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Creativity and Ethics: The Relationship of Creative and Ethical Problem-Solving

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Abstract

Students of creativity have long been interested in the relationship between creativity and deviant behaviors such as criminality, mental disease, and unethical behavior. In the present study we wished to examine the relationship between creative thinking skills and ethical decision-making among scientists. Accordingly, 258 doctoral students in the health, biological, and social sciences were asked to complete a measure of creative processing skills (e.g., problem definition, conceptual combination, idea generation) and a measure of ethical decision-making examining four domains, data management, study conduct, professional practices, and business practices. It was found that ethical decision-making in all four of these areas was related to creative problem-solving processes with late cycle processes (e.g., idea generation and solution monitoring) proving particularly important. The implications of these findings for understanding the relationship between creative and deviant thought are discussed.

Keywords

creative thinking; processes; ethics; decision-making

Creative ideas are held to be reflected in original, and useful, problem solutions (Ghiselin, 1963; Mumford & Gustafson, 1988). The originality apparent in creative ideas involves a departure from normative behavior (Stokes & Balsam, 2003). This observation, in turn, has led many scholars to ask whether creativity is related to other forms of deviant behavior. For example, although controversial (Ramey & Weisberg, 2004), Jamison (1993) has argued that creativity may be linked to bipolar disorder. Similarly, Sass and Schuldborg (2001) have suggested that creativity may be linked to schizophrenia. Other scholars (Brower, 1999; Eisenman, 1999) have provided evidence indicating that at least certain forms of creative thought may be linked to criminal behavior – a form of deviance. Still other investigations have examined the relationship between creativity and moral, or ethical, behavior (Runco & Nemiro, 2003) noting that the relationship obtained between measures of moral reasoning and creative thought have been inconsistent (Andreani & Pagnin, 1993).

In the present effort we examined the relationship between creative thinking processes (Mumford, Mobley, Uhlman, Reiter-Palmon, & Doares, 1991) and ethical decision-making (Mumford et al., 2006) in a specific domain (Baer, 2003). More specifically, we wished to examine the relationship between creative thought and ethical decision-making among scientists. Our interest in scientists was based, in part, on the fact that creative thought is considered critical to eminent achievement in this arena (Feist & Gorman, 1998; Mumford et

al., 2005). And, in part, our interest was based on the fact that ethical conduct is considered a critical aspect of performance in the sciences (Steneck, 2006). Although scientists do not always display ethical conduct, scientists are expected to adhere to ethical codes of conduct in doing their work (Hamner & Organ, 1978; McCabe and Pavea, 1998), and scientists are routinely trained in ethical conduct (National Institute of Medicine, 2002).

Ethical Conduct

Traditionally, unethical conduct in the sciences was held to be reflected in fabrication, falsification, and plagiarism (Koenig, 2001). These actions, while clearly ethical issues (Marshall, 1996), do not necessarily cover all forms of ethical conduct relevant to performance in the sciences (Steneck, 2004; 2006). For example, ethical issues are brought to fore by conflicts of interest arising from scientists' involvement in multiple related ventures (Campbell, Louis, & Blumenthal, 1998). Similarly, assignment of authorship on publications broaches ethical concerns with regard to both inappropriate allocation of authorship and failure to award authorship to those that have actually contributed to the work (Macrina, 2000).

Although authorship misallocation and conflicts of interest are less severe than fabrication, falsification, and plagiarism, they may occur with greater frequency. Some support for this conclusion has been provided in a recent study by Martinson, Anderson, and de Vries (2005). They conducted a survey study examining scientists' exposure to incidents of unethical behavior. They found that a large proportion, more than 30%, had been exposed to incidents of misconduct in the year prior to the survey. Moreover, many of the ethical breaches scientists reported having been exposed to reflected less severe forms of misconduct (e.g., authorship misallocation) than fabrication, falsification, and plagiarism.

Recognition of the variety of ethical issues arising in the sciences has led to attempts to formulate viable taxonomies examining ethical conduct in the sciences. In one effort intended to address this issue, Helton-Fauth et al. (2003) reviewed codes of conduct published by professions (e.g., American Psychological Association, American Medical Association, American Society for Cell Biology) in the health, biological, and social sciences. This review led to the identification of 17 dimensions of ethical behavior organized into four broader areas, namely data management (data massaging, publication practices), study conduct (institutional review board, informed consent, confidentiality protection, protection of human participants, protection of animal subjects), professional practices (objectivity in evaluating work, recognition of expertise, protection of intellectual property, adherence to professional commitments, protection of public welfare and the environment, exploitation of staff and/or collaborators), and business practices (conflicts of interest, deceptive bid and contract practices, inappropriate use of physical resources, inappropriate management practices). The evidence compiled by Helton-Fauth et al. (2003) indicate that these dimensions, while of varying importance across fields, can account for most incidents of misconduct. Moreover, Kligyte, Marcy, Sevier, Godfrey, and Mumford (2008) have provided evidence for the generality of these dimensions to other scientific fields such as meteorology and computer science.

This taxonomy, and other related taxonomies, of course, provides a basis for assessing ethical conduct (Fleishman & Quaintance, 1984). However, ethical behavior with respect to these dimensions might be assessed using any of a number of techniques (e.g., self-reports, behavioral observations). As O'Fallon and Butterfield (2005) noted, however, the relative infrequency of unethical conduct, and the social consequences of such conduct, have led many investigators to assess ethical conduct through ethical decision-making measures.

Recently, Mumford et al. (2006) developed a set of ethical decision-making measures intended to provide measures of these dimensions. These ethical decision-making measures were

developed using a low-fidelity simulation approach (Motowidlo, Dunnette, & Carter, 1990). Here, a general real-world scenario was presented where participants were asked to assume the role of the principal actor. Subsequently, events unfolding from this scenario were presented where each event had implications for one of the 17 dimensions included in the taxonomy of ethical behavior. For each event, participants were asked to select the best two, of six to twelve, response options where response options varied with respect to ethical implications on a given dimension.

When scores on these dimensions were aggregated to provide measures of data management, study conduct, professional practices, and business practices, the resulting scale scores were found to be moderately related to intelligence ($r = .19$), negatively related to narcissism and cynicism ($r = -.18$), but unrelated to social desirability ($r = -.01$) in a sample of 156 doctoral students working in health, biological, and social science fields. More centrally, it was found that exposure to unethical events in the course of these doctoral students' day-to-day work was negatively related to ethical decisions ($r = -.45$). Moreover, scores on these ethical decision-making measures were positively related to the severity of the punishments awarded for ethical violations by doctoral students when working on an incident review panel ($r = .47$). Thus, it appears that this measure of ethical decision-making evidenced some construct validity as a measure of ethical behavior among younger scientists.

Creativity and Ethics

Of course, the central question underlying the present study was how ethical decision-making would be related to creativity among scientists. One model that might be used to account for this relationship has been provided by Ludwig (1995;1998). He (1995; 1998) was most directly concerned with the relationship between "madness", poor mental health, and eminent achievement, historically notable achievement, in the arts and sciences. He argued that the sciences, in contrast to the arts, emphasize formal, objective modes of creative problem-solving. When creative thought is based on this formal objective mode of thinking, the relationship between poor mental health and creativity is held to be undermined. In fact, Ludwig (1995;1998) provides support for this theory by showing not only that the incidence of mental health problems is lower for successful scientists than artists, but that it is lower for artists employing a formal as opposed to emotive style.

Although Ludwig's (1995;1998) work speaks most directly to eminent achievement and madness, it does have relevance for understanding the relationship between creativity and ethics among scientists. Although creative scientists sometimes display irrational behavior, creative *work* in the sciences depends on systematic theorizing accompanied by systematic, potentially replicable, tests of this theory (Feist & Gorman, 1998; Tweney, 1992). The formal, systematic nature of scientific thought, in turn, implies that scientific creativity occurs *within* a rule bound system – rule bound systems in both conceptual and methodological terms. These rules, or optimized courses of action for theory development and testing, are, of course, subject to change (Kuhn, 1970). However, creative achievement in the sciences often appears to require the ability both to recognize these rules and manipulate theory, and tests, within the rule system applying at that particular point in time. Thus, creative work in the sciences requires both convergent and divergent thinking within a system of constraints (Zuckerman, 1977).

The ability to recognize and apply rules when working through creative problems in the sciences implies that one would, for two reasons, expect a positive relationship between scientific creativity and ethical decision-making. First, because scientists work in a rule bound world, one would expect that they would be particularly attentive to rule systems bearing on their work (Ericsson & Charness, 1994). This attentiveness to work rules should, given the ethical context in which scientific work occurs, encourage scientists to attend to relevant ethical

rules. Second, scientists manipulate and reason within the rule system applying to their particular work domain. Accordingly, one would expect that scientists, incoming younger scientists such as doctoral students, would be skilled in working creatively within these rule systems to give rise to a positive relationship between creativity and ethical decision-making. These observations led to our first hypothesis:

Hypothesis One: Creative thinking skills will be positively related to ethical decision-making among doctoral students in the sciences.

Of course, ethical decisions, particularly ethical decisions in complex and ambiguous settings, do not arise in a vacuum. Recently, Mumford (Kligyte et al., 2008; Mumford et al., in press) proposed a model of how people think about ethical decisions. In this model, it is held that ethical decision-making is based on interpersonal and professional sensemaking (Drazin, Glynn, & Kazanjian, 1999; Weick, 1995). In sensemaking, people attempt to create a mental model for understanding the ethical issue at hand with people using this model to forecast the likely outcomes of actions in emotionally charged and ambiguous interpersonal situations. This sensemaking model of ethical decision-making, in turn, implies that effective ethical decision-making will depend on multiple strategic processing operations such as recognizing circumstances, dealing with emotions, questioning judgment, self-reflection, anticipating consequences, and considering others. Kligyte et al. (2008) and Mumford et al. (in press) showed that training interventions intended to improve application of these strategies leads to improved ethical decision-making. Other work by Mumford et al. (2006) has shown that effective application of these strategies is also strongly positively related to ethical decision-making ($r = .40$).

The importance of these strategies, however, suggests a second way creative thinking might contribute to ethical decision-making. More specifically, creative thinking skills might contribute to more effective execution of each of these strategies. For example, creative thinking may allow people to forecast a larger range of outcomes or construct the ethical problem at hand from the perspective of others. The more effective application of these ethical decision-making strategies brought about by creative thinking skills should lead to more ethical decisions among scientists, including doctoral students beginning their career in the sciences. These observations, in turn, led to our second hypothesis:

Hypothesis Two

Creative thinking skills will be positively related to strategies held to contribute to ethical decision-making among doctoral students in the sciences.

With regard to these first two hypotheses, however, it should be clear that we have formulated hypotheses with respect to creative thinking skills as a general phenomenon. However, over the years a number of models of the cognitive processing operations underlying creative thought have been proposed (e.g., Hennessey & Amabile, 1988; Isaksen & Parres, 1985; Merrifield, Guilford, Christensen, & Frick, 1962; Osborn, 1953; Sternberg, 1986). In a review of these process models, Mumford et al. (1991) identified eight core processing activities involved in creative thought – problem definition, information gathering, concept selection, conceptual combination, idea generation, idea evaluation, implementation planning, and monitoring. In fact, subsequent work by Mumford and his colleagues (e.g., Lonergan, Scott, & Mumford, 2005; Mumford, Supinski, Baughman, Costanza, & Threlfall, 1997; Osburn & Mumford, 2006; Scott, Lonergan, & Mumford, 2005) has led Brophy (1998) and Lubart (2001) to conclude this model represents the best available description of creative thinking processes.

Although all of these processes, in conjunction with knowledge (Hunter, Bedell-Avers, Ligon, Hunsicker, & Mumford, 2008; Weisberg, 2006), exert unique effects on creative problem-

solving, these processes represent distinct entities. Mumford (2001) distinguished these processes with respect to early cycle processing activities involving knowledge generation (i.e., problem definition, information gathering, concept selection, and conceptual combination) and late cycle processing activities involving product production (i.e., idea generation, idea evaluation, implementation planning, monitoring). Late cycle processes differ from early cycle processes in that process execution is contextualized to take into account real-world considerations. Thus, Finke, Ward, and Smith (1992) found that idea generation was enhanced by asking people to consider potential applications of new understandings emerging from conceptual combination. Similarly, Lonergan et al. (2005) showed that idea evaluation improves when people employ a compensatory approach seeking to offset real-world deficiencies in new ideas.

This contextualization of late cycle processing activities is significant because it has implications for the kind of creative processing skills that would influence strategy execution and ethical decision-making. Eisenman (1999) contrasted more and less creative prisoners to norms of three creative tests – singing, dancing, and storytelling based on the Thematic Apperception Test. It was found that creative prisoners obtained higher scores than non-creative peers on singing and dancing but not storytelling – presumably due to the external constraints imposed on creativity by storytelling requirements (Eisenman, 1999). Ethical decisions, of course, imply that decisions must be made to take into account the real-world consequences of actions. This observation, in turn, implies that late cycle processing activities will exert stronger effects on ethical decisions, and the strategies employed in making these decisions, than early cycle processing activities. One would expect these relationships to hold for both experienced scientists and doctoral students just starting their careers in the sciences. Hence, our final two hypotheses:

Hypothesis Three

Late cycle creative processing activities will be more strongly, and positively, related to ethical decision-making among doctoral students in the sciences than early cycle creative processing activities.

Hypothesis Four

Late cycle creative processing activities will be more strongly, and positively, related to strategies underlying ethical decision-making among doctoral students in the sciences than early cycle creative processing activities.

Method

Participants

The sample used to test these hypotheses consisted of 258 doctoral students attending a large research university in the southwest. The 98 men and 151 women (9 unreported) recruited to participate in this study had a minimum of 4 months experience working at the university and a maximum of 60 months experience. Sample members were recruited from programs awarding doctoral degrees in the biological (40%), health (27%), and social sciences (33%). All programs required independent research for award of a doctorate. On average, sample members were 28 years old with 61% of the sample being composed of majority group members and 39% of the sample being composed of minority group members. A typical sample member had completed 17 years of education prior to admission into their relevant doctoral program. Although 45% of the sample was employed in non-research (primarily teaching) positions, 55% were employed as full time research assistants. All sample members, however, reported being actively involved in one or more research projects, and most go on to active careers in research in either applied or academic settings.

General Procedures

The present study was conducted as a part of a larger, federally funded, initiative concerned with research integrity. The university provided names, department assignments, email addresses, and telephone numbers of all doctoral students attending the university in 2005 and 2006. A three stage recruitment process was used to recruit the doctoral students who agreed to participate in this study. First, flyers announcing the study, and that \$100.00 would be provided as compensation for participation, were placed in the mailboxes of doctoral students. Second, one phone call was made to each doctoral student to encourage participation. Finally, each doctoral student was sent up to four email requests to solicit participation.

In all stages of this recruitment process, it was noted that the study was concerned with research integrity. More specifically, the study was described as examining the effects of educational experience on integrity and problem-solving. Those students who agreed to participate in this study were asked to schedule a time when they could complete a four hour battery of paper-and-pencil measures. Students were asked to read and complete each measure under conditions where no time pressure was induced. Once the doctoral students had completed these measures, they were debriefed.

The battery of paper-and-pencil measures the doctoral students were asked to complete included a number of inventories. First, students were asked to complete a background information form. Second, they were asked to describe the work they were doing and events that had occurred in the course of doing this work. Third, they were asked to assume the role of an institutional review board member and assign penalties for ethical breeches. Fourth, they were asked to complete a battery of individual differences measures intended to provide covariate controls. Fifth, and finally, participants were asked to complete a professional, field relevant, problem-solving measure. It is of note that this field specific problem-solving measure was structured such that people were asked to make ethical decisions and engage in creative problem-solving vis--vis issues that might be encountered in their day-to-day work. This measure was administered as a problem-solving measure after the review board task, which expressly focused on ethics, to minimize demand characteristics. Thus, participants saw the ethical decision-making measures as a work performance measure.

Covariates

The first two control measures examined cognitive abilities that might influence peoples' problem-solving (Vincent, Decker, & Mumford, 2002). More specifically, people were asked to complete a 30-item verbal reasoning measure drawn from the Employee Aptitude Survey (Ruch & Ruch, 1980) along with a 5-item consequences test (Merrifield, Guilford, Christensen, & Frick, 1962) intended to provide a measure of divergent thinking. The consequences test was scored for fluency given its use as a control. Both these measures yielded split-half reliability coefficients above .80. Evidence bearing on their construct validity may be obtained by consulting Ruch and Ruch (1980) and Merrifield, Guilford, Christensen, and Frick (1962).

In addition to these cognitive measures, participants were asked to complete two sets of personality measures. The first set of measures examined general dispositional characteristics that might be relevant to creativity or ethics. Accordingly, participants were asked to complete John, Donahue, and Kentle's (1991) behavioral self-report inventory to provide measures of agreeableness, extraversion, conscientiousness, neuroticism, and openness – NEO dimensions (McCrae & Costa, 1987). Additionally, participants were asked to complete Paulhus's (1984) behavioral self-report measure of socially desirable responding. All the scales included in these inventories produced internal consistency coefficients above .70. Paulhus's (1984) and

John, Donahue, and Kentle (1991) have provided evidence bearing on the construct validity of their instruments.

The second set of personality measures, again all behavioral self-report inventories, examined personality characteristics that have been linked to integrity and ethical decision-making. Thus, participants were asked to complete Emmons's (1987) measure of narcissism and Wrightsman's (1974) measure of cynicism. Finally, based on Fromm's (1973) observations concerning the impact of uncertainty on ethical breaches, participants were asked to complete Taylor's (1953) Manifest Anxiety Scale. Again, these scales all produced internal consistency coefficients in the low .70s. Evidence bearing on the construct validity of these scales has been provided by Emmons (1987), Taylor (1953), and Wrightsman (1974).

Ethical Decision-Making

The principle criterion measure of concern in the present study was the measure of ethical decision-making developed by Mumford et al. (2006). Development of this measure was based on Helton-Fauth et al.'s (2003) taxonomy describing the major behavioral dimensions included in ethical conduct in the sciences. More specifically, this measure was intended to provide an assessment of the four broader dimensions, data management, study conduct, professional practices, and business practices, based on expression of specific dimensions subsumed under these broader rubrics, such as the objectivity in evaluating work and protection of intellectual property – dimensions subsumed under professional practices.

Development of the ethical decision-making measure began with a review of ethics websites (e.g., On-line Ethics Center, American Psychological Association) to identify work-oriented cases that might be used to assess decision-making with respect to one or more of the 17 dimensions identified by Helton-Fauth et al. (2003). This review led to the identification of 45 cases in each of the three fields under consideration – biological, health, and social sciences. These cases were then reviewed, by three psychologists, with respect to their ability to meet three criteria: 1) relevance to day-to-day work, 2) both ethical and technical issues involved, and 3) potentially challenging decisions across a range of expertise. These criteria led to selection of the 10 to 15 cases applying in a given field that would be used to develop the measures of ethical decision-making.

Development of the ethical decision-making measure involved two stages – context preparation and item development. Context generation began with rewriting of the case into a short one or two paragraph scenario. Next, a panel of three psychologists, and a subject matter expert, generated a list of 8 to 12 events that might occur within this scenario under the constraint that half these events were to have only technical implications and half of the events were to have ethical implications for one of the 17 dimensions. Panel members were asked to review these events, the basis for item development, and select the two technical and two ethical events most likely to occur in this scenario. Panel members were then asked to take the two best ethical, and the two best technical, events and organize them into a flow of action within the scenario.

The two ethical events identified in each scenario provided the basis for developing the measure of ethical decision-making. For each of these events, 6 to 12 potential responses were generated by three psychologists for each ethical event. One third of these responses were to reflect highly ethical responses, one third moderately ethical responses, and one third poor ethical responses. These response options were based on professional codes of conduct. All response options generated were reviewed by a panel of three psychologists, all with more than seven years experience working in the area of scientific ethics, with respect to the responses proposed scoring (high, moderate, poor), the relevance of the responses to a hypothesized dimensions (e.g., data massaging), and clarity. On average, 2 to 3 events were formulated for each of the 17 dimensions of ethical conduct applying to a given field – biological, health, and social

sciences. Separate measures were formulated for each field. Figure 1 illustrates the ethical decision-making questions administered to doctoral students in the social sciences.

In responding to these questions, participants were asked to read through the scenario and assume the role of the primary actor in the scenario. After they had read through an event, they were to select the two response options that they believed would most likely resolve the issue broached by the event. Responses selected were scored as high (3), moderate (2), and low (1). The average of the two responses provided a participant's score for the event. The average of these scores was then obtained for all questions bearing on a given dimension of ethical conduct. The average of scores across dimensions subsumed under the four general rubrics of ethical conduct, data management, study conduct, professional practices, and business practices, provided the final measures of ethical conduct applied in the present study.

The average, across field, split-half reliability obtained for scores on the data management, study conduct, professional practice, and business practices dimensions was .74. Evidence bearing on the construct validity of these scales has been provided by Mumford and colleagues (2006) who noted that 1) the scales measuring these four dimensions of ethical decision-making evidenced an interpretable pattern of relationships (e.g., data management and professional practices were strongly related ($r = .57$) while data management and study conduct ($r = .22$) displayed a weaker relationship), 2) these scales yielded an interpretable pattern of relationships with relevant individual difference measures (e.g., proving to be negatively related to cynicism and narcissism), 3) these scales were uncorrelated with social desirability, 4) these scales were negatively related to career events held to influence ethical conduct, and 5) these scales were positively related to the severity of punishment awarded for incidents of misconduct.

Cognitive Strategies

Prior work on ethical decision-making by Kligyte et al. (2008) and Mumford et al. (in press) led to the identification of seven cognitive strategies that might contribute to ethical decision-making: 1) recognition of circumstances, 2) seeking help, 3) questioning one's judgment, 4) anticipating consequences, 5) dealing with emotions, 6) analysis of personal motivations, and 7) consideration of the effects of one's actions on others (Butterfield, Treviño, & Weaver, 2000; Street, Douglas, Geiger, & Martinko, 2001; Yaniv & Kleinberger, 2000).

To develop measures of these strategies, operational definitions of each strategy were formulated. A panel of four psychologists, all psychology doctoral students, was presented with these operational definitions and the way in which application of each strategy manifested itself in ethical decisions. Following this 20 hour training program, the judges were asked to read through each scenario, the associated ethical events, and the response options that might be provided for these events. Judges were then asked to rate the extent to which each response option would emerge from application of each of these cognitive strategies using a 7-point Likert scale (1 = Low, 7 = High).

The interrater agreement coefficient obtained for these ratings of strategy application was .91. Scores on each strategy were obtained by weighting each response based on the judges' average rating and then multiplying these weights by each response selected to obtain the average strategy score across all selected responses. Evidence bearing on the validity of these strategy scores has been provided by Mumford et al. (2006) and Mumford et al. (in press). The findings obtained in these studies indicate not only that execution of these strategies is positively related to ethical decision-making ($r = .40$), but that effective educational interventions with regard to ethics result in improvements of peoples skill in executing these strategies.

Creative Thinking Skills

The measure of creative thinking skills applied in the present study was based on the model of creative thinking processes developed by Mumford et al. (1991). This model holds that creative thought involves 8 core processing activities: 1) problem definition, 2) information gathering, 3) concept selection, 4) conceptual combination, 5) idea generation, 6) idea evaluation, 7) implementation planning, and 8) monitoring. Prior studies by Lonergan et al. (2004), Mumford et al. (1997), Osburn and Mumford (2006), and Scott et al. (2005) have provided evidence indicating the influence of effective execution of these processing activities on creative thought.

In the present effort, measures of these creative processing activities were based on the technical events following scenarios being used to measure ethical decision-making. As noted earlier, half the events following a given scenario had ethical implications while the remaining half of the events had technical implications. All technical events were written to call for the production of novel, potentially useful, solutions to the technical problem broached by the event, and this could be said to reflect creative thought (Mumford & Gustafson, 1988). Four psychologists wrote those questions concerning technical events with respect to the 8 processes identified by Mumford and colleagues (1991). Prior to writing these technical event questions, three psychologists, again all doctoral students in industrial and organizational psychology, were provided with a 20 hour training program describing each process and how it was reflected in technical work in the field. The judges, and a subject matter expert, were asked to generate 4 to 8 events in each field that would fit with the relevant scenario and reflect application of the relevant process.

The measurement of these processes occurred using a variation on the procedures suggested by Runco, Dow, and Smith (2006). More specifically, once events calling for application of a given process had been generated, the three judges, and a subject matter expert, were asked to generate potentially usable response options that might be used in resolving the technical issues broached by this event. Response options were to be generated under the constraints that 1) one-quarter of the options were to reflect responses of high quality and high originality, 2) one-quarter of the options were to reflect responses of high originality but low quality, 3) one-quarter of the options were to reflect responses of low originality but high quality, and 4) one-quarter of the options were to reflect responses of low quality and low originality.

Again, participants were asked to read through the scenario and assume the role of the principle actor. After reading through the description of a technical event, they were asked to select the two options they believed would most likely resolve the issue broached by the event. The options selected were given scores of 3 (high quality, high originality), 2 (high quality, low originality or low quality, high originality), or 1 (low quality, low originality) with average scores being obtained for the two options selected. These scores were then averaged over all events bearing on the application of a given process to obtain process application scores within the three fields of health, biological, and social sciences. Figure 2 provides an illustration of 2 creative problem-solving items, for idea generation and conceptual combination, for social scientists.

The average split-half reliability coefficient obtained across the three fields for scores on these 8 process dimensions was .71. Some initial evidence bearing on the construct validity of these measures was obtained by examining their convergent and divergent validity. Thus, conceptual combination was found to be positively related to idea generation ($r = .29$) and idea evaluation ($r = .15$) but not problem definition ($r = .07$). Problem definition, however, was found to be positively related to implementation planning ($r = .19$). Taken together, these relationships provide some initial evidence for the construct validity of these measures.

Analyses

Initially, scores on the measures of creative processing were correlated with the measures of ethical decision-making. Subsequently, scores on the four ethical decision-making dimensions, data management, study conduct, professional practices, and business practices, were regressed on the creative processing dimensions. It is of note that each decision-making dimension was then treated as a separate criterion based on prior studies indicating that they demonstrate different patterns of relationships with respect to certain predictors (Mumford et al., 2006). These analyses were then repeated after adding individual differences control measures as the first block of predictors. This same set of analyses was then replicated using the strategy measures as the criterion variables of interest.

Results

Ethical Decision-Making

Table 1 presents the correlations, and associated significance levels, of the ethical decision-making measures with the measures of creative processing skills. As may be seen, two critical creative processing skills, specifically conceptual combination ($r = .17$) and idea generation ($r = .26$), were positively related to ethical decisions involving data management, study conduct, professional practices, and business practices. In addition, solution monitoring ($r = .19$) was positively related to these four dimensions of ethical decision-making. Thus, it appears that creative thinking skills are related to ethical behavior, at least as it is reflected in this kind of low-fidelity simulation.

In this regard, however, it is important to bear in mind the other dimensions of creative thought were related to specific dimensions of ethical decision-making. For example, idea evaluation ($r = .17$) was found to be positively related to ethical decision-making with regard to professional practices, perhaps reflecting the external evaluative aspects of professional behavior. Similarly, implementation planning ($r = .25$) was found to be positively related to study conduct, a relationship that may reflect the importance of planning in conducting research projects. More surprising were the findings that information gathering ($r = -.30$) and concept selection ($r = -.14$) were negatively related to ethical decisions with respect to study conduct. Although these relationships may reflect the self-protective tendencies evidenced by people engaging in unethical conduct (Fromm, 1973), they do suggest that there may be a complex pattern of relationships between creative thinking skills and ethical decision-making.

Table 2 presents the results obtained in the regression analyses when scores on the measures of creative processes were used to account for ethical decision-making both with and without taking into account the individual differences control variables. Significant ($p \leq .05$) multiple correlations of .34, .51, .37, and .39 were obtained when only the creative thinking skills were used to predict ethical decision-making. When the creative thinking skills were used added to the block of individual differences measures, significant ($p \leq .05$) gains in prediction were obtained with multiple correlations of .45, .57, .46, and .45 being observed for the data management, study conduct, professional practices, and business practices. In keeping with the observations of Mumford et al. (2006) intelligence, vis--vis study conduct ($\beta = .21$), professional practices ($\beta = .24$), and business practices ($\beta = .14$), and cynicism, vis-à-vis data management ($\beta = -.16$) and professional practices ($\beta = -.15$), produced the strongest relationships.

More centrally, when relationships among the creative thinking skills were taken into account, it was found that idea generation, both with and without controls taken into account, produced significant ($p \leq .05$) regression weights for data management ($\beta_1 = .23$, $\beta_2 = .23$), study conduct ($\beta_1 = .18$, $\beta_2 = .18$), professional practices ($\beta_1 = .25$, $\beta_2 = .24$), and business practices ($\beta_1 = .$

28, $\beta_2 = .30$). In addition, solution monitoring produced significant ($p \leq .05$) regression weights with respect to ethical decisions involving data management ($\beta_1 = .12$), study conduct ($\beta_1 = .22$, $\beta_2 = .17$), professional practices ($\beta_1 = .15$), and business practices ($\beta_1 = .15$, $\beta_2 = .12$). Again, in the case of study conduct, information gathering ($\beta_1 = -.24$, $\beta_2 = -.22$) and concept selection ($\beta_1 = -.14$, $\beta_2 = -.14$) produced significant ($p \leq .05$) negative relationships. Implementation planning ($\beta_1 = .18$, $\beta_2 = .15$) produced a significant ($p \leq .05$) positive relationship. Even bearing these relationships in mind, however, it appears that two late cycle processing skills (Mumford et al., 1991), idea generation and solution monitoring, are the aspects of creative thought most strongly, and consistently, related to ethical behavior.

Ethical Decision Strategies

Table 3 presents the correlations, and accompanying significance levels, of the strategies held to contribute to ethical decision-making with the measures of creative thinking skills. As may be seen, idea generation ($r = .30$) and solution monitoring ($r = .22$) were consistently positively correlated with application of these strategies. Moreover, both idea evaluation and implementation planning yielded significant ($p \leq .05$) relationships with select strategies. More specifically, idea evaluation was positively related to seeking help ($r = .13$), questioning judgment ($r = .23$), dealing with emotions ($r = .22$), and analyzing personal motivations ($r = .24$) – all strategies where a skeptical evaluative approach would prove beneficial. Similarly, implementation planning was positively related to recognition of circumstances ($r = .15$) and anticipating consequences ($r = .18$), both strategies integral to planning (Mumford, Schultz, & Osburn, 2002). In keeping with this interpretation, implementation planning was found to be negatively related to seeking help ($r = -.18$). Thus, it appears that late cycle creative thinking skills were related to ethical decision-making strategies.

Among early cycle processes, conceptual combination, problem definition, and information gathering produced the strongest relationships. Conceptual combination was positively related to recognition of circumstances ($r = .25$), seeking help ($r = .16$), anticipating consequences ($r = .22$) and consideration of the effects of actions on others ($r = .21$). Because all these strategies require bringing other considerations to bear on ethical problems it was not surprising that they were related to conceptual combination. Problem definition, however, produced negative relationships with seeking help ($r = -.23$), questioning judgment ($r = -.20$), dealing with emotions ($r = -.15$), and analysis of personal motivations ($r = -.21$) – a pattern of findings suggesting that a firm grasp of the problem may undermine more sophisticated analyses of ethical issues. Finally, information gathering was positively related to questioning judgment ($r = .18$), dealing with emotions ($r = .20$), and analysis of personal motivations ($r = .14$) – all strategies that would benefit from information gathering.

Table 4 presents the results obtained when the ethical decision-making strategies were regressed on the creative processing skills. In all cases, the multiple correlations obtained from the processing skills measures were significant ($p \leq .05$) and sizeable ($R = .48$) when no controls were applied. When the control measures were entered as the first block of predictors, again intelligence ($\beta = .30$), cynicism ($\beta = -.17$), and openness ($\beta = .17$) produced the largest regression weights. More centrally, addition of the creative thinking processes resulted in significant ($p \leq .05$) gains in prediction with an average multiple correlation of .58 being obtained. Thus, creative processing skills do seem related to application of ethical decision-making strategies among doctoral students.

The regression weights, however, indicated that two processing skills, idea generation and solution monitoring, were consistently strongly related to application of these ethical decision-making strategies. Idea generation produced an average regression weight of .30 when no controls were applied and an average regression weight of .29 when controls were entered first. Similarly, solution monitoring yielded significant ($p \leq .05$) regression weights for 6 of the 7

ethical decision-making strategies with the average regression weights obtained when controls were not, and were, included being .26 and .19. Thus, it appears idea generation and solution monitoring are related not only to ethical decision-making but also the strategies held to underlie these decisions.

In keeping with the findings obtained in the correlational analyses, implementation planning was found to be negatively related to seeking help ($\beta = -.19$), questioning judgment ($\beta = -.13$), and analysis of personal motivations ($\beta = -.14$). Although idea evaluation was positively related to questioning judgment ($\beta = .13$), dealing with emotions ($\beta = .12$), and analysis of personal motivations ($\beta = .14$) when controls were not applied, these relationships did not reach significance when the controls were entered first.

The relationships produced by the early cycle processing skills with ethical decision-making strategies were substantially weaker than those produced by the late cycle processing skills. However, it was found that conceptual combination was positively related to recognition of circumstances in both the control and no control regressions ($\beta = .13$) while it was positively related to anticipating consequences ($\beta = .12$) when controls were not considered. Similarly, information gathering was positively related to dealing with emotions ($\beta = .13$) in both regressions and was positively related to questioning judgment ($\beta = .11$) only when the controls were not considered. In contrast, concept selection was negatively related ($\beta = -.12$) to consideration of the effects of actions on others – a finding that may reflect the negative effects of abstraction on ethical cognition (Fromm, 1973). Finally, in keeping with the correlational findings, problem definition was found to be negatively related to seeking help ($\beta = -.16$), in both analyses, and to analysis of personal motivations ($\beta = -.12$) when controls were taken into account. Despite the existence of these relationships, however, it seems that the late cycle processes produced a stronger, more consistent, pattern of relationships with ethical decision-making strategies and ethical decisions.

Discussion

Before turning to the broader conclusions flowing from the present study, certain limitations should be noted. To begin, we have not examined all aspects of creativity and creative thought that might conceivably be related to ethics. For example, certain aspects of creative motivation such as flow (Csikszentmihalyi, 1999) or certain aspects of divergent thinking (Andreani & Pagnin, 1993; Runco & Nemiro, 2003) that might also be related to ethical behavior and ethical decision-making have not been examined. Instead, in the present study creative capacities were assessed with reference to the process model of creative thought proposed by Mumford et al. (1991). Although substantial evidence is available for this particular model of creative thought (Lubart, 2001; Scott et al., 2005), it should be recognized that it is only one model of creative thought (e.g., Sternberg, 1988), and the present study focuses solely on these cognitive aspects of creativity.

Moreover, it should be recognized that we have examined only one form of ethical conduct. More specifically, we have examined ethical conduct with respect to ethical decision-making using a series of field-specific, low-fidelity, simulations (Motowidlo, Dunnette, & Carter, 1990). Although ethical decision-making measures, especially low-fidelity work simulations, are commonly used as a low impact mechanism of assessing ethical behavior, and, clearly ethical decision-making is a precursor to overt ethical breeches (O'Fallon & Butterfield, 2005), it is also true that the present study has not examined overt incidents of misconduct. Moreover, we have not examined how situational attributes might shape these incidents of misconduct (James, Clark, & Cropanzano, 1999).

Along related lines, the use of low-fidelity simulation measures allowed us to examine only one form of ethical misconduct. These simulations require active, conscious, processing. Accordingly, the results obtained in this study do not speak to ethical mistakes arising from unintentional breeches. Nonetheless, it should be noted that unintentional breeches do occur, although they were not examined in the present study.

It should also be recognized that we examined the relationship between creative thinking skills and ethical decision-making at a particular point in scientists' careers. With regard to career stage, we have examined the relationship between creative thinking and ethical decision-making among doctoral students. Doctoral students are at the beginning of their careers in the sciences (Zuckerman, 1977). By the same token, these initial experiences set the groundwork for subsequent work. And, more centrally, all these students were actively involved in research. Nevertheless, the question remains as to whether these findings can be extended to more experienced professionals.

Finally, it should be recognized that the present study focused on scientists, health, biological, and social scientists, to help establish the generality of our conclusions in this regard. As Ludwig (1995;1998) has pointed out, there is reason to suspect that deviance might not be linked to creativity in fields emphasizing formal thought, such as the sciences. What should be recognized in this regard, however, is that caution is called for in generalizing our findings to other forms of creative work, such as the arts (Feist, 1999).

One must, of course, bear these limitations in mind when interpreting the findings obtained in the present study. Nonetheless, our findings lead to one clear cut conclusion with regard to the relationship between ethical decision-making and creative thought. More specifically, creative thinking skills are positively related to ethical decision-making among doctoral students in the sciences. As noted above, because the sciences emphasize formal thought and adherence to replicable procedures, it is not surprising that creative thinking skills would be linked to ethical conduct (Ludwig, 1995;1998).

By the same token, however, the practical importance of this finding should not be underestimated. People remember salient events (Mumford et al., 2002). Not only are ethical breeches salient, their salience increases when these breeches are committed by world class creative scientists. Reporting of these events, and their salience in our minds, has led to an assumption that creative thinking may act to undermine ethical conduct. The results obtained in the present study, however, bring to question the truth of this urban legend, at least in the case of scientists – specifically doctoral students beginning their careers in the sciences. Indeed, our findings indicate that creative thinking skills are positively related to ethical decision-making, and, in fact, creative thinking seemed to promote ethical decisions in multiple areas where scientists must make ethical decisions. Hence sizable, and significant, multiple correlations were obtained when creative thinking skills were used to predict ethical decisions concerning data management, study conduct, professional practices, and business practices.

The strong, consistent relationships observed between creative thinking and ethical decision-making in the present study are such that they bring to fore the question why weak, inconsistent, results have been obtained in prior studies (Andreani & Pagnin, 1993; Runco & Nemiro, 2003). What should be remembered here, however, is that in prior studies assessments of ethics, and creative thinking skills, were based on general, non-domain specific measures. Thus, the relationship between creative thought and ethics may be stronger when with field specific skills rather than when general, cross-field, capacities are examined.

One reason these field specific effects might arise is evident in the way people make ethical decisions. Ethical decisions involve cognition in a complex, high stakes, ambiguous setting where a premium is placed on the interpersonal and personal sensemaking (Mumford et al., in

press). A number of cognitive strategies, such as recognizing circumstances, dealing with emotions, and anticipating consequences of actions for others, all appear to influence ethical decision-making. The findings obtained in the present study indicate that creative thinking skills contribute to more effective ethical decision-making because creative thinking skills, at least among doctoral students in the sciences, are associated with more effective strategic processing.

Of course, this argument might be questioned on two bases. First, is there evidence available indicating that execution of these strategies, in fact, contribute to ethical decisions? The studies conducted by Mumford et al. (in press), examining the effects of strategy training on ethical decision-making, and Mumford et al. (2006), examining the relationship between application of these strategies and ethical decision-making, indicate that these strategies are, in fact, a powerful influence on ethical decisions.

Second, do other explanatory systems exist that might account for these relationships? Of course, it is impossible to rule out every alternative explanation in any study. Nonetheless, the findings obtained in the regression analyses indicated that the relationship of creative thinking skills to ethical decision-making and the strategies contributing to these decisions held when general cognitive capacities (e.g., intelligence), general personality characteristics (e.g., openness), and personality characteristics (e.g., cynicism) expressly linked to ethical decision-making were taken into account. Thus, it seems plausible to argue that, at least among young scientists (doctoral students), creative thinking skills contribute to more effective application of ethical decision-making strategies which, in turn, contribute to better ethical decision-making.

These observations, of course, pertain to two of our initial hypotheses – confirming both these hypotheses. Our two remaining hypotheses, however, referred to the influence of late versus early cycle (Mumford, 2001) creative processing skills on ethical decision-making and the strategies people employ when making these decisions. The findings obtained in the correlational and regression analyses indicated that late cycle processing skills – idea generation, idea evaluation, implementation planning, and solution monitoring – made a stronger contribution to prediction of both ethical decision-making, and ethical decision-making strategies, than early cycle creative thinking skills such as problem definition, information gathering, concept selection, and conceptual combination.

Although these findings confirm our remaining two hypotheses, they also broach a broader question. Exactly how do these late cycle processes exert a positive influence on the ethical decision-making of scientists? In part, an answer to this question lies in the two dimensions of creative thought that produced strong, consistent relationships. More specifically, in both the correlational and regression analyses, idea generation and solution monitoring were found to be related to both the various types of ethical decisions under consideration and the strategies applied in making these decisions.

The effects of solution monitoring on the ethical thinking of doctoral students in the sciences can be interpreted in a relatively straightforward fashion. More specifically, a concern with the effects of ones' actions, an aspect of solution monitoring, may well lead to a concern with the effects of ones' actions on others. This concern would give rise to more intensive and extensive analysis of the social implications of action, thus contributing to better strategic processing with regard to ethical decisions and hence better ethical decisions.

The effects of idea generation on ethical decision-making and the strategies applied in making these decisions might, at first glance, appear more surprising. Presumably a wide array of ideas, including unethical ideas, might be generated by creative people. In contrast to this traditional view of idea generation, Finke, Ward, and Smith (1992) have argued that idea generation is an

exploratory activity where people examine the applications and implications of new understandings created through conceptual combination (Baughman & Mumford, 1995). Exploration of the implications and applications of new understandings, however, implies that context must be taken into account in idea generation. Consideration of these contextual issues, coupled with generation of ideas to address these issues, provides one plausible explanation as to why idea generation would also be positively related to ethical thought among younger scientists.

Although these findings indicate that late cycle creative thinking skills are positive influences on creative thought, it should also be recognized that early cycle creative thinking skills were weakly related, and in some cases negatively related, to ethical decision-making and strategies held to contribute to these decisions. This finding is of some importance because it suggests that failure of consistent effects to emerge in prior studies examining the relationship between deviance and creativity may not be solely a function of field, for example science versus the arts (Ludwig, 1995;1998), but also the specific creative thinking skills being examined in these studies (Eisenman, 1999). Hopefully, the present study will provide impetus to future studies more expressly delineating exactly what aspects of creative thought are being examined in studies of deviance and creativity.

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Figure 1. Example Ethical Decision-Making Scenario

Moss is a researcher in the laboratory of Dr. Abrams, a well-known researcher in the field of economics. Moss is trying to develop a model to predict performance of stocks in the technology sector, but she is having difficulty analyzing and selecting trends to include in the model. She enlists the help of Reynolds, another experienced researcher working on a similar topic. With Reynolds's help, Moss eventually analyzes and identifies some key trends working them into a testable model. She also discusses some of her other research ideas with Reynolds. Two weeks later, Moss comes across a grant proposal developed by Reynolds and Abrams. She sees that it includes ideas very similar to those she discussed with Reynolds. She takes the matter to Abrams, who declines to get involved, saying that the two researchers should work it out on their own.

Figure 2. Example of Creative Thinking Questions

Baron works in a non-profit research center set up as part of a 500 square-mile wildlife reserve. Researchers in this lab study how wild animals respond to regular contact with humans. The National Parks and Recreation Service has funded three of the center's research projects examining the impact of human-animal contact on reproductive behavior in different small mammal species. These projects were developed jointly and were funded together because similarities in ecosystem variables and observation methodologies will enable some level of comparison of results across species. Baron is the principal investigator for one of these projects.

Table 1

Correlations of Creative Thinking and Ethical Decision-Making Measures

	<i>M</i>	<i>SD</i>	Data Management (<i>M</i> = 2.26, <i>SD</i> = .25)	Study Conduct (<i>M</i> = 2.22, <i>SD</i> = .31)	Professional Practices (<i>M</i> = 2.23, <i>SD</i> = .19)	Business Practices (<i>M</i> = 2.19, <i>SD</i> = .31)
Problem Definition	2.49	.40	-.05	.09	.03	.04
Information Gathering	2.63	.34	-.04	-.30*	.04	.07
Concept Selection	2.64	.39	.11	-.14*	.07	.00
Conceptual Combination	2.68	.34	.17*	.16*	.13	.20*
Idea Generation	2.82	.32	.28*	.18*	.27*	.30*
Idea Evaluation	2.57	.36	.08	-.11	.17*	.04
Implementation Planning	2.76	.36	.05	.25*	.11	.11
Solution Monitoring	2.89	.35	.14*	.25*	.19*	.19*

Note. *M* = Mean, *SD* = Standard Deviation,

* = *p* ≤ .05.

Table 2
Regression of Ethical Decision-Making on Creative Thinking Measures with and without Controls

	Data Management		Study Conduct		Professional Practices		Business Practices	
	β_1	β_2	β_1	β_2	β_1	β_2	β_1	β_2
Problem Definition	-.03	-.05	.05	.02	.09	.04	.07	.05
Information Gathering	-.07	-.09	-.24**	-.22**	.02	.02	.08	.11
Concept Selection	.10	.10	-.14*	-.14*	.02	.01	-.04	-.04
Conceptual Combination	.09	.07	.09	.10	.03	.03	.11	.12
Idea Generation	.23**	.23**		.18**	.25**	.24**	.28**	.30**
Idea Evaluation	.01	-.01	-.10	-.10	.11	.08	-.03	-.07
Implementation Planning	.01	-.02	.18**	.15**	.03	.01	.05	.02
Solution Monitoring	.12*	.08	.22**	.17**	.15**	.11	.15**	.12*
Model 1: Multiple Correlations		.34**		.51**		.37**		.34**
Model 2: Multiple Correlations		.45**		.57**		.46**		.45**
Model 2: Significant Controls from First Block								
Cynicism		-.16*	Intelligence	.20*	Intelligence	.24**	Intelligence	.14*
Openness		.14*			Cynicism	-.15*		

Note. β_1 = Standardized regression weight (no controls), β_2 = Standardized regression weight (with controls).

*
 $p \leq .05$,

**
 $p \leq .01$.

Table 3

Correlations of Creative Thinking and Ethical Strategies Measures

	Recognition of Circumstances <i>M</i> = 3.57 <i>SD</i> = .39	Seeking Help <i>M</i> = .82 <i>SD</i> = .22	Questioning Judgment <i>M</i> = 2.91 <i>SD</i> = .44	Anticipating Consequences <i>M</i> = 3.47 <i>SD</i> = .49	Dealing with Emotions <i>M</i> = 2.98 <i>SD</i> = .44	Analysis of Personal Motivations <i>M</i> = 2.79 <i>SD</i> = .42	Consideration of Effects on Others <i>M</i> = 3.17 <i>SD</i> = .43
Problem Definition	.02	-.23**	-.20**	.04	-.15*	-.21*	-.08
Information Gathering	-.07	.04	.18*	-.09	.20*	.14*	-.09
Concept Selection	-.05	-.03	.09	-.06	.10	.06	-.11
Conceptual Combination	.25*	.16*	.04	.22*	.04	.08	.21*
Idea Generation	.36*	.26*	.28*	.30*	.27*	.31*	.32*
Idea Evaluation	.03	.13*	.23*	.04	.21*	.24*	.09
Implementation Planning	.15*	-.18*	-.09	.18*	-.04	-.09	.04
Solution Monitoring	.34**	.03	.18*	.33*	.17*	.20*	.31*

Note. *M* = Mean, *SD* = Standard Deviation,*
p ≤ .05.

Table 4
Regression of Ethical Strategies Measures on Creative Thinking Measures with and without Covariates

	Recognition of Circumstances		Seeking Help		Questioning Judgment		Anticipating Consequences		Dealing with Emotions		Analysis of Personal Motivations		Consideration of Effects on Others	
	β_1	β_2	β_1	β_2	β_1	β_2	β_1	β_2	β_1	β_2	β_1	β_2	β_1	β_2
Problem Definition	.06	.01	-.16**	-.16*	-.07	-.09	.07	.03	-.03	-.05	-.04	-.12*	-.02	-.06
Information Gathering	-.06	-.05	-.07	-.02	.11*	.10	-.08	-.06	.15*	.12*	.07	.06	-.10	-.09
Concept Selection	-.07	-.08	-.05	-.03	.08	.07	-.09	-.09	.08	.08	.03	.03	-.12*	-.10
Conceptual Combination	.13*	.12*	.08	.07	-.05	-.06	.12*	.10	-.04	-.05	-.02	-.03	.10	.10
Idea Generation	.35**	.35**	.24**	.22**	.30**	.30**	.30**	.28**	.28**	.29**	.32**	.31**	.32**	.29**
Idea Evaluation	-.03	-.06	.05	.06	.13*	.08	-.07	-.04	.12*	.07	.14*	.08	.03	-.01
Implementation Planning	.06	.03	-.19**	-.16**	-.13*	-.13*	.10	.08	-.09	-.09	-.14*	-.14*	-.01	-.02
Solution Monitoring	.29**	.23**	.01	.02	.16**	.14*	.28**	.23**	.16**	.14*	.17**	.15**	.26**	.22**
Model 1: Multiple Correlations		.54**		.41**		.48**		.50**		.45**		.48*		.50**
Model 2: Multiple Correlations		.64**		.45**		.58**		.61**		.57**		.59**		.60**
Model 2: Significant Controls from First Block														
Intelligence		.30**				.29*		.31**		.30**		.29**		.29**
Social Desirability									.14*					
Cynicism								-.17**						-.18**
Conscientiousness				.18*										
Openness		.18**				.13*		.18**				.15*		.20**
Extraversion						-.15*				-.14*		.14*		

Note. β_1 = Standardized regression weight (no controls), β_2 = Standardized regression weight (with controls).

*
 $p \leq .05$,

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 $p \leq .01$