F*	*p*	*Partial η2*
Cognitive Technique	14	2.23**	.01	.15
Interruption	7	1.27	.28	.09
Cognitive Technique x Interruption	14	.74	.73	.06

*Note: ** p < .01*

Table 2

Univariate Effects of Cognitive Technique on Content-Coded Dimensions

Source	*df*	*F*	*P*	*Partial η2*
Number of Steps Identified	2	6.26	.00	.12
Number of Problems Identified	2	7.68	.00	.14
Number of Solutions Identified	2	2.87	.06	.06
Number of Consequences Identified	2	1.09	.34	.02
Ethicality	2	1.30	.28	.03
Forecast Quality	2	1.06	.35	.02
Plan Quality	2	6.69	.00	.12
Wilks' Lambda	14	2.23*	.01	.15

*Note: * p < .05*

Table 3

Univariate Effects of Interruption on Content-Coded Dimensions

Source	*df*	*F*	*P*	*Partial η2*
Number of Steps Identified	1	.00	.99	.00
Number of Problems Identified	1	.18	.67	.00
Number of Solutions Identified	1	1.80	.18	.02
Number of Consequences Identified	1	.04	.85	.00
Ethicality	1	.23	.63	.00
Forecast Quality	1	.12	.73	.00
Plan Quality	1	5.56*	.02	.06
Wilks' Lambda	7	1.26	.59	.09

*Note: * p < .05*

Table 4

3 (Cognitive Technique) x 2 (Interruption) Multiple Analysis of Variance for PMIS Dimensions

Effect	*df*	*F*	*p*	*Partial η2*
Cognitive Technique	18	.95	.52	.09
Interruptions	9	.85	.57	.08
Cognitive Technique x Interruption	18	1.11	.35	.10

*Note: * p < .05*

Table 5

Univariate Effects of Cognitive Technique on PMIS Dimensions

Dimension	*df*	*F*	*p*	*Partial η2*
Identification of an Ethical Dilemma	2	3.09*	.05	.06
Ethical Judgment	2	1.25	.83	.03
Ethical Intentions	2	.01	.99	.00
Magnitude of Consequences	2	2.68	.07	.05
Social Consensus	2	.13	.88	.00
Probability of Effect	2	.29	.75	.01
Temporal Immediacy	2	.68	.51	.01
Proximity	2	.42	.66	.01
Concentration of Effects	2	.04	.97	.00
Wilkes' Lambda	18	.95	.52	.09

*Note: * $p < .05$*

Table 6

Univariate Effects of Cognitive Technique x Interruption on PMIS Dimensions

Dimension	*df*	*F*	*p*	*Partial η2*
Identification of an Ethical Dilemma	2	.15	.86	.00
Ethical Judgment	2	.18	.83	.00
Ethical Intentions	2	1.81	.17	.04
Magnitude of Consequences	2	3.67*	.03	.07
Social Consensus	2	.67	.51	.01
Probability of Effect	2	1.63	.20	.03
Temporal Immediacy	2	3.57*	.03	.07
Proximity	2	2.16	.12	.04
Concentration of Effects	2	1.37	.26	.03
Wilkes' Lambda	18	1.11	.35	.10

*Note: * $p < .05$*

Table 7

Correlations among DVs

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1. Identification of an Ethical Dilemma		-.11	-.01	-.25*	-.19	-.04	-.10	-.07	-.10	.05	-.08	.18	.02	.12	.02	-.03
2. Ethical Judgment			-.14	-.02	.22*	-.07	-.08	.17	.00	-.04	.03	-.05	.14	-.13	.13	.17
3. Ethical Intentions				-.01	-.48**	.15	.04	-.23*	.26**	-.21*	-.19	-.06	-.07	-.03	-.07	-.10
4. Magnitudeof Consequencs					.16	.34**	.23*	.20*	.45**	-.11	-.17	-.17	-.07	-.32**	-.08	-.04
5. Social Consensus						-.01	-.01	.48**	-.13	-.04	.04	.00	.07	.01	.09	.08
6. Probability of Effects							.33**	.12	.39**	-.15	-.19	-.10	-.04	-.16	-.04	-.01
7. Temporal Immediacy								.18	.15	-.08	-.14	-.10	-.09	-.16	-.09	.02
8. Proximity									.05	.00	-.06	-.01	.00	-.05	.00	.11
9. Concentration of Effects										-.04	-.10	-.05	-.02	-.13	-.03	-.14
10. Number of Steps											.58**	.47**	-.10	.54**	-.11	.34**
11. Number of Problems												.62**	-.04	.54**	-.05	.46**
12. Number of Solutions													.04	.57**	.03	.20*
13. Number of Consequences														-.10	.98**	.01
14. Plan Quality															-.10	.22*
15. Forecast Quality																.00
16. Ethicality																

*Note: * p < .05; ** p < .01*

Table 8.

Group Means and Standard Deviations for the Interaction Between Interruption and Cognitive Technique

	ACED-IT				Expressive Writing				No Cognitive Technique			
	Interruption		No Interruption		Interruption		No Interruption		Interruption		No Interruption	
Variable	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Identification of Ethical Dilemma	5.29	0.35	5.59	0.35	6.19	0.36	6.32	0.33	5.65	0.35	5.56	0.36
Ethical Judgment	4.82	0.54	3.82	0.54	3.94	0.56	3.58	0.51	3.77	0.54	3.19	0.56
Ethical Intentions	3.53	0.44	3.06	0.44	3.13	0.46	3.37	0.42	4.00	0.44	2.56	0.46
Magnitude of Consequences* R	2.35	0.36	3.41	0.36	3.31	0.37	2.42	0.34	3.59	0.36	3.63	0.37
Social Consensus	4.41	0.47	4.94	0.47	4.63	0.48	4.32	0.44	4.12	0.47	4.81	0.48
Probabiliy of Effects	2.88	0.39	3.82	0.39	3.88	0.40	3.42	0.37	3.35	0.39	3.69	0.40
Temporal Immediacy*R	2.47	0.34	3.35	0.34	3.69	0.35	2.79	0.32	3.41	0.34	3.13	0.35
Proximity	3.59	0.44	4.35	0.44	4.75	0.46	3.68	0.42	3.94	0.44	3.69	0.46
Concentration of Effects	2.94	0.38	3.59	0.38	3.38	0.39	3.16	0.36	3.65	0.38	3.06	0.39

*Note: * indicates a significant interaction at p < .05; R indicates a reverse-scored scale*