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The Moral Metacognition Scale: Development and Validation

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Scholars have advocated for the inclusion of metacognition (i.e., the extent to which one thinks about one's thinking) in our understanding of the ethical decision making process and in support of moral learning. An instrument to measure metacognition as a domain-specific capacity related to ethical decision making (i.e. moral metacognition) is not found in the current literature. This research describes the development and validation of the 20-item Moral Metacognition Scale (MMS). Psychometric properties of the scale were assessed by exploration (Study 1) and confirmation (Study 2) of the factor structure, and the demonstration of convergent (Studies 3 and 4), discriminant (Studies 3 and 4), and predictive (Study 4) validity. Moral metacognition, as measured by the MMS, was significantly correlated with ethical awareness and ethical judgment. Limitations of our research, suggestions for future exploration, and practical implications are discussed.

Keywords: ethical decision making, ethics, metacognition, moral metacognition

Organizational life is being impacted by a continual increase in dynamism and complexity. This can be attributed in part to rapid advancements in technology, the resulting speed with which we communicate, the globalization of business, and ever shorter product life cycles. In this new reality, organizational actors have more stakeholders to satisfy, more information to attend to, and shorter spans of time to make a range of decisions. Such complexity makes ethical dilemmas more frequent and the process by which to resolve them more difficult (Thiel, Bagdasarov, Harkrider, Johnson & Mumford, 2012).

The added dynamism and complexity embedded within the modern organizational context and subsequent ethical dilemmas create a paradox. Increased complexity creates dilemmas that require more careful deliberation on the part of the involved individual(s) engaged in ethical decision making, and yet that very complexity fosters greater reliance on cognitive shortcuts to

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simplify the decision-making process (Jordan, 2009; Van de Ven & Poole, 1988), often causing individuals to process information automatically (Haidt, 2001). Although such automaticity serves individuals by lowering processing demands and enabling more rapid decision making (Mandler, 2014), it can reduce the probability of ethical behavior, as the individual is likely to make a decision based on nonethical considerations (Street, Douglas, Geiger, & Martinko, 2001). This is of great concern, and is an issue that must be addressed. The question is, How can individuals improve their ethical decision making so that, when faced with complex ethical dilemmas, they rely less on automatic information processing and engage in more deliberative cognitive reasoning? Although it is beyond the scope of this article to debate the use and utility of automatic versus controlled processes (Evans & Stanovich, 2013), it is important that an individual be able to switch gears depending on the complexity of the situation (Louis & Sutton, 1991). Metacognition is a capacity that seems to support individuals in recognizing when cognitive shortcuts (e.g., schemas) are less useful, and override automatic processing in favor of control (Ricco & Overton, 2011; Stanovich, 2009).

Moral learning is fundamentally about metacognition (Sadler-Smith, 2012), which is a general capacity to monitor and control thinking. Moral metacognition is the extent to which one is aware of, monitors, reflects on, and regulates thinking in the specific context of moral reasoning (Narvaez, 2010), and has been cited as a critical factor in effective ethical decision making (Hannah, Avolio, & May, 2011; Narvaez, 2010; Sadler-Smith, 2012). To date there is no measure of moral metacognition in the literature. Being able to operationalize this capacity may serve in research, ethics education, and workplace training and development. Therefore, the purpose of our research was to develop and validate a measure of moral metacognition.

ETHICAL DECISION MAKING

As the words *ethical* and *moral* both refer to principles of right and wrong behavior, in this article we use them interchangeably. We use the term *ethical decision making* to describe the process one goes through in determining the behavior one ultimately engages in when faced with an ethical issue. And, although Allen (2012) claimed that an "ethical dilemma only occurs when two (or more) ethical standards apply to a situation but are in conflict with each other" (p. 5), we use the term *ethical dilemma* to refer to an issue of an ethical nature that creates a dilemma for the individual who must determine how to behave.

Many models have been developed in an effort to explain the ethical decision making process. Generally, ethical decision making models have been developed based on the belief that people process these decisions in very rational and deliberative ways. Yet more recently the field has incorporated the notion that ethical decisions are advanced with less intention. In this section we review a number of models to illustrate the evolution of the field from rationalist/deliberative models to more intuitive/automatic models. We then discuss the implications of this in terms of the usefulness of moral metacognition.

The most well-known ethical decision making model of all, perhaps, is Rest's (1986) model, which posits that decision making is a four-stage *process* that begins with the *awareness* that one is facing an ethical dilemma, which is followed by *judgment*, the stage in which one generates possible actions and judges each in terms of their ethicality, which is followed by *intention*, the stage in which one picks a previously generated behavioral option in which he or she intends to

engage, and finally *behavior*, the stage in which one finally takes action. Building on the work of Piaget (1948) and Kohlberg (1969), Rest's model takes a rationalist approach to ethical decision making in that it suggests that ethical decision making is cognitive in nature and is a process of deliberative reasoning and reflection.

Rest's (1986) parsimonious model fails to acknowledge factors that might influence the decision maker in each of the four steps of the ethical decision making process. Through the years researchers have developed more comprehensive models that include a wide range of factors. These models are descriptive, rather than normative or prescriptive, in nature. That is, they attempt to describe the decision making process as individuals actually engage in it, rather than as individuals should engage in it.

Ferrell and Gresham's (1985) contingency model of ethical decision making embeds the ethical decision making process within the social and cultural environment and posits that the actual process of making a decision when faced with an ethical dilemma is directly affected by the type of ethical issue or dilemma one is faced with (e.g., advertising deception, bribes); the individual's knowledge, values, attitudes, and intentions; significant others; and opportunity, a factor that includes professional codes, corporate policy, and rewards/punishment.

Hunt and Vitell's (1986) general theory includes the last three stages of Rest's (1986) model (ethical judgment, intention, and behavior). The ethical decision making process begins in the cultural, industry, and organizational environment, and with the decision maker's personal experiences. These lead to the individual's perception of the ethical problem, the alternatives, the probability and desirability of consequences, and the importance of stakeholders. Perceptions lead the individual to engage in both a deontological evaluation (consideration of ethical rules) and a teleological evaluation (consideration of consequences), which directly affect the individual's ethical judgment. Both ethical judgment and the teleological evaluation affect intention, and both intention and situational constraints affect the individual's ultimate behavior.

Trevino's (1986) person-situation interactionist model begins with the ethical dilemma, which leads to the individual's cognitions (i.e., stage of cognitive moral development; Kohlberg, 1981). Cognitions are directly affected by factors within the situation, such as the immediate job context (e.g., reinforcement and other pressures), organizational culture (e.g., norms, referent others, obedience to authority, responsibility for consequences), and characteristics of the work (e.g., role taking and resolution of moral conflict). Cognitions lead directly to the individual's final behavior, which is moderated by both the situational factors that directly affect cognitions and individual moderators such as ego strength, field dependence, and locus of control.

Dubinsky and Loken's (1989) model for analyzing ethical decision making includes two of Rest's (1986) stages—intention and behavior—and is based closely on Fishbein and Ajzen's (1975) theory of reasoned action. The ethical decision making process starts with the individual's beliefs regarding the potential outcomes of ethical/unethical behaviors and the individual's evaluation of probable outcomes. These lead to the individual's attitude toward ethical/unethical behavior. The process also begins with the individual's beliefs regarding the likelihood that others think the individual should or should not engage in ethical/unethical behavior and the individual's motivation to comply with referent others. These lead to the individual's subjective norm toward ethical/unethical behavior. Both the individual's attitude and subjective norm directly affect his or her intentions to engage in ethical/unethical behavior, which leads directly to actual behavior.

Rest's (1986) four-stage model is at the heart of Jones's (1991) issue-contingent model. Jones posited that moral intensity ("the extent of issue-related moral imperative in a situation";

p. 382) directly affects each of the four stages. Moral intensity is determined by six characteristics of the issue: magnitude of consequences, social consensus, probability of effect, temporal immediacy, proximity, and concentration of effect. Both intention and behavior are additionally affected by organizational factors such as group dynamics, authority factors, and socialization processes.

Each of the aforementioned models represents ethical decision making as a largely rational and deliberative process. Street et al. (2001) challenged that supposition with the cognitive elaboration model of ethical decision making, which posits that Rest's (1986) four-stage process is triggered *only* if the individual employs a high level of cognitive expenditure. If the individual employs a low level of cognitive expenditure, the decision will be based on nonethical considerations, which will reduce the probability that the individual will engage in ethical behavior. The level of cognition that is expended is directly affected by both the individual's motivation and ability. Motivation is determined by characteristics of the individual, such as need for cognition and need for closure, and characteristics of the situation, such as the moral intensity of the issue, personal relevance, and personal accountability. Ability is determined by the individual's relevant knowledge and conceptualization of the event and by distractions in the environment and the immediacy of information processing.

Haidt (2001) further questioned the prevailing belief regarding ethical decision making as a rational and deliberative process and proposed the social intuitionist model of moral judgment as an alternative.[1] This model recognizes that both intuition and reasoning are cognitive processes. Intuition is triggered automatically, with the decision maker remaining largely unaware of the process through which the outcome was arrived. In contrast, the process of reasoning tends to be more deliberative, requiring the decision maker to expend conscious cognitive resources. Haidt's process model begins with an *eliciting situation* that triggers the first principal process, the *intuitive judgment link*, in which the individual's intuition automatically generates the individual's conscious judgment. In the second principal process, the *post hoc reasoning link*, the individual engages in an effortful cognitive search for support of the judgment he or she has already made. So, one's intuition leads to one's judgment, which leads to one's reasoning, the purpose of which is to justify one's automatic judgment that was reached as a result of one's intuition. Haidt claims that objective moral reasoning is possible but rarely happens because of challenges such as time constraints, motivation, and the activation of related beliefs and judgments. According to Baron (1998), "we should not be surprised when . . . intuitions . . . lead to outcomes that are worse than the best we could have, often substantially worse" (p. 1). We tend to believe that our intuitions have some kind of authority, and we accept them without truly knowing the reasons behind them, but trusting that the reasons are there (Baron, 1998). Haidt stressed that his model is not a depiction of how moral judgments should be made but that "a correct understanding of the intuitive basis of moral judgment may . . . be useful in helping decision makers avoid mistakes and in helping educators design programs (and environments) to improve the quality of moral judgment and behavior" (p. 815). Haidt's model is consistent with the larger body of social-cognitive theory and research (Fiske & Taylor, 1984) that suggests that individuals try to simplify processing

[1] Unlike the other models we've discussed, Haidt's model is concerned only with moral judgment and does not include a link to behavior. It includes four principal, and two secondary, processes; we describe only the two principal processes that are most specifically relevant to our research.

in order to reserve cognitive resources. This process is initiated within ethical decision contexts through the application of morally relevant schemas.

Schemas are knowledge structures that organize perceptions and help align attention with what is deemed to be relevant information (Fiske & Taylor, 1991). Consistent with intuitionist models (e.g., Haidt, 2001), moral reasoning may be "pre-consciously guided and influenced by an individual's conceptual schemata related to morality" (Whitaker & Godwin, 2013, p. 63). Schemas (*scripts* when in relation to an action sequence; Abelson, 1981) represent cognitive prototypes or simplifications for what are, in reality, much more complex concepts or events. Individuals who confront an ethical dilemma are at once potentially aided and hampered by schemas in use (Narvaez & Bock, 2002; Walsh, 1995). When faced with an ethical dilemma, a complex schema can help in selecting relevant information and quickly arriving at an acceptable solution. Yet schemas can be more automatically triggered when the executive system is not fully engaged (Posner, DiGirolamo, & Fernandez-Duque, 1997), thereby curtailing more self-regulatory aspects of cognition and leaving the individual to apply less contextualized thinking to a complex moral dilemma (Jordan, 2009). In essence, "schematic information processing can be at once enabling and crippling" (Walsh, 1995, p. 282).

Complex and dynamic environments present ethical dilemmas that call for increased deliberation. "Deliberation permits one to step back from the current flow of events to consider additional information and alternative cues, facts, and paths from those to which one first attends" (Narvaez, 2010, p. 169). Conscious deliberation leads to changes in ethical decision making responses (Bartels, 2008; Greene, Sommerville, Nystrom, Darley, & Cohen, 2001). With such cognitive flexibility (Krebs & Denton, 2006), individuals may be able to engage in ethical decision making that is less reliant on procedures automatically triggered by schemas and more in tune with the contextual needs of the moment (Fernandez-Duque, Baird, & Posner, 2000). Some individuals seem to be more willing and able to apply deliberative moral reasoning than others (Hannah et al., 2011).

Recognizing the schism between ethical decision making models (i.e., rational/deliberative vs. intuitive/automatic) Hannah et al. (2011) developed a comprehensive model of ethical decision making that partitions Rest's (1986) model into two distinct types of processes. They posited that both awareness (sensitivity) and judgment are moral *cognition* processes, whereas intention (motivation) and behavior (action) are moral *conation* processes. Moral cognition processes require complex intellectual analysis and determination of right and wrong behavior (Hannah et al., 2011; Kohlberg, 1981; Rest, 1986). Moral conation, they explained, is "the capacity to generate responsibility and motivation to take moral action in the face of adversity and persevere through challenges" (Hannah et al., 2011, p. 664). In other words, moral conation is the "impetus to act" (p. 664). They argued that Rest's model fails to fully explain how individuals consider and act on ethical dilemmas because of its sole focus on processes; what is missing is the inclusion of the *capacities* needed to effectively process ethical dilemmas. Building on the Rest model, their model proposes that moral maturation capacities (i.e., moral complexity, metacognitive ability, and moral identity) directly impact moral cognition processes (i.e., awareness and judgment), whereas moral conation capacities (i.e., moral ownership, moral efficacy, and moral courage) directly impact moral conation processes (i.e., intention and behavior, p. 666).

Moral metacognition is critical in slowing down the rapid, automatic intuition- and schema-driven ethical decision making process and may lead to more discerning awareness of ethical

issues and more insightful and appropriate ethical judgments, which in turn may contribute to more ethical behavioral outcomes (Hannah et al., 2011).

METACOGNITION

Metacognition, which is commonly referred to as "thinking about thinking" (Flavell, 1979) and "knowing about knowing" (Metcalfe & Shimamura, 1994), includes both knowledge about, and regulation of, cognitive activity (Moses & Baird, 1999). This broad ability is underpinned by the capacities to monitor and regulate thinking (Moses & Baird, 1999; Nelson & Narens, 1994). Metacognition refers to

> one's knowledge concerning one's own cognitive processes and products or anything related to them . . . . [and] refers, among other things, to the active monitoring and consequent regulation and orchestration of these processes . . . . usually in the service of some concrete goal or objective. (Flavell, 1976, p. 232)

When one is metacognitively aware, it is suggestive of the use of two major skill sets (Nelson & Narens, 1994; Schraw & Dennison, 1994). The first skill set includes one's *awareness* of thought processes, including knowledge of strategies, how to use strategies, and when to use strategies (Schraw & Dennison, 1994). The second set of skills enables one to *regulate* choice among various cognitive strategies in the service of an end goal and includes planning, correcting errors, and evaluation (Artzt & Armour-Thomas, 1992; Schraw & Dennison, 1994).

Metacognitive knowledge is the extent to which one is aware of one's current knowledge and how to use it. Three types of metacognitive knowledge are commonly recognized (Schraw, 1998). *Declarative* knowledge refers to how well one understands his or her skills and ability. This can be related to both breadth and depth of knowledge (Pintrich, Smith, Garcia, & McKeachie, 1993). *Procedural* knowledge represents the degree of awareness about how to implement various strategies. *Conditional* knowledge is associated with knowing why and when a specific cognitive strategy should be utilized. Such conditional knowledge can be viewed as knowing when to use declarative and procedural knowledge in the appropriate conditions (Schraw, 1998). These combined knowledge-based skills are vital in providing information from which one can then regulate cognition most effectively.

Metacognitive regulation is often separated into aspects of monitoring and control (Nelson & Narens, 1990). The regulation component of metacognition includes bottom-up monitoring processes such as error detection and top-down control processes such as error correction (Fernandez-Duque et al., 2000). Monitoring (i.e., a bottom-up process) represents the degree to which one tracks the ongoing use of cognitive strategies to determine if they are working. When monitoring leads to recognition of a perceived gap between intent and progress, it can qualify the need for redirecting the cognitive strategies in use (Koriat, Ma'ayan, & Nussinson, 2006; Pintrich & Schrauben, 1992). This represents the control portion of regulation (i.e., top-down process). Individuals perform these regulatory activities through the complete cycle of the task experience by planning prior to the task, managing information to increase organization, correcting or debugging errors as they occur, and evaluating overall success at the end (Schraw & Dennison, 1994).

DOMAIN-SPECIFIC METACOGNITION

Whereas some, such as Schraw (1998), maintain that metacognition is domain-general, others argue that metacognition is a domain-specific skill set (Glaser, Schauble, Raghavan, & Zeitz, 1992). As such, although one may have a general metacognitive capacity, individual experience and expertise may be needed for domain-specific metacognitive capability. This would certainly be consistent with socio-cognitive literature that suggests the development of targeted and complex domain schemas that are applied according to similar aspects of previously experienced contexts (Chi, Glaser, & Farr, 1988). As task complexity increases beyond a certain threshold in a particular domain, the impact of general intelligence decreases, whereas the impact of metacognition increases, in terms of processing information (Veenman, Wilhelm, & Beishuizen, 2004).

Domain-related metacognitive knowledge is consistently revised by ongoing monitoring in a domain-specific task (Fabricius & Schwaenflugel, 1994). Such updates to domain metacognitive knowledge will likely impact further domain-specific metacognitive regulation. So it may not be enough to understand how one *knows about knowing* or *thinks about thinking*; we need to better understand how one knows about knowing for X-domain, and thinks about thinking for Y-domain.

A variety of instruments have been developed to measure domain-specific metacognitive ability. Such measures assess diverse aspects of domain-specific metacognition such as, but not limited to, metacognitive listening (The Metacognitive Awareness Listening Questionnaire: Vandergrift, Goh, Mareschal, & Tafaghodtari, 2006), reading strategies (Metacognitive Awareness of Reading Strategies Inventory: Mokhtari & Reichard, 2002), reading comprehension (Index of Reading Awareness: Jacobs & Paris, 1987), learning strategies of college students (The Motivated Strategies for Learning Questionnaire: Pintrich, Smith, Garcia, & McKeachie, 1991, 1993), math problem solving (Kramarski & Mevarech , 2003), chemistry problem solving (Metacognitive Activities Inventory: Cooper & Sandi-Urena, 2009), the classroom environment (The Metacognitive Orientation Learning Environment Scale—Science: Thomas, 2003), and procrastination (The Metacognitive Beliefs about Procrastination Questionnaire: Fernie, Spada, Nikčević, Georgiou, & Moneta, 2009). Finally, the 15-question Metamoral Questionnaire was developed by Swanson and Hill (1993) to assess moral metacognitive knowledge of school-age children. An example of a question is *Jenny is very good at moral reasoning. She is very smart and seems to have good ideas. One day Jenny forgot to do her homework. What do you think she will do?* The short answer responses are difficult to code, and many of the questions are not applicable to the workplace.

An easy-to-administer instrument to assess metacognition of adults in relation to ethical decision making is not found in the current literature. The purpose of our research was to develop an easy-to-administer, easy-to-score, domain-specific measure of metacognition that can be used to assess how adults think about their thinking, and know about their knowing, when faced with ethical dilemmas. The four-study development and validation of the 20-item Moral Metacognition Scale (MMS) is described next and summarized in Table 1.

TABLE 1
Overview of Scale Development and Validation Studies

Study	*Step of Development*	*Sample*	*Results*
Study 1	Item generation; content validity; exploratory factor analysis; item reduction	$n = 4$ subject matter experts (content validity) $n = 211$ undergraduates from small public university in the mid-Atlantic region of the United States (EFA and item reduction)	One item dropped from preliminary item pool of 110 items based on feedback from subject matter experts 109 items reduced to a 20-item scale consisting of four factors
Study 2	Confirmatory factor analysis	$n = 160$ undergraduates from small public university in the mid-Atlantic region of the United States	Factor structure that emerged in Study 1 was confirmed
Study 3	Convergent validity; discriminant validity	$n = 83$ undergraduates from small private university on the West Coast of the United States	MMS was significantly correlated with N2 index of the DIT-2 (Hypothesis 1 supported) MMS was significantly correlated with Need for Cognition (Hypothesis 2 supported) MMS was not significantly correlated with Mindful Attention Awareness (Hypothesis 3 not supported) MMS was not significantly correlated with the idealism or relativism factors of the Ethics Position Questionnaire (Hypotheses 4 and 5 supported)
Study 4	Convergent validity; discriminant validity; predictive validity	$n = 253$ participants (164 undergraduates from small public university in the mid-Atlantic region of the United States, 89 nonstudent adults)	Reworded 4 items (significantly correlated to original items) MMS was not significantly correlated with the perceptual factor of the Moral Attentiveness Scale (Hypothesis 6 supported) MMS was significantly correlated with the reflective factor of the Moral Attentiveness Scale (Hypothesis 7 supported) MMS was significantly correlated with both the internalization and symbolization factors of the Moral Identity Scale (Hypotheses 8 and 9 supported) MMS was not significantly negatively correlated with ethical awareness *absent* (Hypothesis 10 not supported) MMS was significantly correlated with ethical awareness *present* (Hypothesis 11 supported) MMS was significantly correlated with ethical judgment (Hypothesis 12 supported)

Note. EFA = ; MMS = Moral Metacognition Scale; DIT-2 = Defining Issues Test–Version 2 (Rest, Narvaez, Thoma, & Bebeau, 1999). Need for Cognition (Cacioppo et al., 1984). Mindful Attention Awareness (Brown & Ryan, 2003). Ethics Position Questionnaire (Forsyth, 1980). Moral Attentiveness Scale (Reynolds, 2008). Moral Identity Scale (Aquino & Reed, 2002).

EMPIRICALLY INVESTIGATING MORAL METACOGNITION

Study 1: Initial Scale Development and Exploratory Factor Analysis

Method

Item generation. As suggested by Hinkin (1995), items were generated using a deductive approach and were intended to tap into both the awareness and regulation aspects of the metacognitive construct. We reviewed existing instruments for guidance, drawing from both general metacognitive measures (e.g., Metacognition Awareness Inventory: Schraw & Dennison, 1994) and domain-specific measures (e.g., Motivated Strategies for Learning Questionnaire: Pintrich et al., 1991, 1993), and generated 110 initial items.

Content validity check. After we met with them to explain the purpose of our research and to review the metacognition construct, one faculty member from the psychology department and three faculty members from the philosophy department at a small mid-Atlantic public university took an online survey in which they indicated whether they felt each of the original 110 items was highly representative, somewhat representative, or not at all representative of metacognition in relation to ethical decision making. All four indicated that the *I scan the environment for ethical dilemmas* item (original item #97) was not at all representative of the construct, so that item was dropped, leaving 109 items.

Procedure. An online survey was developed using SurveyMonkey and included an informed consent page, demographic questions (gender, age, and major), the 109 moral metacognition items, and 11 *bogus* items that were included as a means to check individual attentiveness to survey completion (e.g., *I am enrolled in a business/management class*, a question with a correct answer). Participants were asked to indicate the extent of their agreement with each item using a 6-point Likert-type scale, from 1 (*very strongly disagree*) to 6 (*very strongly agree*).

Participants. The survey was taken by undergraduates enrolled in upper-level (junior and senior year) business courses at a small public university in the mid-Atlantic. Students received extra credit for their participation. The survey was accessed 231 times, but the questions that followed the informed consent page were accessed only 226 times. Four students completed portions of the survey twice; two students completed portions of the survey three times. Data were retained for those students for the single attempt in which all questions were answered. Seven students answered at least two of the bogus questions incorrectly, and their data were dropped. Data were retained for 211 students: 102 (48%) were male, and 109 (52%) were female; the age range was 19 to 50; and the mean age was 21.

Analysis and Results

The first step was to determine if the data were suitable for factor analysis. Although opinions regarding necessary sample size vary greatly, Costello and Osborne (2005) stated that "strict rules regarding sample size for exploratory factor analysis have mostly disappeared" (p. 4) and suggested that the strength of the data is a more important consideration than sample size. The

Kaiser–Meyer–Olkin measure of sampling adequacy for these data was .853, which is considered meritorious (Kaiser, 1974). The purpose of Bartlett's test of sphericity is to test the null hypothesis that variables are uncorrelated. The approximate chi-square for our data was 15,224.135 ($p = .000$), so the null hypothesis was rejected, indicating that our data are correlated and therefore suitable for factor analysis.

A scree plot was generated in which 26 components were extracted, with four data points above the break, indicating that four factors should be retained. Principal Component Analysis is the default extraction method in SPSS, and Varimax rotation is the most commonly used orthogonal (assumes factors are uncorrelated) method of rotation (Costello & Osborne, 2005). However, Fabrigar, Wegener, MacCallum, and Strahan (1999) claimed that the maximum likelihood extraction method is the best choice because "it allows for the computation of a wide range of indexes of the goodness of fit of the model . . . . [and] permits statistical significance testing of factor loadings and correlations among factors and the computation of confidence intervals" (Fabrigar et al., 1999, p. 277). Costello and Osborne (2005) suggested that oblique (assumes that factors are correlated) rotation "should theoretically render a more accurate, and perhaps more reproducible, solution" (p. 3) than orthogonal rotation. We elected to run two analyses, one using the Principal Component Analysis extraction method with the Varimax method of orthogonal rotation, the other using the Maximum Likelihood extraction method with the Promax method of oblique rotation (retaining the default delta [0] and kappa [4] values).

Because our ultimate goal was to develop a reliable and valid measure of moral metacognition that is easy to administer, after detecting the presence of four factors we decided that our goal for exploratory factor analysis was to retain close to five items per factor, for a total of 20 items. To do this we developed a number of rules for item retention and applied these rules to the results from both analyses. First, we eliminated all items with a factor loading of less than .50. Second, we eliminated all items that had a positive cross loading on another factor greater than .30. Third, we examined the remaining items for interpretability based on the metacognition construct and eliminated items that did not share a conceptual meaning with other items that loaded on the same factor. Fourth, we eliminated items that were highly duplicative of items with a higher factor loading.

The six items that we retained from the items that loaded on the first factor are all related to regulation of one's thinking (see Table 2). Schraw and Dennison (1994) posited that regulation consists of planning, information management, monitoring, debugging, and evaluation. All of these processes are represented in the six items we retained; Item 39 has to do with planning, Item 50 with information management, Items 63 and 54 with monitoring, Item 68 with debugging, and Item 75 with evaluation. We labeled the first factor *regulation of cognition.*

The six items that we retained for Factor 2 are all related to one's awareness of one's knowledge in relation to ethical decision making. These six items are declarative in nature and reflect one's understanding of his or her skills and ability. For example, Item 8 states *I am good at making ethical decisions*. We labeled the second factor *knowledge of cognition (declarative).*

The four items that we retained for Factor 3 are also related to one's awareness of one's knowledge in relation to ethical decision making. These four items have to do with one's awareness of one's utilization of strategies. In the case of ethical decision making, this is done through the use of a moral framework and/or ethical philosophy. For example, Item 24 states *I try to apply moral frameworks and/or ethical philosophies that I found helpful when faced with ethical dilemmas in the past*. We labeled the third factor *knowledge of cognition (procedural).*

TABLE 2
Results of Exploratory Factor Analysis of the Moral Metacognition Items in Study 1

Original Item No.	Item	Component 1		Component 2		Component 3		Component 4	
		PC w/VR	*ML w/PR*	*PC w/VR*	*ML w/PR*	*PC w/VR*	*ML w/PR*	*PC w/VR*	*ML w/PR*
75	I spend time reflecting on my decision after I have made it	.616	.676						
63	I find myself pausing regularly to confirm that I am considering all aspects of the ethical dilemma	.625	.652						
39	I ask myself what is important before engaging in the ethical decision making process	.620	.626						
50	I try to make sense of the ethical dilemma by breaking down the main elements I need to consider	.589	.601						
54	I consider several possible courses of action before making an ethical decision	.534	.585						
68	I stop and review the elements of the ethical dilemma when I remain unclear	.557	.566						
3	I know which factors are important to consider when making an ethical decision			.687	.725				
5	I do a good job considering the important factors needed to make an ethical decision			.673	.695				
8	I am good at making ethical decisions			.615	.660				
7	I know what is ethical and unethical			.607	.648				
100	I know when I need to consider the ethical aspects in a dilemma			.604	.621				
1	I know my strengths and weaknesses when it comes to making an ethical decision			.594	.635				
81	After engaging in the ethical decision making process I ask myself if I successfully followed a moral framework and/or ethical philosophy					.719	.780		
95	During the ethical decision making process I periodically check to make sure the moral framework and/or ethical philosophy I am using is effective in making an ethical decision					.665	.700		

(*continued*)

TABLE 2
(*Continued*)

Original Item No.	*Item*	*Component 1*		*Component 2*		*Component 3*		*Component 4*	
		PC w/VR	*ML w/PR*	*PC w/VR*	*ML w/PR*	*PC w/VR*	*ML w/PR*	*PC w/VR*	*ML w/PR*
92	Before engaging in the ethical decision process I determine the appropriateness of the moral framework and/or ethical philosophy I normally use to solve ethical dilemmas					.632	.648		
24	I try to apply moral frameworks and/or ethical philosophies that I found helpful when faced with ethical dilemmas in the past					.623	.606		
16	I am a better ethical decision maker when faced with an ethical dilemma that is about a topic I care about							.715	.683
14	I am a better ethical decision maker when faced with an ethical dilemma that is interesting to me							.652	.630
15	I am a better ethical decision maker when faced with an ethical dilemma that directly impacts me							.631	.622
13	I am a better decision maker when faced with an ethical dilemma that is important to me							.627	.587
	Eigenvalue	28.22		6.66		4.39		3.94	
	% of variance explained	25.89		6.11		4.03		3.61	

Note. $N = 211$. Item No. = original item number in pool of 110 items. PC w/VR = Principal Components with Varimax Rotation; ML w/PR = Maximum Likelihood with Promax Rotation.

The four items that we retained for the fourth factor were again related to one's awareness of one's knowledge in relation to ethical decision making. They reflect one's understanding that his or her effectiveness in the ethical decision making process is conditional in nature. For example, Item 16 states *I am a better ethical decision maker when faced with an ethical dilemma that is about a topic I care about*. We labeled the fourth factor *knowledge of cognition (conditional).*

Discussion

The results demonstrated the existence of the two prominent factors of metacognition: *knowledge* and *regulation* (Flavell, 1976; Nelson & Narens, 1994; Schraw & Dennison, 1994). They also demonstrated the existence of the three types of metacognitive knowledge commonly recognized: *declarative, procedural*, and *conditional* (Schraw, 1998). Study 1 successfully produced an easy-to-administer, easy-to-score, 20-item instrument to assess adult metacognition specific to ethical decision making. We discarded the original item numbers of the 20 items we retained, reordered and renumbered the items, tweaked the wording of several items in order to be consistent (in Items 11, 17, and 18 the wording was changed from *the ethical dilemma* to *an ethical dilemma*), and named this instrument the MMS (see the appendix for the final version).

Study 2: Confirmatory Factor Analysis

The purpose of Study 2 was to test, and confirm, the relationship between the 20 items of the MMS and the latent factors that were identified in Study 1 using exploratory factor analysis.

Method

Procedure. Data were collected via paper-and-pencil administration of the MMS. One side of the paper included the informed consent and asked students for their student ID number (rather than signature) in order to assign extra credit, age, gender, intended major, and year in school. The other side of the paper included the 20 items, with instructions to *please indicate the extent to which you agree with the following statements regarding how you think when faced with an ethical dilemma.* The items were numbered and presented in a spreadsheet with columns, to the right of the items, labeled *very strongly disagree, strongly disagree, somewhat disagree, somewhat agree, strongly agree,* and *very strongly agree*. The students were to check the box that best represented their agreement with each item.

Participants. Participants were students enrolled in undergraduate economics classes at a small mid-Atlantic public university. Extra credit was given for participation. One hundred seventy-six surveys were collected. Two of the surveys included the same student ID number, so both were discarded. On one survey all 20 items were checked as *strongly agree*, so it was discarded. On one survey two ratings were checked for two items, so it was discarded. Data were missing on 12 surveys, so these were discarded. Data were retained for 160 participants: 91 (57%) were male, 69 (43%) were female; age range was 18 to 27; and the mean age was 19.

Analysis and Results

Confirmatory factor analysis was conducted using SAS software, and the PROC CALIS program, on the covariance matrix. Correlation structure analysis used the maximum likelihood estimation. Functional equations for each of the 20 items reflected the causal relationship between the item (the manifest endogenous variable), the single latent factor (exogenous variable) it was presumed to measure (as identified in Study 1), and the item's residual term (error). The variance for each factor was fixed at 1, which established a measurement scale for the factors, thereby solving the *scale indeterminancy problem* (Hatcher, 1994). All latent factors were allowed to covary.

Hatcher (1994) recommended three steps in reviewing significance tests for factor loadings (p. 291). First, the model should include no near-zero standard errors; our model did not include any. Second, *t* values

> represent *t* tests of the null hypothesis that the factor loading is equal to zero in the population. *t* values greater than 1.960 are significant at $p < .05$; those greater than 2.576 are significant at $p < .01$; and those greater than 3.291 are significant at $p < .001$. (p. 295)

All *t* values in our model were greater than 3.291, so were significant at $p < .001$. Finally, Hatcher recommended reviewing standardized factor loadings. The standardized factor loadings for our model ranged from .453 for Item 12 to .833 for Item 13; only four loadings were less than .60 (see Table 3). Hatcher indicated that loadings at this level are considered "at least moderately large" (p. 295).

A number of indices were reviewed to determine whether the model provided a good fit to the data (see Table 3). Schreiber, Nora, Stage, Barlow, and King (2006) provided guidelines for the use of fit indexes and claimed that a "general rule for acceptable fit" (p. 330) is that the ratio of chi-square to degrees of freedom (χ^2/df) should be less than or equal to 2 or 3. In this study, $\chi^2 = 329.92$ and the $df = 164$, resulting in a ratio of 2.01, which indicated an acceptable fit.

Schreiber et al. (2006) recommended that the standardized root mean square residual should be less than or equal to .08. The standardized root mean square residual for our model was .066, indicating an acceptable fit. Schreiber et al. also recommended that the root mean square error of approximation be less than .08. The root mean square error of approximation for our model met the guideline at .0798.

Hatcher (1994) advised that values over .9 on the Bentler Comparative Fit Index and the Bentler-Bonett Non-normed Index may indicate an acceptable fit (p. 291). Schrieber et al. (2006) indicated that those indexes should be greater than or equal to .95. The comparative fit index for our model was .8848 and the non-normed index was .8666. Although neither of these indices met either guideline, they were both close to .90; considering that other analyses indicate a good fit, we felt these results were within an acceptable range. Table 3 includes the Cronbach's alpha for all four factors, which range from .818 (Factor 2) to .825 (Factor 4). Internal consistency within each factor is a strong indicator of the instrument's reliability.

Discussion

Exploratory factor analysis in Study 1 identified four metacognition factors based on the data; these four factors are commonly recognized in the literature describing the metacognition

TABLE 3
Confirmatory Factor Analysis of Moral Metacognition Items in Studies 2, 3, and 4

		Study 2				*Study 3*				*Study 4*			
No.	*Item*	*F1*	*F2*	*F3*	*F4*	*F1*	*F2*	*F3*	*F4*	*F1*	*F2*	*F3*	*F4*
1	I ask myself what is important before engaging in the ethical decision making process	.703				.842				.737			
6	I consider several possible courses of action before making an ethical decision	.692				.558				.680			
11	I stop and review the elements of an ethical dilemma when I remain unclear	.737				.561				.683			
12	I spend time reflecting on my decision after I have made it	.453				.504				.527			
17	I find myself pausing regularly to confirm that I am considering all aspects of an ethical dilemma	.674				.645				.650			
18	I try to make sense of an ethical dilemma by breaking down the main elements I need to consider	.738				.601				.673			
4	I am good at making ethical decisions		.768				.688				.827		
5	I know which factors are important to consider when making an ethical decision		.735				.741				.892		
7	I know when I need to consider the ethical aspects in a dilemma		.627				.627				.794		
10	I know my strengths and weaknesses when it comes to making an ethical decision		.570				.635				.706		
14	I do a good job considering the important factors needed to make an ethical decision		.696				.812				.709		
16	I know what is ethical and unethical		.565				.612				.661		
3	I try to apply (ethical guidelines) that I found helpful when faced with ethical dilemmas in the past			.704				.737				.746	
8	After engaging in the ethical decision making process I ask myself if I successfully followed (ethical guidelines)			.696				.749				.717	
15	During the ethical decision making process I periodically check to make sure the (ethical guidelines) I am using is effective in making an ethical decision			.741				.743				.636	
20	Before engaging in the ethical decision process I determine the appropriateness of the (ethical guidelines) I normally use to solve ethical dilemmas			.816				.797				.658	

(*continued*)

TABLE 3
(*Continued*)

		Study 2				*Study 3*				*Study 4*			
No.	*Item*	*F1*	*F2*	*F3*	*F4*	*F1*	*F2*	*F3*	*F4*	*F1*	*F2*	*F3*	*F4*
2	I am a better ethical decision maker when faced with an ethical dilemma that directly impacts me				.542				.584				.758
9	I am a better ethical decision maker when faced with an ethical dilemma that is interesting to me				.767				.709				.829
13	I am a better decision maker when faced with an ethical dilemma that is important to me				.833				.814				.867
19	I am a better ethical decision maker when faced with an ethical dilemma that is about a topic I care about				.819				.915				.892
	Cronbach's α	.821	.818	.820	.825	.784	.829	.842	.833	.819	.892	.786	.899
	N		160				83				253		
	χ^2		329.92***				232.28***				478.88***		
	χ^2 *df*		164				164				164		
	Standardized root mean square residual		.066				.085				.065		
	Root mean square error of approximation		.080				.071				.087		
	Bentler comparative fit index		.885				.909				.893		
	Bentler-Bonett non-normed index		.867				.895				.876		
	Goodness of fit index		.833				.794				.827		

Note. F1 = Regulation of Cognition; F2 = Knowledge of Cognition (Declarative); F3 = Knowledge of Cognition (Procedural); F4 = Knowledge of Cognition (Conditional). ***$p < .001$

construct. We labeled the factors: *regulation of cognition, knowledge of cognition (declarative), knowledge of cognition (procedural)*, and *knowledge of cognition (conditional)* and identified the 20 items that we felt best measure those factors. An examination of the results of confirmatory factor analysis in Study 2 confirmed that the 20 MMS items do, indeed, measure those four metacognition factors in the specific domain of ethical decision making.

Study 3: Convergent and Discriminant Validation

The purpose of Study 3 was to begin the validation process of the MMS by exploring both convergent and discriminant validity using existing measures related to cognitive moral development, mindful awareness, individual need for cognition, and ethical ideology.

Method

Procedure. An online survey was developed using SurveyMonkey and included an informed consent page, demographic questions (gender, age, major, and year in school), and the five instruments described next: MMS, Defining Issues Test–Version 2 (DIT-2; Rest, Narvaez, Thoma, & Bebeau, 1999), Need for Cognition Scale (Cacioppo, Petty, & Kao, 1984), Mindful Attention Awareness Scale (Brown & Ryan, 2003), and the Ethics Position Questionnaire (Forsyth, 1980)). Individuals signed up for participation in the study through an online university-sponsored system; participation was used to fulfill part of their course requirements.

Participants. Participants were drawn from an undergraduate student population at a small private school on the West Coast. Students enrolled in Introduction to Psychology, Foundations of Psychology, and Introduction to Statistics courses are required to earn 4 hours of Research Participation Credit. Participation in this study satisfied 1 credit hour toward the requirement. The survey was accessed 93 times. One participant withdrew after giving consent and answering the demographic questions. Seven participants were dropped through the *standard checks* employed by the DIT-2 analysis, which assesses bogus data (described next). Two participants were dropped because they entered the same answer for every item in at least two of the instruments. Therefore, data were retained for a total of 83 participants. Forty-four (53%) participants were male, and 39 (47%) were female. Ages ranged from 17 to 24, with a mean age of 19. Sixty-nine (83%) were freshman or sophomore in class rank.

Measures and Hypotheses. Demographic information included age, gender, major, and student status (year in college). Moral metacognition was measured using the 20 items retained in Study 1.

The DIT-2 (Rest et al., 1999) is a recognition task that is meant to measure moral judgment and development. The test presents five hypothetical moral dilemmas, and for each dilemma it offers 12 potentially relevant statements. Respondents indicate the degree of importance that each of the 12 statements has to them in relation to the dilemma using a 5-point Likert-type scale, from 1 (*great*) to 5 (*no*). Respondents then complete a forced ranking of the four most important statements (from the 12 items that were previously rated). Rankings are scored according to the different levels of cognitive moral development (i.e., Preconventional, Conventional, and Postconventional) indicated by the statements. Respondents are assigned a

Principled Score, which is determined based on the number of ranked items that indicate the use of Postconventional reasoning. Respondents are also assigned an N2 index that, combined with the Principled Score, indicates the number of items using Preconventional reasoning that were not ranked. The N2 index is considered a more robust and reliable measure of moral development and was therefore used in our study (Rest et al., 1999). The MMS is meant to indicate the degree to which one is aware, and in control, of the cognition operations used in responding to ethical dilemmas, an ability more likely to be used by individuals as their cognitive moral development progresses. Therefore, we anticipated that scores on the MMS would be positively correlated with N2 index scores on the DIT-2.

H1: Moral metacognition, as measured by the MMS mean, will be significantly correlated with cognitive moral development, as measured by the N2 index of the DIT-2.

The Need for Cognition scale (Cacioppo et al., 1984) is an 18-item measure that assesses one's preference for situations that require the use of thinking. An example item from this measure is *I would prefer a task that is intellectual, difficult, and important to one that is somewhat important but does not require much thought*. Respondents indicate the extent to which each item is characteristic of their preferences using a 5-point Likert-type scale from 1 (*extremely uncharacteristic*) to 5 (*extremely characteristic*). Individuals who have a high need for cognition are intrinsically motivated to employ more effort toward thinking in relation to a given issue, preferring tasks that require more thinking; they are also more likely to be aware of how they utilize cognition, as it satisfies their intrinsic motivation. A past study demonstrates a relationship between the Need for Cognition and a trait-oriented measure of metacognition ($r = .36$, $p < .01$; Coutinho, 2006). Ethical dilemmas represent a particular domain in which one has a clear choice regarding the use of cognitive effort. More effort employed in managing ethical dilemmas would likely result in higher awareness and control of cognition in such situations. Therefore, we predicted that scores on the MMS would be positively correlated with scores on the Need for Cognition scale.

H2: Moral metacognition, as measured by the MMS mean, will be significantly correlated with the need for cognition, as measure by the Need for Cognition Scale.

The Mindful Attention Awareness Scale (MAAS; Brown & Ryan, 2003) is a 15-item measure of one's dispositional mindfulness, defined as the capacity to maintain present moment attention and awareness. An example item from the measure is *I forget a person's name almost as soon as I've been told it for the first time* (reverse scored). The measure uses a 6-point Likert-type scale from 1 (*almost always*) to 6 (*almost never*). Mindfulness has been described as a "kind of meta-cognitive ability in which the participant has the capacity to observe his or her own mental processes" (Bishop, 2002, p. 74). Being mindful is suggestive of being aware of awareness and not simply running cognitive operations on automatic pilot, suggesting greater regulation and control. Metacognition is suggestive of being aware of how one uses and regulates cognition before, during, and after a task. Furthermore, the MAAS has been linked to intentions and standards in ethical decision making (Ruedy & Schweitzer, 2010), suggesting it may be related to an ethically oriented metacognition measure. Therefore, we predicted a positive relationship between the MMS and the MAAS.

H3: Moral metacognition, as measured by the MMS mean, will be significantly correlated with mindful awareness, as measured by the MAAS.

The Ethics Position Questionnaire (EPQ) (Forsyth, 1980) utilizes 20 items to measure one's ethical ideology using the dimensions of *relativism* ("the extent to which the individual rejects universal moral rules in favor of relativism"; p. 175) and *idealism* (the extent to which individuals "assume that desirable consequences can, with the 'right' action, always be obtained"; p. 176). An example of a relativism item is *Questions of what is ethical for everyone can never be resolved since what is moral or immoral is up to the individual.* An example of an idealism item is *If an action could harm an innocent other, then it should not be done.* Respondents indicate their level of agreement with each statement on a 9-point Likert-type scale from 1 (*completely disagree*) to 9 (*completely agree*). An individual's score is suggestive of a personal ethical decision making philosophy rather than his or her effectiveness, effort, or awareness of control in ethical decision making. Therefore, we predicted that this measure would not be related to the MMS and included it as a measure to demonstrate discriminant validity.

H4: Moral metacognition, as measured by the MMS mean, will not be significantly correlated with *relativism*, as measured by the EPQ.

H5: Moral metacognition, as measured by the MMS mean, will not be significantly correlated with *idealism*, as measured by the EPQ.

Results

Descriptive statistics and correlations for the study variables are found in both Table 4 and Table 5. A highlight of significant correlations follows.

The MMS mean was significantly correlated with each MMS factor score, and each factor was significantly correlated with each of the other factors. The MMS mean was significantly correlated with the N2 index of the DIT-2 (Rest et al., 1999; $r = .26$, $p < .05$). A significant correlation between .20 and .30 is suggestive of a moderate relationship (Hemphill, 2003). Therefore, Hypothesis 1 was supported. It should be noted that two of the four MMS factors were also significantly correlated with the N2 index (*regulation of cognition:* $r = .31$, $p < .01$; *knowledge of cognition [declarative]:* $r = .25$, $p < .05$).

The MMS mean was significantly correlated with Need for Cognition (Cacioppo et al., 1984; $r = .30$, $p < .01$). Therefore, Hypothesis 2 was supported. Three of the four MMS factors were also significantly correlated with Need for Cognition (*regulation of cognition:* $r = .41$, $p < .01$; *knowledge of cognition [declarative]:* $r = .28$, $p < .05$; *knowledge of cognition [procedural]:* $r = .27$, $p < .05$).

The MMS mean was not significantly correlated with the MAAS (Brown & Ryan, 2003; $r = .04$, $p > .05$). Therefore, Hypothesis 3 was not supported.

The MMS mean was not significantly correlated with the *idealism* factor of the EPQ (Forsyth, 1980; $r = .09$, $p > .05$) or with the *relativism* factor ($r = .00$, $p > .05$). Therefore, Hypotheses 4 and 5 were supported.

Discussion

Convergent validity of the MMS was supported by a significant relationship between the MMS and the N2 index from the DIT-2 (Rest et al., 1999). This moderate relationship ($r = .26$, $p < .05$) suggests a conceptual overlap between the variables but is small enough to infer

TABLE 4
Nomological and Discriminant Validity: Means, Standard Deviations, and Correlations with Moral Metacognition Dimensions in Study 3

			Moral Metacognition				
Variable	M	SD	*MMS Total*	*Regulation*	*Knowledge (Declarative)*	*Knowledge (Procedural)*	*Knowledge (Conditional)*
MMS Total (all 20 items)	4.45	.62					
MMS—Regulation of Cognition	4.50	.73	**.85****				
MMS—Knowledge of Cognition (Declarative)	4.47	.71	**.87****	**.68****			
MMS—Knowledge of Cognition (Procedural)	4.30	.81	**.81****	**.67****	**.58****		
MMS—Knowledge of Cognition (Conditional)	4.50	.91	**.64****	**.28***	**.45****	**.37****	
Hypothesized theoretically convergent measures							
DIT-2 N2 Index	31.04	13.21	**.26***	**.31****	**.25***	.12	.11
Need for Cognition	3.24	.61	**.30****	**.41****	**.28***	**.27***	−.03
Mindful Attention Awareness	3.56	.64	.04	.08	.08	.10	−.15
Hypothesized theoretically discriminant measures							
Ethics Position Questionnaire Total (all 20 items)	5.68	1.15	.06	.03	.02	.00	.14
Ethics Position Questionnaire—Idealism	6.00	1.49	.09	.06	−.03	.05	.21
Ethics Position Questionnaire—Relativism	5.37	1.38	.00	−.02	.06	−.05	.01

Note. $N = 83$. Gender (1 = male, 2 = female). MMS = Moral Metacognition Scale; DIT-2 = Defining Issues Test–Version 2. Bold values indicate significant differences at $p < 0.05$.
$^{*}p < .05$. $^{**}p < .01$.

that they are not redundant measures. It may be that individuals who are able and willing to think about what guides the ethical decision making process (moral metacognition) are more advanced in cognitive moral development. It may also be that those with higher cognitive moral development allot more resources to considering and regulating the ethical decision making process.

Convergent validity was further tested using the Need for Cognition (Cacioppo et al., 1984) scale and the MAAS (Brown & Ryan, 2003). The moderate and significant relationship between the MMS and the Need for Cognition scale ($r = .30$, $p < .01$) suggests that the two measures have some conceptual overlap. The more an individual prefers to think carefully (i.e., need for cognition), the more likely he or she will monitor and regulate cognition. This is likely to be found in a general sense (nondomain specific metacognition) and appears to be the case in regard to domain-specific ethical decision making as well. Convergent validity was not established using the MAAS, which was not significantly correlated with the MMS ($r = .04$, $p > .05$). One possible explanation is that the MAAS focuses on attention and awareness during the performance of daily tasks (e.g., walking, learning someone's name, listening to someone, driving) rather than during decision making.

TABLE 5
Means, Standard Deviations, and Correlation Matrix of Variables Used in Study 3

	Variable	M	SD	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*
1.	Gender	1.47	.50												
2.	Age	19.24	1.28	−.08											
3.	MMS Total	4.45	.62	.10	−.11										
4.	MMS—Regulation of Cognition	4.50	.73	.03	.02	**.85****									
5.	MMS—K of C (Declarative)	4.47	.71	.13	−.03	**.87****	**.68****								
6.	MMS—K of C (Procedural)	4.30	.81	.02	−.11	**.81****	**.67****	**.58****							
7.	MMS—K of C (Conditional)	4.50	.91	.14	**−.27***	**.64****	**.28***	**.45****	**.37****						
8.	DIT = 2 N2 Index	31.04	13.21	**.23***	−.10	**.26***	**.31****	**.25***	.12	.11					
9.	Need for Cognition	3.24	.61	−.09	.08	**.30****	**.41****	**.28***	**.27***	−.03	.21				
10.	Mindful Attention Awareness	3.56	.64	−.04	.03	.04	.08	.08	.10	−.15	.07	**.30****			
11.	Ethics Position Questionnaire Total	5.68	1.15	.07	−.01	.06	.03	.02	.00	.14	−.04	**−.23***	−.06		
12.	EPQ—Idealism	6.00	1.49	.18	−.01	.09	.06	−.03	.05	.21	.00	**−.25***	−.04	**.82****	
13.	EPQ—Relativism	5.37	1.38	−.09	.00	.00	−.02	.06	−.05	.01	−.08	−.13	−.05	**.79****	**.29****

Note. $N = 83$. Gender (1 = male, 2 = female). MMS = Moral Metacognition Scale; K of C = Knowledge of Cognition; DIT-2 = Defining Issues Test–Version 2; EPQ = Ethics Position Questionnaire. Bold values indicate significant differences at $p < 0.05$.

$^{*}p < .05$. $^{**}p < .01$.

Results from the relationship between the EPQ (Forsyth, 1980) and the MMS were used to assess discriminant validity. The EPQ measures the individual's ethical ideology, which may be considered an ethical *schema* that would allow the individual to employ a low level of cognitive expenditure when faced with an ethical dilemma. Those who score high on moral metacognition, on the other hand, are likely to employ high levels of cognitive expenditure as they monitor, reflect on, and regulate their thinking during the ethical decision making process. The fact that the MMS was not significantly correlated with the idealism factor ($r = .09$, $p > .05$) or with the relativism factor ($r = .00$, $p > .05$) of the EPQ provides support for the discriminant validity of the MMS.

Study 4: Convergent, Discriminant, and Predictive Validation

The purpose of Study 4 was to not only further establish both the convergent and discriminant validity of the MMS but also test its predictive validity. In addition, to increase the probability of the generalizability of our findings, both undergraduate students and nonundergraduate adults were surveyed.

Method

Procedure. An online survey was developed using SurveyMonkey and included an informed consent page; demographic questions (described next); the MMS; the Moral Attentiveness scale (Reynolds, 2008); the Moral Identity Scale (MIS; Aquino & Reed, 2002); two scenarios followed by three questions intended to measure ethical awareness (Reynolds, 2008); and six scenarios (McMahon & Harvey, 2006), each followed by the Multidimensional Ethics Scale (MES; Reidenbach & Robin, 1990), intended to measure ethical judgment.

Participants. Participants were recruited in two ways. In the first, students enrolled in upper-level (junior and senior year) undergraduate business classes at a small mid-Atlantic public university were offered extra credit for participation. In the second, we used a networking approach to recruit nonundergraduate adults. An e-mail with the link to the survey was sent to approximately 162 nonundergraduate adults in our networks, which included members of the Board of Advisors of a business school at a small mid-Atlantic public university, colleagues, business associates, family, and friends. The e-mail not only requested that the recipient take the survey but that the recipient forward the link to his or her social/business network.

The online survey was accessed 279 times—175 times by undergraduates and 104 times by nonundergraduates. Twelve participants (five undergraduates, seven nonundergraduates) indicated their consent by clicking the radio button to do so but did not proceed further. Seven participants (one undergraduate and six nonundergraduates) stopped before completing any of the survey instruments. One undergraduate took the survey twice and attempted to receive extra credit for two different courses, even though the survey itself said that students would receive extra credit for only one course. The second attempt for that student was dropped. Four undergraduates accessed the survey twice but only fully completed the survey once. The incomplete attempts were dropped. Two nonundergraduates only completed the survey through the first 10 questions

of the MMS, so were dropped. Data, then, were retained for the 253 participants who completed the survey at least through the entire MMS; six of those participants did not complete every item in the survey and were excluded from relevant statistical analyses when data were missing. Of the 253 participants (which included both undergraduate and nonundergraduate samples), 117 (46%) were male and 136 (54%) were female; ages ranged from 19 to 88, with a mean age of 33.

Measures and Hypotheses. Demographic information collected included age, gender, and major (undergraduates only), and for nonundergraduates included highest degree/level of education completed, employment status, type of organization, and job title.

Moral metacognition was measured using the 20 items retained in Study 1. Based on feedback we received on preliminary findings of the first three studies,[2] we also included reworded versions of the four items that measure the *knowledge of cognition (procedural)* factor. For example, the original version of Item 3 stated *I try to apply moral frameworks and/or ethical philosophies that I found helpful when faced with ethical dilemmas in the past*. It was felt that these items were not only too wordy but that individuals might not understand what was meant by *moral frameworks* or be familiar with *ethical philosophies*. So, for the undergraduates only, we also included reworded versions of Items 3, 8, 15, and 20 that replaced *moral frameworks and/or ethical philosophies* with the words *ethical guidelines*.

The Moral Attentiveness Scale (MAS; Reynolds, 2008) is a measure of "the extent to which an individual chronically perceives and considers morality and moral elements in his or her experiences" (p. 1027). The scale contains 12 items that measure two factors; agreement with items is measured using a 7-point Likert-type scale from 1 (*strongly disagree*) to 7 (*strongly agree*). Seven of the items (one is reverse-scored) load on the *perceptual* factor, which measures the extent to which "information is automatically colored as it is encountered" (p. 1028). An example of an item measuring perceptual moral attentiveness is *In a typical day, I face several ethical dilemmas*. Five of the items load on the *reflective* factor, which measures the extent to which an "individual uses morality to reflect on and examine experience" (p. 1028). An example of an item measuring reflective moral attentiveness is *I regularly think about the ethical implications of my decisions*. Because the MMS measures the individual's propensity to think about his or her thinking when faced with an ethical dilemma, rather than the individual's propensity to habitually perceive dilemmas as being ethical in nature, we predicted the following:

H6: Moral metacognition, as measured by the MMS mean, will not be significantly correlated with the *perceptual* factor of the MAS.

H7: Moral metacognition, as measured by the MMS mean, will be significantly correlated with the *reflective* factor of the MAS.

The Moral Identity Scale (MIS; Aquino & Reed, 2002) measures one's "self-conception organized around a set of moral traits" (p. 1424). Participants are first presented with nine characteristics (caring, compassionate, fair, friendly, generous, hardworking, helpful, honest, and kind) that might be used to describe someone and are asked to image a person with these characteristics and how that person would think, feel, and act. Then participants are presented with 10 items (two are reverse-scored) and, using a 5-point Likert-type scale from 1 (*strongly disagree*) to 5

[2]Results from Studies 1, 2, and 3 were presented at the 2013 Society for Business Ethics Annual Meeting, Orlando, FL.

(*strongly agree*), are asked to indicate the extent to which these characteristics are important to them. Five of the items (two are reverse-scored) load on the *internalization* factor, which measures "the degree to which the moral traits are central to the self-concept" (p. 1427). An example of an item measuring internalization is *It would make me feel good to be a person who has these characteristics*. Five of the items load on the *symbolization* factor, which measures "the degree to which the traits are reflected in the respondent's actions in the world." An example of an item measuring symbolization is *The fact that I have these characteristics is communicated to others by my membership in certain organizations*. Although the MMS is intended to measure the individual's perception of his or her cognitive capacities and processes in use when he or she is faced with ethical dilemmas, rather than his or her self-concept as an ethical person, the individual's perception that *I am good at making ethical decisions* (Item 4 of the MMS) does, in fact, reflect the individual's self-concept as an ethical person, and the individual's perception that *After engaging in the ethical decision making process I ask myself if I successfully followed an ethical guideline* (Item 8 of the MMS) is indicative of the individual's actions in the world. Hannah et al. (2011) posited that both moral metacognition and moral identity are moral maturation capacities. Therefore, we predicted the following:

H8: Moral metacognition, as measured by the MMS mean, will be significantly correlated with the *internalization* factor of the MIS.
H9: Moral metacognition, as measured by the MMS mean, will be significantly correlated with the *symbolization* factor of the MIS.

Ethical awareness was measured using two scenarios developed by Reynolds (2008, p. 1041). The first describes a situation in which harm and behavioral norm violation are absent; the second describes a situation in which they are present. Using a 7-point Likert-type scale (1 = *strongly disagree*, 5 = *strongly agree*), participants indicated their agreement with three questions (p. 1036) intended to measure their ethical awareness (*there are very important ethical aspects to this situation, this matter clearly does not involved ethics or moral issues* [reverse-scored], and *I would definitely report this situation to the Ethics Resource Committee of my company*). Because moral metacognition reflects the tendency to be more aware of, monitor, reflect on, and regulate thinking in the specific context of moral reasoning (Narvaez, 2010), individuals scoring higher on the MMS should be more aware of the ethical nature of dilemmas. Therefore, we predicted the following:

H10: Moral metacognition, as measured by the MMS mean, will be significantly negatively correlated with ethical awareness when harm and behavior norm violation are *absent*.
H11: Moral metacognition, as measured by the MMS mean, will be significantly positively correlated with ethical awareness when harm and behavioral norm violation are *present*.

Ethical judgment was measured using six scenarios developed by McMahon and Harvey (2006, pp. 386–393) in their study of moral intensity (Jones, 1991). Jones posited that six characteristics of an issue—magnitude of consequences (MC), social consensus (SC), probability of effect (PE), temporal immediacy (TI), proximity (PX), and concentration of effect (CE)—impact the moral imperative of an issue (moral intensity) and that the moral intensity of an issue has a direct effect on ethical judgment. McMahon and Harvey developed three versions (high intensity, low intensity, and control) of 18 different scenarios, three for each moral intensity characteristic.

In this study we used the low-intensity version of one scenario for each moral intensity characteristic (i.e., MC = office supplies, SC = computer software, PE = delivery date, TI = waste disposal, PX = used car, CE = warranty). After participants read a scenario, they were asked to judge the ethicality of the action taken in the scenario using the eight-item Multidimensional Ethics Scale (MES; Reidenbach & Robin, 1990). Each of the eight MES items presents two bipolar words (e.g., *just/unjust*), and a 7-point scale by which 1 indicates that the action was judged to be ethical and 7 indicates that the action was judged to be unethical. Although the MES consists of three factors (i.e., *moral equity, relativism*, and *contractualism*), we are interested in the effect of moral metacognition on the mean of all eight items. Because moral metacognition reflects the tendency to be more aware of, monitor, reflect on, and regulate thinking in the specific context of moral reasoning (Narvaez, 2010), individuals scoring higher on the MMS should be better able to assess information accuracy and the impact of emotions and competing values when making ethical judgments (Hannah et al., 2011). Therefore, we hypothesized the following:

H12: Moral metacognition, as measured by the MMS mean, will be significantly positively correlated with ethical judgment, as measured by the MES mean.

Results

Correlations. Table 6 shows that the correlations for the old and new versions of Items 3, 8, 15, and 20 (using undergraduates only) were all significant at the $p < .01$ level. Therefore, we revised the MMS (see the appendix) to incorporate the new wording of those items, and the new wording was used when nonundergraduates took the survey. All statistical analyses for Study 4 use data for the new items.

Descriptive statistics and correlations for the study variables are found in Table 7, with significant correlations shown in bold. A highlight of significant correlations follows.

The MMS mean was significantly correlated with each MMS factor score. Each MMS factor was significantly correlated with each of the other factors.

The MMS mean was significantly correlated to the mean of the MAS (Reynolds, 2008; $r = .14$, $p < .05$), as were the regulation of cognition factor ($r = .20$, $p < .01$) and knowledge of cognition (procedural) factor ($r = .17$, $p < .01$). Neither the mean of the MMS nor any of the four MMS

TABLE 6
Correlation of Means for Items 3, 8, 15, and 20 (Original Wording vs. New Wording) in Study 4

	Original Wording		*New Wording*		
Item	M	SD	M	SD	r
3	4.54	1.18	4.49	1.26	**.553****
8	3.99	1.36	4.04	1.22	**.651****
15	3.92	1.19	3.79	1.16	**.537****
20	4.08	1.16	4.17	1.13	**.499****

Note. $N = 164$. Original wording = *moral frameworks and/or ethical philosophies*; New wording = *ethical guidelines*. Bold values indicate significant differences at $p < 0.05$.

**$p < .01$.

TABLE 7
Means, Standard Deviations, and Correlation Matrix of Variables Used in Study 4

	Variable	M	SD	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*	*14*	*15*	*16*	*17*	*18*
1.	Gender	1.54	.50																		
2.	Age	32.71	18.49	−.02																	
3.	MMS Total	4.52	.76	−.04	−.02																
4.	MMS-Reg. of Cog.	4.47	.85	−.04	.03	**.89****															
5.	MMS-K of C (Dec)	4.72	.86	−.04	.05	**.87****	**.69****														
6.	MMS-K of C (Pro)	4.15	.90	−.06	.11	**.81****	**.75****	**.61****													
7.	MMS-K of C (Con)	4.67	1.12	−.01	**−.22****	**.71****	**.47****	**.51****	**.36****												
8.	MAS Total	4.21	1.23	**−.18****	**−.25****	**.14***	**.20****	.02	**.17****	.09											
9.	MAS-Perceptual	4.07	1.37	**−.17****	**−.26****	.08	.12	−.03	.09	.10	**.94****										
10.	MAS-Reflective	4.41	1.32	**−.15***	**−.19****	**.20****	**.28****	.09	**.26****	.07	**.87****	**.66****									
11.	MIS Total	4.05	.49	**.16***	.00	**.32****	**.30****	**.26****	**.26****	**.23****	**.23****	**.22****	**.20****								
12.	MIS-Internalization	4.64	.49	.10	.07	**.30****	**.26****	**.32****	**.19****	**.20****	.09	.08	.07	**.61****							
13.	MIS-Symbolization	3.46	.78	**.14***	−.04	**.21****	**.21****	.13	**.20****	**.17****	**.23****	**.22****	**.20****	**.87****	**.13***						
14.	EA Absent	3.26	1.47	−.05	**.13***	−.06	−.02	−.09	−.05	−.05	**.22****	**.21****	**.19****	.12	−.04	**.17***					
15.	EA Present	5.78	1.23	.11	.02	**.16***	.10	**.18****	.04	**.17****	.10	.09	.09	**.24****	**.31****	.10	.04				
16.	EJ MES Total	5.84	.76	**.22****	.12	**.23****	**.21****	**.27****	**.19****	.09	.02	−.01	.06	**.34****	**.33****	**.22****	.06	**.23****			
17.	EJ Moral Equity	6.06	.75	**.23****	**.19****	**.19****	**.17****	**.24****	**.16***	.05	.04	.01	.06	**.36****	**.34****	**.23****	.05	**.26****	**.94****		
18.	EJ Relativism	5.28	1.08	**.14***	−.03	**.24****	**.20****	**.24****	**.21****	**.15***	−.03	−.06	.02	**.22****	**.23****	**.14***	.01	**.15***	**.84****	**.63****	
19.	EJ Contractualism	5.94	.84	**.20****	.11	**.20****	**.19****	**.24****	**.15***	.04	.06	.03	.10	**.32****	**.28****	**.22****	.11	**.19****	**.89****	**.81****	**.62****

Note. $N = 247$. Gender (1 = male, 2 = female). MMS = Moral Metacognition Scale; Reg. of Cog. = Regulation of Cognition; K of C = knowledge of cognition; Dec = declarative; Pro = procedural; Con = conditional; MAS = Moral Attentiveness Scale; MIS = Moral Identity Scale; EA = Ethical Awareness; EJ MES = ethical judgment, measured by the Multidimensional Ethics Scale. Bold values indicate significant differences at $p < 0.05$.

*$p < .05$. **$p < .01$.

factors were significantly correlated with the perceptual factor of the MAS. Therefore, Hypothesis 6 was supported. The MMS mean was significantly correlated to the reflective factor of the MAS ($r = .20, p < .01$). Therefore, Hypothesis 7 was supported. In addition, the regulation of cognition factor ($r = .28, p < .01$) and the knowledge of cognition (procedural) factor ($r = .26, p < .01$) of the MMS were significantly correlated to the reflective factor of the MAS.

The mean of the MMS was significantly correlated with the mean of the MIS (Aquino & Reed, 2002; $r = .32, p < .01$), the internalization factor of the MIS ($r = .30, p < .01$), and the symbolization factor of the MIS ($r = .21, p < .01$), Therefore, both Hypothesis 8 and Hypothesis 9 were supported. The regulation of cognition factor ($r = .30, p < .01$), knowledge of cognition (declarative) factor ($r = .26, p < .01$), knowledge of cognition (procedural) factor ($r = .26, p < .01$), and knowledge of cognition (conditional) factor ($r = .23, p < .01$) of the MMS were significantly correlated with mean of the MIS. The regulation of cognition factor ($r = .26, p < .01$), knowledge of cognition (declarative) factor ($r = .32, p < .01$), knowledge of cognition (procedural) factor ($r = .19, p < .01$), and knowledge of cognition (conditional) factor ($r = .20, p < .01$) of the MMS were significantly correlated with the internalization factor of the MIS. The regulation of cognition factor ($r = .21, p < .01$), knowledge of cognition (procedural) factor ($r = .20, p < .01$), and knowledge of cognition (conditional) factor ($r = .17, p < .01$) of the MMS were significantly correlated with the symbolization factor of the MIS.

Whereas the mean of the MMS was negatively correlated with moral awareness for the scenario in which harm and violation of norm behavior were absent, the correlation was not significant ($r = –.06, p > .05$). Therefore, Hypothesis 10 was not supported.

The mean of the MMS was significantly correlated with ethical awareness for the scenario in which harm and norm behavior violation were present ($r = .16, p < .05$). Therefore, Hypothesis 11 was supported. In addition, the knowledge of cognition (declarative) factor ($r = .18, p < .01$), and knowledge of cognition (conditional) factor ($r = .17, p < .01$) of the MMS were significantly correlated with ethical awareness for the present scenario.

The mean of the MMS was significantly correlated with ethical judgment ($r = .23, p < .01$) as measured by the MES (Reidenbach & Robin, 1990) mean. Therefore, Hypothesis 12 was supported. In addition, the regulation of cognition factor ($r = .21, p < .01$), the knowledge of cognition (declarative) factor ($r = .27, p < .01$), and the knowledge of cognition (procedural) factor ($r = .19, p < .01$) of the MMS were significantly correlated with ethical judgment as measured by the MES mean.

Independent Samples t *Test.* Table 8 shows the results of independent samples *t* tests comparing the undergraduate sample with the nonundergraduate sample for all study variables. There was a significant difference between undergraduates' and nonundergraduates' scores for the knowledge of cognition (conditional) factor of the MMS, the total and both factors of the MAS (Reynolds, 2008), and the moral equity factor of the MES (Reidenbach & Robin, 1990).

Multiple Regression Analysis

Hannah et al. (2011) posited that moral metacognition, moral complexity, and moral identity have a direct effect on both ethical awareness and ethical judgment. We conducted exploratory analyses of these relationships using multiple regression analysis. Hannah et al. suggested "that moral complexity is a central antecedent to moral attentiveness" (p. 669), so in these analyses we use Reynolds's (2008) measure of moral attentiveness to represent moral complexity.

TABLE 8
Independent Sample *t* Tests of Undergraduates versus Nonundergraduates in Study 4

	Undergraduates[a]		*Nonundergraduates*[b]		
	M	SD	M	SD	t *test*
MMS Total	4.54	.77	4.46	.76	.73
MMS-Reg. of Cog.	4.46	.86	4.46	.85	.03
MMS-K of C (Dec)	4.68	.88	4.76	.85	−.74
MMS-K of C (Pro)	4.12	.92	4.22	.87	−.81
MMS-K of C (Con)	4.86	1.10	4.28	1.08	**4.08****
MAS Total	4.46	1.07	3.70	1.35	**4.63****
MAS-Perceptual	4.35	1.23	3.52	1.41	**4.85****
MAS-Reflective	4.62	1.18	3.94	1.48	**3.72****
MIS Total	4.08	.48	4.00	.50	1.17
MIS-Internalization	4.61	.53	4.70	.39	−1.37
MIS-Symbolization	3.54	.73	3.30	.84	**2.33***
EA Absent	3.20	1.45	3.41	1.54	−1.03
EA Present	5.77	1.26	5.80	1.18	−.14
EJ MES Total	5.79	.76	5.93	.77	−1.32
EJ Moral Equity	5.98	.75	6.22	.71	**−2.43***
EJ Relativism	5.31	1.01	5.21	1.21	.65
EJ Contractualism	5.89	.81	6.05	.90	−1.39

Note. MMS = Moral Metacognition Scale; Reg. of Cog. = Regulation of Cognition; K of C = knowledge of cognition; Dec = declarative; Pro = procedural; Con = conditional; MAS = Moral Attentiveness Scale; MIS = Moral Identity Scale; EA = Ethical Awareness; EJ MES = ethical judgment, measured by the Multidimensional Ethics Scale. Bold values indicate significant differences at $p < 0.05$.

[a]$n = 164$. [b]$n = 89$.

*$p < .05$. **$p < .01$.

Table 9 shows the result of the regression of gender, age, factor scores for the MMS, factors scores for the MAS (Reynolds, 2008) and factor scores for the MIS (Aquino & Reed, 2002), on ethical awareness absent, ethical awareness present, the three factors of the MES (Reidenbach & Robin, 1990), and the mean of the MES. Age ($p < .01$), the perceptual factor ($p < .05$) of the MAS, and the symbolization factor ($p < .01$) of the MIS had significant partial effects in the full model for ethical awareness absent, and the model was able to account for 12.7% of the variance ($F = 3.45$, $p < .01$). The internalization factor of the MIS had a significant ($p < .01$) partial effect in the full model for ethical awareness present, and the model was able to account for 14.3% of the variance ($F = 3.97$, $p < .01$). Gender ($p < .01$), age ($p < .01$), the knowledge of cognition (declarative) factor ($p < .05$) of the MMS, the internalization factor ($p < .01$) of the MIS, and the symbolization factor ($p < .01$) of the MIS, had significant partial effects in the full model for the moral equity factor of the MES, and the model was able to account for 24.1% of the variance ($F = 7.50$, $p < .01$). The internalization factor of the MIS had a significant ($p < .05$) partial effect in the full model for the relativism factor of the MES, and the model was able to account for 12.1% of the variance ($F = 3.25$, $p < .01$). Gender ($p < .01$), the knowledge of cognition (declarative) factor ($p < .05$) of the MMS, the internalization factor ($p < .01$) of the MIS, and the symbolization factor ($p < .05$) of the MIS, had significant partial effects in the full model

TABLE 9
Regression Results: The Influence of Study Variable Factors on Ethical Awareness and Ethical Judgment in Study 4

Variable	*Ethical Awareness—Absent* B	*Ethical Awareness—Present* B	*EJ–Moral Equity* B	*EJ–Relativism* B	*EJ–Contractualism* B	*EJ– MES Total* B
Constant	**2.21***	1.06	**2.50****	**2.05****	**2.47****	**2.38****
Gender	−.06	.25	**.30****	.25	**.31****	**.29****
Age	**.02****	.01	**.01****	.00	.00	.00
Regulation of Cognition	.06	−.09	−.04	−.02	.03	−.02
K of C (Declarative)	−.13	.22	**.18***	.14	**.22***	**.18***
K of C (Procedural)	−.21	−.18	−.02	.14	−.05	.01
K of C (Conditional)	.04	.13	−.05	.01	−.09	−.04
Moral Attentiveness—Perceptual	**.18***	.03	.00	−.09	−.01	−.03
Moral Attentiveness—Reflective	.11	.09	.05	.03	.07	.05
Moral Identity—Internalization	−.17	**.64****	**.37****	**.36***	**.32****	**.36****
Moral Identity—Symbolization	**.33****	.05	**.15****	.11	**.17***	**.15***
R^2	.127	.143	.241	.121	.191	.212
F	**3.45****	**3.97****	**7.50****	**3.25****	**5.56****	**6.35****
N	248	248	247	247	247	247

Note. Gender (1 = male, 2 = female). EJ = ethical judgment; K of C = Knowledge of Cognition; MES = Multidimensional Ethics Scale. Bold values indicate significant differences at $p < 0.05$.

*$p < .05$. **$p < .01$.

for the contractualism factor of the MES, and the model was able to account for 19.1% of the variance ($F = 5.56$, $p < .01$). Gender ($p < .01$), the knowledge of cognition (declarative) factor ($p < .05$) of the MMS, the internalization factor ($p < .01$) of the MIS, and the symbolization factor ($p < .05$) of the MIS had significant partial effects in the full model for the mean of the MES, and the model was able to account for 21.2% of the variance ($F = 6.35$, $p < .01$).

Table 10 shows the result of the regression of gender, age, the mean of the MMS, the mean of the MAS (Reynolds, 2008), and the mean of the MIS (Aquino & Reed, 2002) on ethical awareness absent, ethical awareness present, the three factors of the MES (Reidenbach & Robin, 1990), and the mean of the MES. Age ($p < .01$), moral metacognition ($p < .05$), and moral attentiveness ($p < .01$) had significant partial effects (moral metacognition had a significant negative effect) in the full model for ethical awareness absent, and the model was able to account for 10.4% of the variance ($F = 5.61$, $p < .01$). Moral identity had a significant ($p < .01$) partial effect in the full model for ethical awareness present, and the model was able to account for 7.7% of the variance ($F = 4.02$, $p < .01$). Gender, age, and moral identity had significant ($p < .01$) partial effects in the full model for the moral equity factor of the MES, and the model was able to account for 20.7% of the variance ($F = 12.55$, $p < .01$). Moral metacognition ($p < .01$) and moral identity ($p < .05$) had significant partial effects in the full model for the relativism factor of the MES, and the model was able to account for 10.5% of the variance ($F = 5.68$, $p < .01$). Gender ($p < .01$), age ($p < .05$), and moral identity ($p < .01$) had significant partial effects in the full model for the contractualism factor of the MES, and the model was able to account for 15.4% of the variance ($F = 8.78$, $p < .01$). Gender ($p < .01$), age ($p < .05$), moral metacognition ($p < .05$), and moral

TABLE 10
Regression Results: The Influence of Study Variable Totals on Ethical Awareness and Moral Judgment in Study 4

Variable	*Ethical Awareness-Absent* B	*Ethical Awareness-Present* B	*EJ– Moral Equity* B	*EJ– Relativism* B	*EJ– Contractualism* B	*EJ– MES Total* B
Constant	1.29	**2.50****	**3.01****	**2.54****	**2.85****	**2.85****
Gender	−.06	.24	**.29****	.24	**.30****	**.28****
Age	**.02****	.00	**.01****	.00	**.01***	**.01***
Moral Metacognition	**−.27***	.15	.11	**.30****	.13	**.16***
Moral Attentiveness	**.29****	.07	.03	−.07	.04	.00
Moral Identity	.38	**.46****	**.43****	**.35***	**.42****	**.41****
R^2	.104	.077	.207	.105	.154	.180
F	**5.61****	**4.02****	**12.55****	**5.68****	**8.78****	**10.59****
N	248	248	247	247	247	247

Note. Gender (1 = male, 2 = female). EJ = ethical judgment; MES = Multidimensional Ethics Scale. Bold values indicate significant differences at $p < 0.05$.

*$p < .05$. **$p < .01$.

identity ($p < .01$) had significant partial effects in the full model for the mean of the MES, and the model was able to account for 18.0% of the variance ($F = 10.59$, $p < .01$).

Discussion

Results from Study 4 provided additional support for the validity of the MMS. The lack of a significant correlation between the MMS and the perceptual factor of the MAS (Reynolds, 2008) provided support for the divergent validity of the MMS. Although those scoring higher on the MMS are more likely to monitor and regulate their thinking when engaged in the ethical decision making process, they are not more likely to automatically perceive their experiences as being ethical in nature.

Convergent validity of the MMS was supported by the significant correlation between the MMS and the reflective factor of the MAS (Reynolds, 2008), such that those scoring higher on the MMS are more likely to think about, and reflect on, their ethical experiences. Convergent validity was additionally supported by the significant correlation between the MMS and both the internalization and symbolization factors of the MIS (Aquino & Reed, 2002). Those who score higher on the MMS are more likely to believe that they are ethical individuals, and act in ways that reflect that perception.

The predictive validity of the MMS was supported by the significant correlation between the MMS and ethical awareness in the present scenario, such that individuals who scored high on moral metacognition were more aware of the ethical nature of the dilemma presented. Although the correlation between the MMS and ethical awareness in the absent scenario was not significant, the negative correlation was in the hypothesized direction, such that those who scored high in moral metacognition did not perceive an ethical dilemma when harm and violation of norm behavior were absent.

The predictive validity of the MMS was further supported by the significant correlation between the MMS and ethical judgment. Those who scored higher on moral metacognition judged the behavior taken in the scenarios as being more unethical in nature, as measured by the total MES (Reidenbach & Robin, 1990).

Although we have used the correlations between the MMS and ethical awareness and ethical judgment as indicators of the predictive validity of the MMS, it must be remembered that correlation does not imply causation. It is possible that moral metacognition causes greater ethical awareness and ethical judgment, or that ethical awareness and ethical judgment cause moral metacognition, or that the constructs are simply correlated.

Multiple regression analysis provided support of the predictive validity of the MMS, and partial support for a small portion of the ethical decision making model developed by Hannah et al. (2011). The model posits that the moral maturation capacities of moral metacognition, moral complexity, and moral identity have a direct effect on ethical awareness and ethical judgment. The MMS mean had a significant partial negative effect on ethical awareness for the absent scenario and on ethical judgment as measured by the MES (Reidenbach & Robin, 1990). Although the MMS was significantly correlated with ethical awareness for the present scenario, it was also significantly correlated with moral identity, and once moral identity was taken into account, there was no longer a significant difference in ethical awareness based on moral metacognition. This did not occur with ethical judgment, however, as both moral metacognition and moral identity (along with gender and age) had significant partial effects in the regression model. The failure of moral attentiveness (Reynolds, 2008) to have a significant effect on ethical judgment should not be taken as an indictment of the Hannah et al. (2011) model, in which moral *complexity*, rather than attentiveness, is posited to have a direct effect. We included moral attentiveness as a *proxy* variable for complexity. Further research needs to be conducted to fully support the Hannah et al. model.

GENERAL DISCUSSION

The studies presented here help demonstrate the existence and validity of *moral* metacognition, the extent to which an individual monitors and regulates thinking in relation to ethical decision making. Scholars have advocated for this domain-specific form of metacognition as a central component to moral learning and development (Hannah et al., 2011; Narvaez, 2010; Sadler-Smith, 2012). Hannah et al. (2011), in particular, demonstrated that the ethical decision making field of study has been deficient in recognizing the individual *capacities* needed to effectively process ethical dilemmas and that instruments need to be developed that extend generalized capacities to domain-specific capacities. Moral metacognition represents one of these critical capacities in need of development and validation. Therefore, the primary contribution of our research is a reliable, valid, and easy-to-administer scale that measures moral metacognition, the MMS, a scale that enabled us to demonstrate that moral metacognition is correlated with ethical awareness and judgment.

The results from these studies demonstrate that the MMS is reliable and valid. The data suggest four distinct factors that we labeled *regulation of cognition, knowledge of cognition (declarative), knowledge of cognition (procedural)*, and *knowledge of cognition (conditional*; Study 1). This four-factor model is theoretically consistent with the literature on metacognition and an existing measure of domain-general metacognition, the Metacognitive Awareness Inventory (Schraw &

Dennison, 1994). The four factors were upheld through confirmatory factor analysis (Study 2). Convergent validity was demonstrated in Studies 3 and 4, with a particularly important association shown between the MMS and the N2 index of the DIT-2 (Rest et al., 1999), and associations with the Need for Cognition Scale (Cacioppo et al., 1984), the reflective factor of the MAS (Reynolds, 2008), and the internalization and symbolization factors of the MIS (Aquino & Reed, 2002). Discriminant validity was demonstrated by the lack of a significant correlation between the MMS and the idealism and relativism factors of the EPQ (Forsyth, 1980) in Study 3, and the perceptual factor of the MAS (Reynolds, 2008) in Study 4. Predictive validity was demonstrated by the significant relationship of the MMS to ethical awareness and ethical judgment (Study 4).

IMPLICATIONS FOR MANAGERIAL EDUCATION

Narvaez (2006) suggested that the development of moral reasoning is perhaps best promoted through a more deliberative moral education, and advocated. Scholars have advocated ethical education models rooted in greater self-regulation and careful analysis (Narvaez, 2007). Sadler-Smith (2012) proposed that organizational actors become more capable when they

> refine their objective and subjective moral knowledge both by reflecting *in* moral action (i.e., responding and reasoning in real-time in the midst of a moral dilemma; see Schön, 1983) and reflecting *on* moral action (e.g., by recalling puzzling or perplexing features of a moral dilemma, reflecting on and questioning the events as they appear to have unfolded, questioning one's feelings, assumptions, thoughts and actions, and generating new prototypes). (p. 368)

This claim is highly consistent with the elements and processes associated with moral metacognition. An educational platform that tests employees' moral metacognition, and trains them in ways to improve it, should both help employees recognize when schema-driven automatic processing is not working well (Ricco & Overton, 2011) and develop their capacity to override it (Stanovich, 2009), thereby improving the process of ethical decision making.

The MMS is an important tool for educators, both in the classroom and in industry. Scores on the overall instrument will give a snapshot view of the extent to which individuals monitor and regulate their thinking when faced with an ethical dilemma, whereas scores on the individual factors will provide guidance in terms of specific skills that can be improved.

LIMITATIONS AND SUGGESTIONS FOR FUTURE RESEARCH

Further testing of the MMS is warranted. Study 1 tested 109 items using 211 participants. Although Costello and Osborne (2005) suggested that the strength of the data is a more important consideration than sample size, and the Kaiser–Meyer–Olkin measure of our data (.853) is considered meritorious, Meyers, Gamst, and Guarino (2013) stated that it is important to consider the ratio of participants to variable. Their recommendation is "do not drop below an *N* of 200. Start with a target ratio of 20 participants for every variable. With a larger number of variables, you can back off in this sample size to number of variables ratio" (p. 687). The original 109 items are available from the authors for researchers desiring to replicate Study 1 using a larger sample size.

Verification of the validity of the MMS will be enhanced by a comparison of the domain-specific MMS to existing measure(s) of metacognition, such as the domain-general Metacognitive Awareness Inventory (Schraw & Dennison, 1994). Whereas the MMS was compared to a number of scales (DIT–2: Rest et al., 1999; Need for Cognition Scale: Cacioppo et al., 1984; MAAS: Brown & Ryan, 2003; EPQ: Forsyth, 1980; MAS: Reynolds, 2008; MIS Aquino & Reed, 2002), convergent and discriminant validity would be further supported by comparing it to other scales, such as the Need for Cognitive Closure Scale (Webster & Kruglanski, 1994). Although we used a number of scenarios already found in the literature to measure ethical awareness (Reynolds, 2008) and ethical judgment (McMahon & Harvey, 2006), we suggest future research that uses a wide variety of ethical dilemmas, and with specific participants, for example, banking scenarios with bankers and marketing scenarios with marketers. We also suggest that future research include a measure of social desirability response bias and that measures of ethical awareness and ethical judgment be given prior to the administration of the MMS (or on a different day) to prevent priming.

Future research might also focus on the ethical decision making model proposed by Hannah et al. (2011), in which metacognitive ability has a direct effect on moral sensitivity and moral judgment. They claimed that metacognitive ability is a "developed capacity underlying . . . depth of processing" (p. 669) and that "at higher levels of development, moral cognitive functioning will be guided . . . by metacognitive ability that has been tailored to various areas of prior moral experiences" (p. 670). Yet good habits fostered by virtue ethics may diminish the need for moral metacognition in many situations, such that moral metacognition might be reduced as one develops the efficiency that comes with expertise.

Perhaps moral metacognition is a skill that is, or might be, used selectively, called upon in situations in which the decision maker has limited experience, yet under- or unutilized in situations in which the decision maker has expertise. It may be that as one becomes an expert in ethical decision making in a particular domain he or she shifts from more effortful, deliberate cognition to more automatic processing, and therefore relies less on moral metacognition. Perhaps there is an inverted U-shaped correlation, with novices being low on moral metacognition, and moral metacognition increasing with one's experience in a specific domain and then going down as one becomes an expert, which would be a cause for concern as it could lead to cognitive entrenchment (Dane, 2010). This proposition might be explored by administering a survey online to subjects who are experts in a particular field (e.g., dentists, accountants), and comparing the time taken to respond to questions about ethical awareness and ethical judgment for scenarios in their field versus scenarios outside of their field of expertise.

Although the Hannah et al. (2011) model posits that metacognitive ability has a direct effect on moral sensitivity and moral judgment, rather than on moral motivation and moral action, the model suggests that moral sensitivity leads to moral judgment, which leads to moral motivation, which leads to moral action. Research might explore the relation between a participant's moral metacognition and either a direct measure or a third-party assessment of the participant's ethical behavior.

CONCLUSION

The need for ethical decision making in the workplace is obvious, and the challenges one faces in the ethical decision making process are increasing as organizational life becomes more dynamic

and complex. The identification of the underlying capacities that support one in being able to make ethical decisions (e.g., Hannah et al., 2011) is an important addition to the body of work of ethical decision making scholars. Our research offers empirical support for the value of being metacognitively engaged during the ethical decision making process and may offer insight into the debate on deliberative versus automatic processing when faced with an ethical dilemma. The MMS will enable researchers to further this work by providing a way to assess an individual's ability to enact these underlying capacities. The goal of all ethical decision making research is to improve the effectiveness of the ethical decision making process. This can be done, in part, by encouraging individuals to *think about their thinking* and *know about their knowing* when faced with an ethical decision. Narvaez and Lapsley (2009) stated that

> moral exemplars display moral wisdom (knowing the good) and practical wisdom (knowing how to carry it out in the situation) . . . . (and have) sets of procedural, declarative and conditional knowledge that are applied in the right way at the right time. (pp. 258–259)

The development of moral exemplars will require the study and measurement of moral metacognition. We hope that the MMS will contribute to that line of inquiry.

REFERENCES

Abelson, R. P. (1981). Psychological status of the script concept. *American Psychologist*, *36*, 715–729. doi:10.1037/0003-066X.36.7.715

Allen, K. (2012). What is an ethical dilemma? *The New Social Worker*, *19*, 4–5.

Aquino, K., & Reed, A. (2002). The self-importance of moral identity. *Journal of Personality and Social Psychology*, *83*, 1423–1440. doi:10.1037/0022-3514.83.6.1423

Artzt, A. F., & Armour-Thomas, E. (1992). Development of a cognitive-metacognitive framework for protocol analysis of mathematical problem solving in Small Groups. *Cognition and Instruction*, *9*, 137–175. doi:10.1207/s1532690xci0902_3

Baron, J. (1998). *Judgment misguided: Intuition and error in public decision making*. New York, NY: Oxford University Press.

Bartels, D. M. (2008). Principled moral sentiment and the flexibility of moral judgment and decision making. *Cognition*, *108*, 381–417. doi:10.1016/j.cognition.2008.03.001

Bishop, S. R. (2002). What do we really know about mindfulness-based stress reduction? *Psychosomatic Medicine*, *64*, 71–83. doi:10.1097/00006842-200201000-00010

Brown, K. W., & Ryan, R. M. (2003). The benefits of being present: Mindfulness and its role in psychological well-being. *Journal of Personality and Social Psychology*, *84*, 822–848. doi:10.1037/0022-3514.84.4.822

Cacioppo, J. T., Petty, R. E., & Kao, C. F. (1984). The efficient assessment of need for cognition. *Journal of Personality Assessment*, *48*, 306–307. doi:10.1207/s15327752jpa4803_13

Chi, M. T. H., Glaser, R., & Farr, M. J. (Eds.). (1988). *The nature of expertise*. Hillsdale, NJ: Erlbaum.

Cooper, M. M., & Sandi-Urena, S. (2009). Design and validation of an instrument to assess metacognitive skillfulness in chemistry problem solving. *Journal of Chemical Education*, *86*, 240–245. doi:10.1021/ed086p240

Costello, A. B., & Osborne, J. W. (2005). Best practices in exploratory factor analysis: Four recommendations for getting the most from your analysis. *Practical Assessment, Research & Evaluation*, *10*, 1–9.

Coutinho, S. A. (2006). The relationship between the need for cognition, metacognition, and intellectual task performance. *Educational Research and Reviews*, *1*, 162–164.

Dane, E. (2010). Reconsidering the trade-off between expertise and flexibility: A cognitive entrenchment perspective. *Academy of Management Review*, *35*, 579–603. doi:10.5465/AMR.2010.53502832

Dubinsky, A. J., & Loken, B. (1989). Analyzing ethical decision making in marketing. *Journal of Business Research*, *19*(2), 83–107. doi:10.1016/0148-2963(89)90001-5

Evans, J. S. B., & Stanovich, K. E. (2013). Dual-process theories of higher cognition: Advancing the debate. *Perspectives on Psychological Science*, *8*, 223–241. doi:10.1177/1745691612460685

Fabricius, W. V., & Schwaenflugel, P. (1994). The older child's theory of mind. In A. Demetriou & A. Efklides (Eds.), *Intelligence, mind and reasoning: Structure and development* (pp. 111–132). Amsterdam, the Netherlands: Elsevier Science.

Fabrigar, L. R., Wegener, D. T., MacCallum, R. C., & Strahan, E. J. (1999). Evaluating the use of exploratory factor analysis in psychological research. *Psychological Methods*, *4*, 272–299. doi:10.1037/1082-989X.4.3.272

Fernandez-Duque, D., Baird, J. A., & Posner, M. I. (2000). Awareness and metacognition. *Consciousness & Cognition*, *9*, 324–326. doi:10.1006/ccog.2000.0449

Fernie, B. A., Spada, M. M., Nikčević, A. V., Georgiou, G. A., & Moneta, G. B. (2009). Metacognitive beliefs about procrastination: Development and concurrent validity of a self-report questionnaire. *Journal of Cognitive Psychotherapy*, *23*, 283–293. doi:10.1891/0889-8391.23.4.283

Ferrell, O. C., & Gresham, L. G. (1985). A contingency framework for understanding ethical decision making in marketing. *Journal of Marketing*, *49*, 87–96. doi:10.2307/1251618

Fishbein, M., & Ajzen, I. (1975). *Belief, attitude, intention and behavior: An introduction to theory and research*. Reading, MA: Addison-Wesley.

Fiske, S. T., & Taylor, S. E. (1984). *Social cognition*. Reading, MA: Addison-Wesley.

Fiske, S. T., & Taylor, S. E. (1991). *Social cognition* (2nd ed.). New York, NY: McGraw-Hill.

Flavell, J. H. (1976). Metacognitive aspects of problem solving. In L. B. Resnick (Ed.), *The nature of intelligence* (pp. 231–236). Hillsdale, NJ: Erlbaum.

Flavell, J. H. (1979). Metacognition and cognitive monitoring: A new area of cognitive-developmental inquiry. *American Psychologist*, *34*, 906–911. doi:10.1037/0003-066X.34.10.906

Forsyth, D. R. (1980). A taxonomy of ethical ideologies. *Journal of Personality and Social Psychology*, *39*, 175–184. doi:10.1037/0022-3514.39.1.175

Glaser, R., Schauble, L., Raghavan, K., & Zeitz, C. (1992). Scientific reasoning across different domains. In E. DeCorte, M. Linn, H. Mandl, & L. Verschaffel (Eds.), *Computer- based learning environments and problem-solving* (pp. 345–371). Heidelberg, Germany: Springer-Verlag.

Greene, J. D., Sommerville, R. B., Nystrom, L. E., Darley, J. M., & Cohen, J. D. (2001). An FMRI investigation of emotional engagement in moral judgment. *Science*, *293*, 2105–2108. doi:10.1126/science.1062872

Haidt, J. (2001). The emotional dog and its rational tail: A social intuitionist approach to moral judgment. *Psychological Review*, *108*, 814–834. doi:10.1037/0033-295X.108.4.814

Hannah, S. T., Avolio, B. F., & May, D. R. (2011). Moral maturation and moral conation: A capacity approach to explaining moral thought and action. *Academy of Management Review*, *36*, 663–685.

Hatcher, L. (1994). *A step-by-step approach to using the SAS system for factor analysis and structural equation modeling*. Cary, NC: SAS Institute.

Hemphill, J. F. (2003). Interpreting the magnitudes of correlation coefficients. *American Psychologist*, *58*, 78–79. doi:10.1037/0003-066X.58.1.78

Hinkin, T. R. (1995). A review of scale development practices in the study of organizations. *Journal of Management*, *21*, 967–988. doi:10.1177/014920639502100509

Hunt, S. D., & Vitell, S. (1986). A general theory of marketing ethics. *Journal of Macromarketing*, *6*, 5–16. doi:10.1177/027614678600600103

Jacobs, J. E., & Paris, S. G. (1987). Children's metacognition about reading: Issues in definition, measurement, and instruction. *Educational Psychologist*, *22*, 255–278. doi:10.1080/00461520.1987.9653052

Jones, T. M. (1991). Ethical decision making by individuals in organizations: An issue-contingent model. *Academy of Management Review*, *16*, 366–395.

Jordan, J. (2009). A social cognition framework for examining moral awareness in managers and academics. *Journal of Business Ethics*, *84*, 237–258. doi:10.1007/s10551-008-9706-3

Kaiser, H. F. (1974). An index of factorial simplicity. *Psychometrika*, *39*, 31–36. doi:10.1007/BF02291575

Kohlberg, L. (1969). Stage and sequence: The cognitive-developmental approach to socialization. In D. A. Goslin (Ed.), *Handbook of socialization theory and research* (pp. 347–480). Chicago, IL: Rand McNally.

Kohlberg, L. (1981). *The philosophy of moral development*. San Francisco, CA: Harper & Row.

Koriat, A., Ma'ayan, H., & Nussinson, R. (2006). The intricate relationships between monitoring and control in metacognition: Lessons for the cause-and-effect relation between subjective experience and behavior. *Journal of Experimental Psychology: General*, *135*, 36–69. doi:10.1037/0096-3445.135.1.36

Kramarski, B., & Mevarech, Z. R. (2003). Enhancing mathematical reasoning in the classroom: The effects of cooperative learning and metacognitive training. *American Educational Research Journal*, *40*, 281–310. doi:10.3102/00028312040001281

Krebs, D. L., & Denton, K. (2006). Explanatory limitations of cognitive-developmental approaches to morality. *Psychological Review*, *113*, 672–675. doi:10.1037/0033-295X.113.3.672

Louis, M. R., & Sutton, R. I. (1991). Switching cognitive gears: From habits of mind to active thinking. *Human Relations*, *44*, 55–76. doi:10.1177/001872679104400104

Mandler, J. M. (2014). *Stories, scripts, and scenes: Aspects of schema theory*. New York, NY: Psychology Press.

McMahon, J. M., & Harvey, R. J. (2006). An analysis of the factor structure of Jones' moral intensity construct. *Journal of Business Ethics*, *64*, 381–404. doi:10.1007/s10551-006-0006-5

Metcalfe, J., & Shimamura, A. P. (1994). *Metacognition: Knowing about knowing*. Cambridge, MA: MIT Press.

Meyers, L. S., Gamst, G., & Guarino, A. J. (2013). *Applied multivariate research: Design and interpretation* (2nd ed.). Thousand Oaks, CA: Sage.

Mokhtari, K., & Reichard, C. (2002). Assessing students' metacognitive awareness of reading strategies. *Journal of Educational Psychology*, *94*, 249–259. doi:10.1037/0022-0663.94.2.249

Moses, L. J., & Baird, J. A. (1999). Metacognition. In R. Wilson (Ed.), *Encyclopedia of cognitive neuroscience*. Cambridge, MA: MIT Press.

Narvaez, D. (2006). Integrative ethical education. In M. Killen & J. G. Smetana (Eds.), *Handbook of moral development* (pp. 703–733). Mahwah, NJ: Erlbaum.

Narvaez, D. (2007). How cognitive and neurobiological sciences inform values education for creatures like us. In D. N. Aspin & J. D. Chapman (Eds.), *Values education and lifelong learning: Principles, policies, programmes* (pp. 127–146). Dordrecht, the Netherlands: Springer.

Narvaez, D. (2010). Moral complexity: The fatal attraction of truthiness and the importance of mature moral functioning. *Perspectives on Psychological Science*, *5*, 163–181. doi:10.1177/1745691610362351

Narvaez, D., & Bock, T. (2002). Moral schemas and tacit judgement or how the defining issues test is supported by cognitive science. *Journal of Moral Education*, *31*, 297–314. doi:10.1080/0305724022000008124

Narvaez, D., & Lapsley, D. K. (2009). Chapter 8 moral identity, moral functioning, and the development of moral character. *Psychology of Learning and Motivation*, *50*, 237–274. doi:10.1016/S0079-7421(08)00408-8

Nelson, T. O. & Narens, L. (1990). Metamemory: A theoretical framework and new findings. In G. H. Bower (Ed.), *The psychology of learning and motivation* (pp. 125–173). New York, NY: Academic Press. doi:10.1016/S0079-7421(08)60053-5.

Nelson, T. O., & Narens, L. (1994). Why investigate metacognition. In J. Metcalfe & A. P. Shimamura (Eds.), *Metacognition: Knowing about knowing*. Cambridge, MA: MIT Press.

Piaget, J. (1948). *The moral judgment of the child*. Glencoe, IL: Free Press.

Pintrich, P. R., & Schrauben, B. (1992). Students' motivational beliefs and their cognitive engagement in classroom academic tasks. In D. Schunk & J. Meece (Eds.), *Student perceptions in the classroom* (pp. 149–183). Hillsdale, NJ: Erlbaum.

Pintrich, P. R., Smith, D. A. F., Garcia, T., & McKeachie, W. J. (1991). A manual for the use of the Motivated Strategies for Learning Questionnaire (MSLQ). Retrieved from http://www.eric.ed.gov/ERICWebPortal/search/detailmini.jsp?_nfpb=true&_&ERICExtSearch_SearchValue_0=ED338122&ERICExtSearch_SearchType_0=no&accno=ED338122

Pintrich, P. R., Smith, D. A. F., Garcia, T., & McKeachie, W. J. (1993). Reliability and predictive validity of the Motivated Strategies for Learning Questionnaire (MSLQ). *Educational and Psychological Measurement*, *53*, 801–813. doi:10.1177/0013164493053003024

Posner, M. I., DiGirolamo, G. J., & Fernandez-Duque, D. (1997). Brain mechanisms of cognitive skills. *Consciousness and Cognition*, *6*, 267–290. doi:10.1006/ccog.1997.0301

Reidenbach, R. E., & Robin, D. P. (1990). Toward the development of a multidimensional scale for improving evaluations of business ethics. *Journal of Business Ethics*, *9*, 639–653. doi:10.1007/BF00383391

Rest, J. R. (1986). *Moral development: Advances in research and theory*. New York, NY: Praeger.

Rest, J. R., Narvaez, D., Thoma, S. J., & Bebeau, M. J. (1999). DIT2: Devising and testing a revised instrument of moral judgment. *Journal of Educational Psychology*, *91*, 644–659. doi:10.1037/0022-0663.91.4.644

Reynolds, S. J. (2008). Moral attentiveness: Who pays attention to the moral aspects of life? *Journal of Applied Psychology*, *93*, 1027–1041. doi:10.1037/0021-9010.93.5.1027

Ricco, R. B., & Overton, W. F. (2011). Dual systems Competence←-→ Procedural processing: A relational developmental systems approach to reasoning. *Developmental Review*, *31*, 119–150. doi:10.1016/j.dr.2011.07.005

Ruedy, N. E., & Schweitzer, M. E. (2010). In the moment: The effect of mindfulness on ethical decision making. *Journal of Business Ethics*, *95*, 73–87. doi:10.1007/s10551-011-0796-y

Sadler-Smith, E. (2012). Before virtue: Biology, brain, behavior, and the "moral sense". *Business Ethics Quarterly*, *22*,351–376. doi:10.5840/beq201222223

Schön, D. A. (1983). *The reflective practitioner*. London, England: Temple Smith.

Schraw, G. (1998). Promoting general metacognitive awareness. *Instructional Science*, *26*, 113–125. doi:10.1023/A:1003044231033

Schraw, G., & Dennison, R. S. (1994). Assessing metacognitive awareness. *Contemporary Educational Psychology*, *19*, 460–475. doi:10.1006/ceps.1994.1033

Schreiber, J. B., Nora, A., Stage, F. K., Barlow, A., & King, J. (2006). Reporting structural equation modeling and confirmatory factor analysis results: A review. *The Journal of Educational Research*, *99*, 323–338. doi:10.3200/JOER.99.6.323-338

Stanovich, K. E. (2009). Distinguishing the reflective, algorithmic, and autonomous minds: Is it time for a tri-process theory. In J. S. B. T. Evans & K. Frankish (Eds.), *In two minds: Dual processes and beyond* (pp. 55–88). New York, NY: Oxford University Press.

Street, M. D., Douglas, S. C., Geiger, S. W., & Martinko, M. J. (2001). The impact of cognitive expenditure on the ethical decision-making process: The cognitive elaboration model. *Organizational Behavior and Human Decision Processes*, *86*, 256–277. doi:10.1006/obhd.2001.2957

Swanson, H. L., & Hill, G. (1993). Metacognitive aspects of moral reasoning and behavior. *Adolescence*, *28*, 711–735.

Thiel, C. E., Bagdasarov, Z., Harkrider, L., Johnson, J. F., & Mumford, M. D. (2012). Leader ethical decision-making in organizations: Strategies for sensemaking. *Journal of Business Ethics*, *107*, 49–64. doi:10.1007/s10551-012-1299-1

Thomas, G. P. (2003). Conceptualisation, development and validation of an instrument for investigating the metacognitive orientation of science classroom learning environments: The Metacognitive Orientation Learning Environment Scale–Science (MOLES-S). *Learning Environments Research*, *6*, 175–197. doi:10.1023/A:1024943103341

Trevino, L. K. (1986). Ethical decision making in organizations: A person–situation interactionist model. *Academy of Management Review*, *11*, 601–617.

Vandergrift, L., Goh, C., Mareschal, C. J., & Tafaghodtari, M. H. (2006). The metacognitive awareness listening questionnaire: Development and validation. *Language Learning*, *56*(3), 431–462. doi:10.1111/j.1467-9922.2006.00373.x

Van de Ven, A. H., & Poole, M. S. (1988). Paradoxical requirements for a theory of organizational change. In R. Quinn & K. Cameron (Eds.), *Paradox and transformation: Toward a theory of change in organization and management* (pp. 19–63). Cambridge, MA: Ballinger.

Veenman, M. V. J., Wilhelm, P., & Beishuizen, J. J. (2004). The relation between intellectual and metacognitive skills from a developmental perspective. *Learning and Instruction*, *14*, 89–109. doi:10.1016/j.learninstruc.2003.10.004

Walsh, J. P. (1995). Managerial and organizational cognition: Notes from a trip down memory lane. *Organization Science*, *6*, 280–321. doi:10.1287/orsc.6.3.280

Webster, D. M., & Kruglanski, A. W. (1994). Individual differences in need for cognitive closure. *Journal of Personality and Social Psychology*, *67*, 1049–1062. doi:10.1037/0022-3514.67.6.1049

Whitaker, B. G., & Godwin, L. N. (2013). The antecedents of moral imagination in the workplace: A social cognitive theory perspective. *Journal of Business Ethics*, *114*, 61–73. doi:10.1007/s10551-012-1327-1

APPENDIX

Moral Metacognition Scale
Please indicate the extent to which you agree with the following statements regarding how you think when faced with an ethical dilemma, using the following scale:

1 = Very strongly disagree
2 = Strongly disagree
3 = Somewhat disagree
4 = Somewhat agree
5 = Strongly agree
6 = Very strongly agree

1. I ask myself what is important before engaging in the ethical decision making process.
2. I am a better ethical decision maker when faced with an ethical dilemma that directly impacts me.
3. I try to apply ethical guidelines that I found helpful when faced with ethical dilemmas in the past.
4. I am good at making ethical decisions.
5. I know which factors are important to consider when making an ethical decision.
6. I consider several possible courses of action before making an ethical decision.
7. I know when I need to consider the ethical aspects in a dilemma.
8. After engaging in the ethical decision making process I ask myself if I successfully followed an ethical guideline.
9. I am a better ethical decision maker when faced with an ethical dilemma that is interesting to me.
10. I know my strengths and weaknesses when it comes to making an ethical decision.
11. I stop and review the elements of an ethical dilemma when I remain unclear.
12. I spend time reflecting on my decision after I have made it.
13. I am a better decision maker when faced with an ethical dilemma that is important to me.
14. I do a good job considering the important factors needed to make an ethical decision.
15. During the ethical decision making process I periodically check to make sure the ethical guideline I am using is effective in making an ethical decision.
16. I know what is ethical and unethical.
17. I find myself pausing regularly to confirm that I am considering all aspects of an ethical dilemma.
18. I try to make sense of an ethical dilemma by breaking down the main elements I need to consider.
19. I am a better ethical decision maker when faced with an ethical dilemma that is about a topic I care about.
20. Before engaging in the ethical decision process I determine the appropriateness of the ethical guideline I normally use to solve ethical dilemmas.

Factor 1 = Regulation of Cognition: Items 1, 6, 11, 12, 17, 18
Factor 2 = Knowledge of Cognition (Declarative): Items 4, 5, 7, 10, 14, 16
Factor 3 = Knowledge of Cognition (Procedural): Items 3, 8, 15, 20
Factor 4 = Knowledge of Cognition (Conditional): Items 2, 9, 13, 19