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Field and Experience Influences on Ethical Decision-Making in the Sciences

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Abstract

Differences across fields and experience levels are frequently considered in discussions of ethical decision-making and ethical behavior. In the present study, doctoral students in the health, biological, and social sciences completed measures of ethical decision-making. The effects of field and level of experience with respect to ethical decision-making, metacognitive reasoning strategies, social-behavioral responses, and exposure to unethical events were examined. Social and biological scientists performed better than health scientists with respect to ethical decision-making. Furthermore, the ethical decision-making of health science students decreased as experience increased. Moreover, these effects appeared to be linked to the specific strategies underlying participants' ethical decision-making. The implications of these findings for ethical decision-making are discussed.

Keywords

ethics; decision-making; field differences; reasoning strategies

Few scholars dispute the point that ethics are integral to the success of the scientific enterprise (Steneck, 2004; 2006). Salient events, such as the death of study participants as a result of protocol violation or the outright fabrication of data (Kochran & Budd, 1992; Marshall, 1996), remind us of the consequences of unethical behavior on the part of scientists. Although these events are dramatic, less salient but potentially more pervasive forms of misconduct may represent a greater threat to the scientific enterprise. For example, Martinson, Anderson, and de Vries (2005) found that less sensational acts of misconduct – such as conflict of interest and misallocation of authorship – were more common in the sciences than is often assumed.

Recognition of the problems posed by unethical behavior on the part of scientists has led to a number of initiatives intended to enhance ethical conduct. These efforts have ranged from the development of codes of conduct (National Institute of Medicine, 2002), to changes in editorial practices (Marušić, 2006), to ethics instructional programs (Kalichman & Paik, 2004). Accompanying these attempts to enhance research integrity has been a new interest in understanding unethical behavior on the part of scientists. Indeed, a number of explanatory systems have been proposed, including personality (Antes, Waples, Brown, Mumford, Devenport, & Connelly, 2006), work stress (Reall, Bailey, & Stoll, 1998), and environmental press (Sims & Keon, 1999).

In attempts to understand the sources of unethical behavior, two issues commonly arise. The first involves the potential existence of cross-field differences in unethical behavior (Baer, 2003). Such cross-field differences might reflect a variety of phenomena ranging from training and experiential differences to fundamental differences in how scientists in various fields construe ethical issues. A second issue concerns the possibility of changes in ethical behavior as a function of experience working in a field (Rest, Naráñez, Bebeau, & Thoma, 1999). Our intent in the present investigation was to examine field and experience as they relate to ethical decision-making among scientists. Before discussing field and experience as they relate to ethics, however, we will briefly consider how researchers have thought about, and assessed, ethics in previous investigations.

Ethical Decision-Making Measures

Ethical behavior might be measured in a number of ways. One approach that has been applied in attempts to study ethical behavior involves post-hoc analyses of identified incidents of misconduct (e.g., Jasanoff, 1993). Another approach involves asking scientists to report observations of misconduct by colleagues (e.g., Martinson et al., 2005). Still another approach involves assessing ethics with respect to violations of federal guidelines (e.g., Davis & Riske, 2001). These different approaches for measuring ethical conduct all provide useful information. However, another approach for assessing ethical behavior on the part of scientists involves examination of ethical decision-making (e.g., Rest et al., 1999).

Ethical decision-making measures have been widely applied in studies of integrity (O'Fallon & Butterfield, 2005; Mumford, Gessner, Connelly, O'Connor, & Clifton, 1993; Treviño & Youngblood, 1990). In this approach, people are often presented with realistic work scenarios in which ethical issues are raised. Subsequently, they are asked to choose, or produce, responses, which can then be scored for levels of ethicality. Although the idealized, decontextualized nature of these ethical decision-making measures sets limits on the generality of the conclusions that may be drawn from them, due to potential inconsistencies between abstract decisions and actual behavior, this approach to the assessment of ethics is appealing for both practical and theoretical reasons. Practically, ethical decision-making measures represent a low risk assessment strategy in which sufficient variance might be observed in peoples' responses to permit meaningful analyses. Theoretically, however, ethical issues also require people to make choices as to how they will behave (Lovell, 2002; Miner & Petocz, 2003). The choices people make with regard to their behavior in ethical situations are considered a direct and immediate precursor to ethical behavior. As a result, ethical decision-making measures are commonly applied in studies of ethics in general (e.g., Barrett & Vaicys, 2000; Paolillo & Vitell, 2002) and scientific ethics in particular (Eastman, Eastman, & Tolson, 2001; Mumford et al., 2006).

Recently, Helton-Fauth et al. (2003) reviewed ethical codes of conduct in the health, biological, and social sciences. This review led to the identification of four higher order dimensions of ethical conduct in the sciences—1) data management, 2) study conduct, 3) professional practices, and 4) business practices—each subsuming two to six more specific dimensions, such as data massaging and institutional review board practices. These dimensions cover more than 80% of the ethical concerns noted in relevant codes of conduct (e.g., American Medical Association, American Institutes for Biological Science, American Psychological Association). Mumford and colleagues (2006) used this taxonomy to develop a scenario-based measure of ethical decision-making and provided initial construct validity evidence for the measure. This approach to assessing ethical decision-making was used in the current study to investigate the associations between field and experience as they relate to ethical choices and how young scientists think about ethical problems.

Field

The concept of the field in science is inherently complex (Csikszentmihalyi, 1999). In its most direct sense, the concept of a field refers to work within a domain to address a set of problems about which members of this field agree with respect to their relevance and significance. A field, however, is not simply a matter of the work being conducted. Instead, fields are characterized by at least three other attributes. First, fields establish institutional structures intended to control both the flow of work and evaluation of the work accomplished (Baer & Frese, 2003). Second, associated with institutionalization, fields impose educational requirements on people pursuing work in an area (Sternberg, 2005). These educational requirements extend well beyond curricula to include mentoring and key developmental experiences, such as post-doctoral work. Third, fields impose, through institutions and educational experiences, a set of normative expectations on those pursuing work in the area (Feldman, 1999). These normative expectations are typically multifaceted and range from assumptions about the significance of a certain line of work to expectations for appropriate behavior among the people conducting the work.

Not surprisingly, fields, and the normative expectations they establish, have long been considered relevant to understanding ethical behavior and ethical decision-making (National Institute of Medicine, 2002). One might also argue that differences among fields with respect to work, institutions, education, and normative expectations may give rise to differences in ethical behavior and ethical decision-making. A case in point may be found in the health sciences, a highly competitive field in which substantial institutional pressure is often placed on investigators to secure funding – indeed, maintenance of an acceptable external funding pattern is often critical to tenure. Because prior research has shown that intense competitive pressure may undermine ethical decision-making (Mumford, Murphy, Connelly, Hill, Antes, Brown, and Devenport, 2007; Robertson & Rymon, 2001), there is reason to suspect that the competitive nature of the health sciences might result in less ethical decision-making than in either biological or social sciences. The effects of competitive pressures in the health sciences might also be exacerbated by the magnitude of rewards provided for apparent achievement and the competing demands produced by a concern with patient well-being versus scientific discovery (Lidz, 2006) – factors that either do not exist, or that exist in less dramatic forms, in the biological and social sciences where a greater emphasis is placed on education and discovery per se.

Other potential differences between fields, including levels of risk to human or animal subjects, the strength of field-specific regulations, and the differential attraction and selection of certain types of individuals (Fiest & Gorman, 1998), lead us to expect differences to occur with respect to ethical decision-making across these fields. Indeed, not only do fields often provide members with strategies for how to approach problems arising in the course of their work (Simonton, 2005) – including ethical problems – but fields also socialize people to engage in certain patterns of social interaction as they conduct their work. As a consequence, there is reason to suspect that differences in characteristic social-behavioral patterns, such as involving others when making decisions (Murphy, 1993), and specific decision-making or metacognitive reasoning strategies, such as anticipating the consequences of one's actions (Mumford et al., 2006), can be expected to emerge across fields on attributes linked to ethical decision-making. These observations led to our first and second research questions.

R1: Do biological, health, and social scientists show differences by field in their level and pattern of ethical decision-making?

R2: Do biological, health and social scientists display differences in social-behavioral responses and metacognitive reasoning strategies linked to ethical decision-making?

Level of Experience

Ethical decision-making, of course, is not solely a matter of cross-field differences. One key variable commonly assumed to influence ethical behavior and ethical decision-making is the person's level of experience working in the field. Experience in a field might be expected to improve ethical decision-making and behavior because with experience people acquire both knowledge about ethical issues and better strategies for working through ethical problems (Ericsson & Charness, 1994). These gains in knowledge and strategies, especially when accompanied by adoption of field norms with regard to ethics, may give rise to better ethical decision-making and perhaps improved ethical behavior.

Although there is reason to suspect that experience in a field would lead to more ethical decisions, findings obtained in studies of experience and ethical decision-making have been mixed. For example, Rest et al. (1999) found that experience led to improvements in ethical decision-making among dental students. In contrast, a study by Katavic, Vujaklija, Salopek, and Hren (2006) failed to find any noteworthy changes as a function of experience in the ethical decision-making of medical students. Of course, these conflicting results might be accounted for by the nature of the decision-making measures used in different studies, the samples under consideration, or intervening events such as the amount of ethics training provided to participants. Nonetheless, at least two other phenomena might be operating that could undermine an otherwise positive relationship between experience and ethical decision-making.

First, experience in a field leads to more than just technical proficiency in that field. More specifically, involvement with the work being conducted in a field provides direct and indirect exposure to real-world cases (Hammond, 1990) which provide models for people's behavior. Unfortunately, this exposure to real-world cases includes potential exposure to incidents of unethical conduct by peers and mentors. Such examples of unethical conduct, especially when misconduct is rewarded, might result in a tendency for more experienced scientists to engage in unethical behavior and view such behavior as legitimate (Jasanoff, 1993). In this way, the benefits of field experience might be offset by a corresponding increase in exposure to unethical practices by others. Accordingly, we propose a third research question.

R3: Does exposure to unethical conduct change as a function of experience?

Of course, mere exposure to unethical conduct will not invariably lead to unethical decision-making or behavior. The effects of exposure to unethical behavior in the sciences might depend on the interpretive structures applied to understanding these behaviors and their significance (Sims & Keon, 1999). What should be recognized in this context, however, is that the interpretive structures applied to these behaviors are also likely to be provided by the field in which the person is working (Csikszentmihalyi, 1999). Thus, given our foregoing observations with regard to differences between scientific fields, our fourth and fifth research questions explore the possibility of interactions between field and experience.

R4: Do field and experience interact to predict ethical decision-making in the sciences?

R5: Do field and experience interact to predict social behavioral responses and metacognitive reasoning strategies linked to ethical decision-making?

In the present study, we examined these questions in a sample of graduate students in various science fields. In addition to assessing the possibility of field and experience differences in ethical decision-making, we also examined the patterns of metacognitive reasoning strategies and social-behavioral responses underlying participants' ethical decisions, which, in conjunction with self-reported levels of exposure to unethical behaviors, might elucidate any decision-making differences observed.

Method

Sample

The sample used to test these hypotheses consisted of 226 doctoral students attending a large university in the southwest. The 90 men and 131 women (5 did not designate) who agreed to participate in this study were recruited no earlier than 4 months after beginning work at the university and no later than their fourth year in the relevant doctoral program. Sample members were recruited from programs awarding doctoral degrees, research Ph.D.'s, in the health sciences (27%) such as medicine (M.D./Ph.D.), nursing, and epidemiology, biological sciences (42%) such as zoology, biochemistry, and micro-biology, and social sciences (31%) such as psychology, sociology, and anthropology. Approximately 60% of the sample were majority group members and 40% of the sample were minority group members. Our average sample members were 29 years old ranging in age from 21 to 54 years of age. Sample members had completed 17 years of education prior to admission to their doctoral program. At the time of data collection, 60% of the sample was employed in research positions, and 40% of the sample was employed in non-research positions. All sample members, however, were actively involved in research in one of the university's laboratories.

General Procedure

The present investigation was conducted as part of a larger study of research integrity. The university provided names, department assignments, e-mail addresses, and telephone numbers for all doctoral students attending the university in 2005 and 2006. In 2005, entry-level, first year, doctoral students were to be recruited. In 2006, third and fourth year doctoral students were recruited. Only doctoral students, or research-oriented (M.D./Ph.D.) medical students, in the health, biological, and social sciences were recruited for the study.

A three stage recruitment procedure was used to encourage these students to agree to participate in the study. First, flyers announcing the study, noting that \$100.00 would be provided as compensation for participation, were placed in student's university mailboxes. Second, students meeting the sampling standards were called to solicit participation. Third, up to four emails were sent asking students to participate in the study. Overall, approximately 25% of those contacted agreed to participate.

When participants were contacted, it was pointed out that the study was an investigation in research integrity among doctoral students. The study was described as an examination of the influence of students' educational experiences on ethical decision-making and problem-solving. If a student agreed to participate, he or she was asked to schedule a time to complete a four hour battery of measures. Students completed an informed consent document prior to starting work on the measures which included a series of ability and personality measures and an ethical experiences inventory on which they were asked to describe events that had happened to them at the university. Next, they were asked to review a set of ethical violations as an institutional review board member and assign punishments. In the final section of this test battery, participants completed an ethical decision-making measure along with a background information form. This measure examined ethical decisions that might be encountered in day-to-day work. The measure was structured and presented as a work-oriented problem-solving measure to minimize demand characteristics. All of these measures are described in more detail in the sections that follow. After students had completed these measures, they were provided with a debriefing form.

Covariate Control Measures

Any attempt to examine cross-field differences must take into consideration both cognitive abilities and personality variables related to attraction and selection into a given field (Fiest,

1999). Table 1 provides a summary description of the ability and personality measures that were applied as covariate controls in the present study. The two cognitive measures participants were asked to complete included a verbal reasoning measure of general intelligence (Ruch & Ruch, 1980) and a consequences measure (scored for fluency) of divergent thinking (Merrifield, Guilford, Christensen, & Frick, 1962). These two measures were applied to assess general intellectual ability and creative thinking, both of which should be important determinants of performance in professional fields.

In addition to these general cognitive measures, participants completed two measures of relevant personality constructs. First, participants completed John, Donahue, and Kentle's (1991) Big Five Inventory to provide a global personality assessment. This inventory includes scales assessing agreeableness, extraversion, conscientiousness, neuroticism, and openness to experience. Second, participants completed Paulhus's (1984) balanced inventory of desirable responding, which includes scales examining impression management and self-deceptive enhancement.

In the third set of measures, participants completed scales assessing personality variables commonly considered to influence integrity. Based on the findings of Mumford et al. (1993), participants completed Emmons' (1987) measure of narcissism, as well as Wrightsman's (1974) philosophies of human nature scale, which includes sub-scales examining perceived variability and complexity of human natures as well as trust and cynicism. Finally, participants completed Taylor's (1953) manifest anxiety scale.

Dependent Variables

Ethical decision-making—The ethical decision-making measure, which provided the primary dependent variable examined in the present study, was developed to provide a low-fidelity simulation of how people might respond to ethical problems encountered in their day-to-day work (Motowidlo, Dunnette, & Carter, 1990). Accordingly, different ethical decisions were presented appropriate to the field with measures being developed for three fields: 1) health sciences, 2) biological sciences, and 3) social sciences. Development of these ethical decision-making measures was based on Helton-Fauth and colleagues' (2003) review of the research integrity literature. In this review, codes of conduct advocated by professional societies in the areas of health, biological, and social sciences were reviewed. This review led to the identification of 17 dimensions of ethical behavior subsumed under four broad domains: 1) data management (including data massaging and publication practices), 2) study conduct (including institutional review board, informed consent, confidentiality protection, protection of human participants, and protection of animal subjects), 3) professional practices (including objectivity in evaluating work, recognition of expertise, protection of intellectual property, adherence to professional commitments, protection of public welfare and the environment, and exploitation of staff and/or collaborators), and 4) business practices (including conflicts of interest, deceptive bid and contract practices, inappropriate use of physical resources, and inappropriate management practices). Evidence supporting the validity of this taxonomy of ethical behavior has been provided by Helton-Fauth et al. (2003).

Helton-Fauth et al. (2003) used this taxonomy to develop the measure of ethical decision-making applied in the present study. Development of this measure began with a review of relevant websites to identify cases reflecting real-world events that might be used to assess ethical decision-making. Overall, an average of 45 cases was identified for each of the three fields. These cases were then reviewed by three psychologists with respect to relevance to day-to-day work, involvement of both technical and professional issues, and challenges across a range of expertise. The best 10 to 15 cases applying in each field were selected.

These cases were then abstracted into short, one or two paragraph summaries describing the context surrounding the case. A panel of three psychologists then generated a list of 8 to 12 events, half with only technical implications and half with ethical implications, that might occur as the case unfolded. The ethical events were written to the dimensions of ethical behavior identified by Helton-Fauth et al. (2003). These events were then reviewed and placed in a plan-of-action context, with two ethical and two technical events selected for each case. Subsequently, for each event, a set of 6 to 12 responses were developed that varied in their degree of ethicality. The same panel of subject matter experts categorized each of these responses options according to high, moderate, or low ethicality based on professional norms within the field. Participants were asked to select the two responses that they believed would provide the best approach for addressing the issue raised in an event. On average, three events were formulated to examine ethical decision-making with respect to each of the 17 dimensions of ethical behavior applying in a field. Figure 1 provides an example of these decision-making questions developed for the social sciences.

Scoring of these event questions involved obtaining the average ethicality score for responses applying to an event. For instance, if a participant selected two responses for an event that was scored as 1 (low ethicality) and 2 (moderate ethicality), they would receive a score 1.5. Next, the average of all scores on event questions subsumed under a given dimension was obtained. Then, the average score on all dimensions subsumed under the four general dimensions (i.e., data management, study conduct, professional practices, and business practices) was obtained. These scale scores yielded split-half reliabilities of .74.

Evidence for the validity of these scales as measures of ethical decision-making has been provided by Mumford et al. (2006), which is a subset of the data presented here (data collection occurred over 3 years). They administered these measures to 102 first year doctoral students in the health, biological and social sciences. It was found, across fields, that scores on these measures were not related to social desirability ($\bar{r} = .02$) but were negatively related to cynicism ($\bar{r} = -.26$). Moreover, in examining the relationships among these scales, additional evidence bearing on their construct validity was obtained. Thus, strong positive relationships were observed between data management and professional practices ($r = .57$), but a weaker relationship was observed between data management and study conduct ($r = .22$) and business practices ($r = .18$). More centrally, scores on these decision-making measures were found to be negatively related to self-reported exposure to unethical practices in the laboratory in which the student was working ($\bar{r} = -.45$) and positively related to the severity of the punishments awarded for incidents of unethical conduct on a review panel task ($\bar{r} = .53$). In another study providing evidence for the construct validity of this measure, Mumford et al. (2007) showed that these ethical decision-making measures also exhibit a meaningful pattern of relationships with measures of ethical climate. Taken as a whole, this pattern of evidence points to the validity of this measure as an index of ethical decision-making.

Social-behavioral responses and metacognitive reasoning strategies—The assessment of social-behavioral responses and metacognitive reasoning strategies applied in the present study was based on the development of alternative scoring systems for the ethical decision-making measure. The scoring of social behavioral responses included 7 dimensions: 1) involving others in the decision, 2) retaliation, 3) deception, 4) active involvement (versus passive disengagement), 5) avoidance of responsibility, 6) selfishness, and 7) making closed-ended decisions that curtail subsequent options. Likewise, scoring of the metacognitive reasoning strategies included 7 dimensions: 1) recognition of circumstances (i.e., awareness of broadly relevant principles, key individuals, and the complex nature of the dilemma), 2) seeking help, 3) questioning one's judgment, 4) anticipating consequences, 5) dealing with one's emotions, 6) analysis of personal motivations and biases, and 7) consideration of the effects of one's actions on others. These dimensions appear in various forms and under various

names in previous studies of ethical misconduct (e.g., Anderson, 2003; Butterfield, Treviño, & Weaver, 2000; Darke & Chaiken, 2005; Kahneman, 2003; Knaus, 2000; Moore & Loewenstein, 2004; Munro, Bore, & Powis, 2005; Schweitzer, DeChurch, & Gibson, 2005; Street, Douglas, Geiger, & Martinko, 2001; Tenbrunsel & Messick, 2004; Tyler, 2006; Yaniv & Kleinberger, 2000).

Following the identification of these dimensions, operational definitions were formulated. After being familiarized with these definitions, a panel of four psychologists was asked to rate each response option across all events with respect to the extent to which it reflected each of these dimensions. These ratings were made on a seven point scale (1 = low, 7 = high). The average interrater agreement coefficient obtained for the social-behavioral responses was .83, whereas the average interrater agreement coefficients obtained for the decision-making strategies was .91. The average of the judges' ratings was used to weight each response, and the average score on each dimension was obtained by computing the average weight across responses for the options selected on the ethical decision-making questions. Evidence for the validity of these measures has been provided by Mumford et al. (2006), who found that scores on these dimensions evidenced an interpretable pattern of relationships as well as significant correlations with the ethical decision-making scores.

Exposure to unethical behavior—The final dependent variable examined in the present study examined exposure to unethical behavior using a measure of laboratory work experiences. Development of this measure began with a review of professional codes of conduct in the health, biological, and social sciences. The review was used to identify work events relevant to ethical behavior (e.g., selectively replacing participants when gathering data and maintaining anonymity in manuscript reviews). In all, 240 ethical events were identified. A panel of three psychologists, and a subject matter expert, then revised these events. Events were eliminated that were 1) redundant, 2) could occur outside the research context, 3) were not observable, 4) would not occur in all fields, and 5) were trivial. This review led to the identification of 52 work events, which were classified by members of the review committee into the form main dimensions under consideration: 1) data management (8 events), 2) study conduct (25 events), 3) professional practices (14 events), and business practices (8 events). Finally, to minimize demand characteristics 52 work events that had no ethical implications were developed. Table 2 presents examples of these ethical and technical work events.

Participants were presented with these events in random order. They rated from 1 (low) to 7 (high) the frequency with which they had been exposed to those events in their day-to-day work. The resulting internal consistency coefficients were .84, .88, .87 and .66 for data management, study conduct, business practices, and professional practices, respectively. Examination of the correlations of these scales provided some evidence for their construct validity. Accordingly, exposure to unethical data management events was found to be strongly related to study conduct ($r = .42$) but less strongly related to business practices ($r = .28$).

Predictor Variables

Field—The relationships between field and these four sets of dependent variables were examined by contrasting people working in the health, biological, and social sciences. Information bearing on the participant's field was obtained from the demographic form. Social sciences included psychology, sociology, international relations, political science, social work, and economics. Biological sciences included zoology, botany, microbiology, biochemistry, cellular biology, ecology, and epidemiology. Health sciences included medicine (M.D./Ph.D.), pharmacology, nursing, speech pathology, public health, and rehabilitation sciences.

Level of experience—Level of experience was determined by the number of years students had been in the doctoral program. First year doctoral students were coded 1 – low experience. Third and fourth year students were coded 2 – high experience. It is of note in this regard that level of experience, in this sample, was unrelated to age. Moreover, pilot analyses indicated no difference in the personalities or cognitive abilities of doctoral students within a field as a function of respondents' year in the program. As a result, there is reason to suspect that this straightforward coding procedure is an adequate measure of level of experience.

Analyses

The principal analyses conducted in this study were analyses of covariance. The cognitive and personality variables were treated as covariate controls along with age, years of prior schooling, and possessing a Master's degree at time of entry to a program. A covariate was retained only if it produced at least a marginally significant ($p < .10$) relationship. The predictor variables examined in all analyses were field, level of experience, and the interaction term between field and level of experience.

Results

Ethical Decision-Making

Table 3 presents the results obtained when field and experience were used to account for ethical decision-making. With regard to data management, three significant ($p < .05$) covariates were obtained. Self-deceptive enhancement was positively related to ethical decision-making with respect to data management, ($F(1, 186) = 4.84, p < .05$). However, ethical decision-making with respect to data management was negatively related to neuroticism ($F(1,186) = 5.67, p < .05$) and anxiety ($F(1,186) = 5.11, p < .05$).

More centrally, field was a significant predictor of data management ($F(2, 186) = 5.95, p < .05$). Ethical decision-making was higher in the biological ($M = 2.29, SE = .03$) and social ($M = 2.26, SE = .04$) sciences than in health sciences ($M = 2.10, SE = .05$). In addition, a significant interaction was obtained between field and experience ($F(2, 198) = 5.36, p < .05$). Inspection of the adjusted cell means indicated that although ethical decision-making, in terms of data management, held relatively constant with experience in the biological ($M = 2.23, SE = .04$ vs. $M = 2.34, SE = .04$) and social sciences ($M = 2.31, SE = .04$ vs. $M = 2.22, SE = .06$), it decreased with experience in the health sciences ($M = 2.21, SE = .04$ vs. $M = 1.99, SE = .08$).

With regard to study conduct, intelligence ($F(1, 186) = 24.41, p < .05$) and neuroticism ($F(1, 186) = 3.45, p < .10$) were found to be positively related to ethical decision-making. More centrally, field comparison again yielded significant differences ($F(2, 186) = 42.11, p < .05$). Ethical decision-making in study conduct was highest in the social sciences ($M = 2.45, SE = .04$) and health sciences ($M = 2.27, SE = .05$) and lowest in biological sciences ($M = 2.01, SE = .03$). The significant interaction obtained between field and experience, however, indicated that biologists' decisions with regard to study conduct improved with experience ($M = 1.92, SE = .04$ vs. $M = 2.11, SE = .04$), $F(2, 186) = 4.76, p < .05$. In contrast, social scientists' decisions were not related to experience ($M = 2.45, SE = .04$ vs. $M = 2.45, SE = .06$), while experience led to a small, but not significant, decrement in the decisions of health scientists ($M = 2.33, SE = .04$ vs. $M = 2.21, SE = .08$).

In examining professional practices only one covariate, intelligence, produced a significant positive relationship with ethical decisions ($F(1, 187) = 16.73, p < .05$). A significant main effect ($F(2,187) = 6.64, p < .05$) obtained for field in examining professional practices was attributable to the poorer decisions made by health scientists ($M = 2.14, SE = .03$) relative to biological ($M = 2.29, SE = .02$) and social ($M = 2.24, SE = .03$) scientists. The significant

interaction obtained between field and experience ($F(2, 187) = 3.15, p < .05$). was attributable to more experienced health science students making less ethical decisions than less experienced health science students ($M = 2.21, SE = .03$ vs. $M = 2.07, SE = .06$). For biological ($M = 2.26, SE = .03$ vs. $M = 2.31, SE = .03$) and social science ($M = 2.22, SE = .03$ vs. $M = 2.26, SE = .05$), no noteworthy changes with experience were observed in ethical decision-making with regard to professional practices.

In examining ethical decisions involving business practices, again, it was found that intelligence was positively related to ethical decisions ($F(1, 186) = 4.86, p < .05$). In addition, extraversion was marginally negatively related to decision-making with respect to business practices ($F(1, 186) = 3.46, p < .10$). However, field and experience were not significantly related to business practices, perhaps due to the limitations placed on doctoral students' involvement in the business aspects of science. Nonetheless, the findings obtained for data management, study conduct, and professional practices indicated that these three types of ethical decisions were associated with field and experience. With the exception of study conduct, where biological students performed poorer at lower experience levels, health scientists made poorer ethical decisions with regard to data management and professional practices, and those with higher level of experience exhibited lower scores. These findings in turn bring to the fore the question as to the origins of these decisions.

Social-Behavioral Response Dimensions

Prior research by Mumford et al. (2006) suggests that ethical decision-making may be related to social-behavioral responses. Table 4 presents the results obtained when field and experience were used to account for the social-behavioral dimensions. Before examining differences in field and experience, however, the significant covariates should be noted. Intelligence was negatively related to retaliation ($F(1, 187) = 12.82, p < .05$), deception ($F(1, 187) = 15.35, p < .05$), avoidance of responsibility ($F(1, 186) = 18.26, p < .05$), and selfishness ($F(1, 185) = 16.69, p < .05$), and marginally related to closed-ended choices ($F(1, 186) = 3.84, p < .10$). In addition, openness was marginally and negatively related to retaliation ($F(1, 187) = 3.44, p < .10$) and selfishness ($F(1, 185) = 3.04, p < .10$). Similarly, conscientiousness was negatively related to deception ($F(1, 187) = 5.45, p < .05$), avoidance of responsibility ($F(1, 186) = 4.31, p < .05$), and selfishness ($F(1, 185) = 3.04, p < .10$). Extraversion was negatively related to retaliation ($F(1, 187) = 5.66, p < .05$) and positively related to avoidance of responsibility ($F(1, 186) = 4.93, p < .05$). Finally, anxiety was positively related to selfishness, ($F(1, 185) = 3.94, p < .05$).

Although these covariate relationships are not surprising, the findings obtained for field and level of experience are of greater interest. Fields potentially calling for more social contact, the social and health sciences, evidenced more effective socially-based behavioral patterns than biological science, which may require less social interaction. Thus the significant differences produced by field for involving others in the decision ($F(2, 185) = 172.11, p < .05$) and active involvement ($F(2, 186) = 12.33, p < .05$) were attributable to social scientists and health scientists being more likely to involve others in the decision and endorse an active response to the problem, as seen in Table 5. In keeping with the notion of social engagement characterizing the health and social sciences, but not the biological sciences, health and social scientists were less likely than biological scientists to be selfish ($F(2, 185) = 24.33, p < .05$), make closed-ended decisions ($F(2, 186) = 30.60, p < .05$), retaliate ($F(2, 187) = 165.89, p < .05$), or engage in deception ($F(2, 187) = 18.96, p < .05$).

The only notable exception to this general rule with regard to social engagement was evident in the significant main effect obtained for avoidance of responsibility ($F(2, 186) = 25.01, p < .05$). Inspection of the relevant cell means indicated that health scientists obtained higher scores on this dimension ($M = 2.03, SE = .07$) than biological ($M = 1.83, SE = .04$) and social ($M =$

1.42, $SE = .06$) scientists. This pattern, of course, may reflect the greater perceived consequences of health sciences work and the corresponding tendency of health scientists to avoid responsibility for these consequences. In keeping with this interpretation, a significant interaction was obtained between field and level of experience for avoidance of responsibility ($F(2, 186) = 7.53, p < .05$). Here it was found that social and biological scientists' scores were not related to experience, whereas health scientists showed increasing levels of responsibility avoidance with experience.

The only other significant interaction obtained in examining the social-behavioral responses occurred for retaliation ($F(2, 187) = 2.97, p \leq .05$). Inspection of the cell means indicated that retaliation tendencies were unaffected by experience among social and biological scientists. However, retaliatory tendencies increased as health science students gained experience.

Taken as a whole, the findings obtained with regard to these social behavioral response dimensions indicate more socially appropriate behavior in fields involving interpersonal contact, the social and health sciences, as opposed to the biological sciences. In addition, the unique demands made by health sciences work, and potential desire to avoid certain consequences, led to concerns with regard to accountability. Although these patterns are consistent with the work being conducted in the field, and field socialization practices, the pattern does not seem consistent with the overall patterns observed in ethical decision-making.

Metacognitive Reasoning Strategies

Table 6 presents the results obtained in the analyses of covariance examining the effects of field and experience on the metacognitive reasoning strategies applied by people in working through ethical problems. Again, intelligence was found to be positively related to recognition of circumstances ($F(1, 187) = 26.07, p < .05$), anticipating consequences ($F(1, 187) = 28.64, p < .05$), dealing with one's emotions ($F(1, 187) = 25.29, p < .05$), analysis of personal motivations and biases ($F(1, 187) = 29.16, p < .05$), and consideration of the effects of one's actions on others ($F(1, 187) = 26.67, p < .05$). In addition, conscientiousness was marginally and positively related to recognition of circumstances ($F(1, 187) = 3.16, p < .10$), anticipating consequences ($F(1, 187) = 3.24, p < .10$), dealing with one's emotions ($F(1, 187) = 3.61, p < .10$), analysis of personal motivations and biases ($F(1, 187) = 2.76, p < .10$), and consideration of effects of one's action on others ($F(1, 187) = 2.88, p < .10$). Openness was positively related to analysis of personal motivations ($F(1, 187) = 4.21, p < .05$), anticipating consequences ($F(1, 187) = 4.70, p < .05$), recognition of circumstances ($F(1, 187) = 3.66, p < .10$), consideration of the effects of one's actions on others ($F(1, 187) = 2.96, p < .10$), and questioning one's judgment ($F(1, 187) = 3.76, p < .10$). In contrast, extraversion was marginally and negatively related to recognition of circumstances ($F(1, 187) = 3.31, p < .10$), anticipating consequences ($F(1, 187) = 3.53, p < .10$), and consideration of the effects of one's actions on others ($F(1, 187) = 2.96, p < .10$).

Of greater interest, however, are the findings obtained for field. Field produced significant main effects for recognition of circumstances ($F(1, 187) = 6.62, p < .05$), seeking help ($F(1, 187) = 42.24, p < .05$), questioning one's judgment ($F(1, 187) = 49.67, p < .05$), anticipating consequences ($F(1, 187) = 5.84, p < .05$), dealing with one's emotions ($F(1, 187) = 41.25, p < .05$), analysis of personal motivations and biases ($F(1, 187) = 46.41, p < .05$), and consideration of the effects of one's actions on others ($F(1, 187) = 26.00, p < .05$). Examination of the relevant cell means, presented in Table 7, reveal a consistent pattern. Specifically, the social and biological sciences obtained higher scores than health scientists on recognition of circumstances, seeking help, questioning one's judgment, anticipating consequences, dealing with one's emotions, analysis of personal motivations and biases, and consideration of the effects of one's actions on others. Thus, it appears that health scientists employ poorer

metacognitive reasoning strategies in ethical decision-making than social and biological scientists.

In addition, application of effective metacognitive reasoning strategies for working through ethical problems appeared to decrease in the health sciences as a function of experience. Thus, significant interactions between field and level of experience were obtained for recognition of circumstances ($F(2, 187) = 2.96, p < .05$), anticipating consequences ($F(2, 187) = 4.12, p < .05$), and dealing with one's emotions ($F(2, 187) = 3.02, p < .05$), and a marginally significant interaction was obtained for consideration of the effects of one's actions on others ($F(2, 187) = 2.80, p < .10$).

Comparison of less and more experienced scientists in these fields indicated that greater decrements were observed as a function of experience in the health as opposed to the social and biological sciences. Thus, for recognition of circumstances, less experienced ($M = 3.73, SE = .05$) and more experienced ($M = 3.67, SE = .09$) social scientists and less experienced ($M = 3.48, SE = .06$) and more experienced ($M = 3.62, SE = .06$) biological scientists obtained similar or improving scores. In contrast, more experienced health scientists ($M = 3.29, SE = .12$) obtained lower scores than less experienced health scientists ($M = 3.50, SE = .06$). A similar pattern of findings emerged for anticipating consequences. Here, less experienced ($M = 3.63, SE = .05$) and more experienced ($M = 3.60, SE = .09$) social scientists and less experienced ($M = 3.35, SE = .05$) and more experienced ($M = 3.54, SE = .06$) biological scientists obtained similar or improving scores. In contrast, more experienced ($M = 3.23, SE = .12$) health scientists evidenced lower scores than less experienced ($M = 3.46, SE = .06$) health scientists.

In contrasting less and more experienced health scientists in each field with respect to dealing with one's emotions and consideration of the effect of one's actions on others, the same pattern of findings emerged. More specifically, in the case of dealing with one's emotions, less experienced ($M = 2.87, SE = .05$) and more experienced ($M = 2.79, SE = .09$) social scientist and less ($M = 3.22, SE = .05$) and more experienced ($M = 3.38, SE = .06$) biological scientists obtained similar or improving scores. Among health scientists, however, less experienced individuals ($M = 2.78, SE = .05$) obtained higher scores than more experienced individuals ($M = 2.61, SE = .12$). Again, in comparing less ($M = 3.48, SE = .05$) and more experienced ($M = 3.42, SE = .09$) social scientists and less ($M = 3.10, SE = .05$) and more experienced ($M = 3.25, SE = .06$) biological scientists, consideration of the effects of one's actions on others remained stable or increased. In the case of health scientists, however, less experienced ($M = 2.95, SE = .05$) scientists evidenced higher scores than more experienced ($M = 2.79, SE = .11$) scientists.

This pattern of findings is noteworthy for two reasons. First, it suggests that the suboptimal performance of health scientists in ethical decision-making may be linked to decrements in metacognitive reasoning strategies. Moreover, the decrements in recognition of circumstances, anticipating consequences, dealing with one's emotions, and consideration of the effects of one's actions on others may, in part, account for the decline in ethical decision-making observed among health scientists as they acquire more experience.

Exposure to Unethical Conduct

Although this explanation seems plausible given the pattern of obtained findings, the question remains as to whether these effects might be accounted for by differential exposure to unethical conduct across fields as a function of experience. Table 8 presents the results obtained when field and experience were used to account for the frequency of exposure to unethical practices. As may be seen, intelligence was negatively related to reported exposure to unethical study conduct ($F(1, 187) = 5.99, p < .05$). Additionally, intelligence was marginally and positively

related to exposure to events involving unethical professional practices ($F(1, 187) = 2.97, p < .10$).

More centrally, level of experience was found to differ significantly with respect to exposure to unethical events involving data management ($F(1, 186) = 13.13, p < .05$) and study conduct ($F(1, 186) = 23.15, p < .05$). As might be expected, given the nature of doctoral student work, exposure to unethical conduct, as indicated in Table 9, was higher for more experienced than less experienced scientists with regard to both data management and study conduct. Moreover, a marginally significant main effect was obtained for field with respect to business practices ($F(2, 182) = 2.77, p < .10$). In the case of exposure to unethical business practices, social scientists obtained low scores relative to biological and health scientists. This pattern of results may simply reflect the lower pressure in the social sciences to secure funding in their laboratories. Notably, these effects, although significant, are not consistent with the findings obtained for ethical decision-making.

Significant interactions were, however, obtained between field and level of experience with regard to exposure to events relevant to unethical study conduct ($F(2, 187) = 5.72, p < .05$) and unethical professional practices ($F(2, 190) = 5.35, p < .05$). In the case of study conduct, it was found that more experienced social scientists ($M = 14.86, SE = .92$) had been exposed to more events than less experienced social scientists ($M = 8.73, SE = .56$). However, these effects were less extreme in contrasting more and less experienced biologists and health scientists. Similarly, greater exposure to events involving poor professional practices was evident in comparing more ($M = 12.22, SE = .89$) and less ($M = 9.38, SE = .53$) experienced social scientists but not in comparing more and less experienced biological scientists and health scientists. Although these effects are not trivial, they do not suggest that environmental events can account for the decline observed in health scientists with regard to ethical decision-making, as their patterns were quite different from those involving ethical decision-making.

Discussion

Before turning to the broader conclusions flowing from the present study, certain limitations should be noted. To begin, the sample being examined in the present study consisted of doctoral students working at a single university. As a result, two questions immediately come to the fore. First, it is open to question whether our findings can be generalized to populations that have more experience – specifically people who have their doctoral degree and substantial real-world experience working in a profession. Second, the findings obtained in the present study were drawn from a population of doctoral students attending a single university. Thus, the question remains as to whether similar findings would be obtained in a more experienced sample or one from other universities.

These observations with regard to the site at which the present study was conducted lead to another question – did intervening events occur that might in one way or another account for the obtained effects? For example, it is possible that all doctoral students participating in this study had a normative research ethics course applying in their discipline. However, given the pattern of obtained effects, specifically the poorer ethical decision-making in the health sciences, it seems unlikely that these events can account for the effects observed, specifically the decrements in ethical decision-making in the health sciences, given the substantial training required by the university in this field relative to the other two fields where training is not required. Nonetheless, the possibility still remains that other events operating in this environment, for example, climate differences (James, James, & Ashe, 1990; Mumford et al., 2007) or interest in ethics instruction might, in part, account for these findings.

Another concern pertains to the design applied in the present study. The present investigation was based on a cross-sectional rather than a longitudinal design. As a result, the present study has nothing to say about patterns of growth and change in ethical decision-making of a particular individual. Rather, our findings bear on general patterns of change as a function of field and level of experience in a field. Some support for this conclusion is provided by the fact that age and prior educational experience were not significant predictors in the covariate analyses. Nonetheless, caution is called for in drawing strong conclusions in this regard until longitudinal studies can be conducted.

Even bearing these limitations in mind, however, we believe that the results obtained in the present study have some noteworthy implications for understanding ethical decision-making. Perhaps the first, and most straightforward, conclusion pertains to overall levels of ethical decision-making. Scoring of the ethical decision-making measures was on a scale from one to three. Our findings indicated that doctoral students, including entry level doctoral students, scored at or above the scale mid-point, with students typically receiving scores around 2.2. Although this level of performance is certainly not “perfect,” given the complexity of the ethical decision-making problems being presented, it is reasonably impressive. Thus, it appears that doctoral students have acquired some skill in making ethical decisions with respect to their field.

With this said, the findings obtained in the present study indicate that cross-field differences exist in the ethical decision-making of doctoral students even when the effects of cross-field differences in cognitive abilities and personality are taken into account (Feist & Gorman, 1998). In addressing our first research question, it was found that health sciences students received particularly low scores on data management and professional practices. In addition, biological students received particularly low scores on study conduct. The pattern of these results is consistent with a field demand explanation. That is, students in the biological sciences tend to have less experience and familiarity with institutional review board practices governing human subject research, a primary component of the study conduct dimension of our decision-making measures. On the other hand, in the health sciences, where the treatment of people is a matter of enculturation (Lidz, 2006), health science students scored higher than biological students on study conduct, but lower on data management and professional practices.

Although these findings suggest that ethics training in the health sciences should focus on data management and professional practices, whereas ethics training in the biological sciences should focus on study conduct, the issue raised by our fourth research question needs to be addressed. Our findings suggest that ethics education should take into account the potential effects of experience in the field in addition to field of study. Experience was not related in a simple way to ethical decision-making. Instead, experience interacted with the field in which people were working. For instance, in the case of study conduct, biologists evidenced improved performance as a function of experience working in their field – a finding suggesting that special consideration of study conduct issues may not be critical within this field.

In contrast, however, health scientists displayed a noteworthy decline in ethical decision-making, performing poorer as a function of experience, with significant declines observed in data management, study conduct, and professional practices. This pattern of findings suggests that experience in a field, particularly in the health sciences, may not necessarily prove beneficial to ethical decision-making. The key question raised by these declines, however, pertains to their origins.

Perhaps the most straightforward explanation for these declines is simply a pattern of unusually bad experiences in the field of health sciences for this sample, as suggested by prior studies indicating that experience is related to ethical decision-making (Goldberg & Greenberg,

1994; Jasanoff, 1993; Mumford et al., 2007). In order to address this point, and addressing our third research question, it was found that exposure to unethical practices increased as a function of experience in the two domains in which doctoral students are most involved in the research enterprise – data management and study conduct. Notably, however, the pattern of the obtained interactions did not suggest that these effects were specific to the health sciences. The field by experience interactions obtained for study conduct and professional practices indicated that it was the social sciences, not the health sciences, which evidenced increased exposure to negative events, which is inconsistent with the pattern obtained for ethical decision-making.

If declines in the ethical decision-making of health scientists cannot be attributed to exposure to unethical events occurring over time, then to what can they be attributed? In addressing our second research question, the fields under consideration in this study did display several differences in social-behavioral response patterns. However, these differences, broadly speaking, involved the health and social sciences displaying better performance on dimensions such as involving others in the decision, active involvement and selfishness. These differences appear to be most easily explained based on the interactional nature of health and social sciences as opposed to biological sciences. Nonetheless, the pattern of these relationships, and the interactions obtained between field and experience, as raised by our fifth question, indicated some gains among health scientists, suggest that the social-behavioral responses of field socialization cannot really account for the declines in ethical decision-making observed in the health sciences.

In contrast, the metacognitive reasoning strategies, such as recognition of circumstances, anticipating consequences, dealing with one's emotions, analysis of the effects of one's actions on others, seeking help, and questioning one's judgment, all produced poorer performance for health scientists than biological or social scientists. Moreover, on five of these seven dimensions experience was associated with particularly poor performance for health scientists. Given the strong relationship between these metacognitive reasoning strategies and ethical decision-making (Mumford et al., 2006), and the decreases observed in performance on these dimensions with experience in the health sciences, it seems that changes in the metacognitive reasoning strategies being applied as a function of experience might account for the poorer performance of health sciences.

Of note, the available evidence indicates that as people acquire experience working in a field, changes are observed in the metacognitive reasoning strategies applied in working through field relevant problems (Ericsson & Charness, 1994; Feldman, 1999). In the case of health sciences, poorer ethical decision-making by upper-level graduate students suggests that the metacognitive reasoning strategies being acquired as a function of experience are hampering ethical decisions. These changes in the metacognitive reasoning strategies being applied may be attributed to a number of sources. One source may be objectification of treatment concerns, or the treatment of humans as work objects, resulting in a more narrow analysis of ethical situations. Another source may be higher levels of competitiveness (Mumford et al., 2007), which, in turn, may lead to a discounting of complex interpersonal consequences of the sort reflected in these dimensions. Still another explanation may lie in health scientists adopting emotional shielding strategies to maintain performance under emotionally evocative conditions. Although the present study cannot say which of these, or other potential explanations, for these strategy changes led to the observed differences, they do point to the need for research examining the nature and sources of strategy changes that might be linked to ethical decision-making.

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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' 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.

1. Reynolds admits to Abrams that he used slightly modified versions of Moss's ideas. Abrams is upset with this, but Reynolds is a key person on the proposal team and the grant application deadline is soon. What should Abrams do? Choose **two** of the following:
 - a. Fire Reynolds from the lab on the grounds of academic misconduct
 - b. Leave Reynolds as first author on the proposal since he wrote up the ideas
 - c. Remove Reynolds from the proposal team, and offer Moss the position if she allows her ideas to be used
 - d. Require Reynolds to write a letter of apology to Moss, including a request to use her ideas and acknowledge her in the proposal
 - e. Ask Moss to join the grant team, placing her as third author on the proposal if she allows her ideas to be used
 - f. Acknowledge Moss in the grant proposal because the ideas were hers originally
 - g. Apologize to Moss and indicate that the proposal must go out as is to meet the deadline
 - h. Remove Moss's ideas from the proposal and try to rework it before the deadline

2. Moss is upset about Reynolds using her ideas and she decides to do something about it. Given that Moss works very closely with Reynolds and their boss Abrams, evaluate the likely success of the following plans of actions Moss can take. Choose **two** of the following:
 - a. Moss asks Reynolds to give her credit by putting her name on the grant proposal as well
 - b. Moss asks Reynolds about the incident and tape records his reaction to later show Abrams
 - c. Moss searches for annotated notes about her ideas that are dated prior to her conversation with Reynolds
 - d. Moss appeals for a "mock trial" for Reynolds to testify under oath to his superiors that the information was his
 - e. Moss searches for Reynolds's lack of understanding of the concepts he claims were his own by questioning him in front of other students
 - f. Moss attempts to sway other researchers to support her to Abrams
 - g. Moss visits Reynolds's office in hopes of finding evidence that she contributed to the proposal
 - h. Moss asks Reynolds to write an account of their conversation on the day in question and shows her comparison account to him as evidence that he is using her ideas

Figure 1. Example of Ethical Decision-Making Questions

Table 1

Description of Individual Difference Measures

Construct	Items	Subscales	Nature of Items (or Example Items)	Reliability Estimates (α)	Validity Citations
Intelligence	30	No	Conclusions based on a set of facts in a given scenario (6 sets of facts)	.80	Ruch & Ruch (1980)
Divergent Thinking	5	No	What would be the results if the force of gravity were suddenly cut in half?	.93	Merrifield, Guilford, Christensen, & Frick (1962)
Social Desirability	40	Self-Deceptive Enhancement Impression Management	SDE: I always know why I like things. IM: I always obey laws, even if I'm unlikely to get caught.	.62 .78	Paulhus (1994)
General Personality (Big Five)	44	Neuroticism Openness Extraversion Conscientiousness	I see myself as someone who can be moody. I see myself as someone who values artistic, aesthetic experiences. I see myself as someone who is talkative. I see myself as someone who does a thorough job.	.80 .81 .89 .79	John, Donahue, & Kentle (1991)
Narcissism	37	Agreeableness	I see myself as someone who has a forgiving nature.	.69	Emmons, 1987
Cynicism	10	No	I can make anybody believe anything.	.82	Wrightsmen (1974)
Trust	10	No	People pretend to care more about one another than they really do.	.79	Wrightsmen (1974)
Anxiety	20	No	The typical person is sincerely concerned about the problems of others.	.81	Wrightsmen (1974)
Philosophies of Human Nature	8	Variability	I work under a great deal of tension. V: Different people react to the same situation in different ways.	.73 .78	Taylor (1953) Wrightsmen (1974)
	6	Complexity	C: People are too complex to ever be understood fully.	.78	

Table 2
Examples of Work Event Questions

Ethical Events	Technical Events
1) Selectively replace subjects or rerun analyses when gathering data	1) Establish procedures for entry of scanned data
2) Publish in “least publishable units” (i.e., write up results as several small articles vs. one or two larger ones)	2) Release data or study findings prior to completion of full data analysis
3) Discuss data that personally identifies human subjects with others not involved in the research	3) Develop a consistent procedure to assign subject codes in a data set
4) Overstate benefits of participation in a study to human subjects	4) Provide sufficient instructions to participants
5) Conduct research without Institutional Review Board approval	5) Provide clear application forms to IRB
6) Include a subject whose health status doesn't quite meet standards in a study considered to be low risk	6) Answer questions that participants may have during an experiment
7) Maintain anonymity of manuscript reviewers	7) Provide clear and specific comments in reviews of manuscripts of drafts or articles
8) Suggest what the “acceptable” results of a study should be to research assistants	8) Monitor ongoing data analysis on a project
9) Accept payment for serving as an expert witness in judicial proceedings	9) Inform study assistants of preliminary experimental hypotheses
10) Accurately describe program content, goals, or costs associated with a research proposal	10) Ask for deadline extensions on deliverables for grants and contracts

Table 3

Analysis of Covariance Results for Ethical Decision-Making

	Data Management				Study Conduct				Professional Practices				Business Practices			
	<i>F</i>	<i>df</i>	<i>p</i>	η^2_p	<i>F</i>	<i>df</i>	<i>p</i>	η^2_p	<i>F</i>	<i>df</i>	<i>p</i>	η^2_p	<i>F</i>	<i>df</i>	<i>p</i>	η^2_p
<i>Covariates</i>																
Intelligence					24.41	1,186	.001	.116				.082	4.86	1,186	.029	.025
Self-Deceptive Enhancement	4.84	1,186	.029	.025					16.73	1,187	.001	.016				
Extraversion													3.46	1,186	.065	.018
Neuroticism	5.67	1,186	.018	.030	3.45	1,186	.065	.018								
Anxiety	5.11	1,186	.025	.027												
<i>Effects</i>																
Field	5.95	2,186	.003	.060	42.11	2,186	.001	.312	6.64	2,187	.002	.066	2.08	2,186	.127	.022
Experience	2.21	1,186	.139	.012	.28	1,186	.597	.002	.182	1,187	.670	.001	.150	1,186	.699	.001
Field by Experience	5.36	2,186	.005	.054	4.76	2,186	.010	.049	3.15	2,187	.045	.033	.468	2,186	.627	.005

Note. *F* = F-ratio, *df* = degrees of freedom, *p* = significance level, η^2_p = partial eta-squared effect size estimate.

Analysis of Covariance Results for Social-Behavioral Pattern Dimensions

Table 4

Involving Others (<i>M</i> = 2.30, <i>SE</i> = .02)										Retaliation (<i>M</i> = 1.66, <i>SE</i> = .027)					Deception (<i>M</i> = 1.50, <i>SE</i> = .035)					Active Involvement (<i>M</i> = 3.56, <i>SE</i> = .046)					Avoidance of Responsibility (<i>M</i> = 2.22, <i>SE</i> = .021)					Selfishness (<i>M</i> = 1.84, <i>SE</i> = .039)					Close self to future decisions (<i>M</i> = 3.03, <i>SE</i> = .037)				
<i>F</i>	df	<i>p</i>	η^2_p	<i>F</i>	df	<i>p</i>	η^2_p	<i>F</i>	df	<i>p</i>	η^2_p	<i>F</i>	df	<i>p</i>	η^2_p	<i>F</i>	df	<i>p</i>	η^2_p	<i>F</i>	df	<i>p</i>	η^2_p	<i>F</i>	df	<i>p</i>	η^2_p	<i>F</i>	df	<i>p</i>	η^2_p								
<i>Covariates</i>																																							
Intelligence				12.82	1,187	.001	.064	15.35	1,187	.001	.076					18.26	1,186	.001	.089	16.69	1,185	.001	.083	3.84	1,186	.052	.020												
Openness				3.44	1,187	.065	.018									3.04	1,185	.083	.016																				
Extraversion				5.66	1,187	.018	.029					4.93	1,186	.028	.026																								
Conscientiousness								5.45	1,187	.021	.028					4.31	1,186	.039	.023	3.04	1,185	.083	.016																
Anxiety																3.94	1,185	.049	.021																				
<i>Effects</i>																																							
Field	172.11	2,185	.001	.650	165.89	2,187	.001	.640	18.96	2,187	.001	.169	12.33	2,186	.001	.117	25.01	2,186	.001	.212	24.33	2,185	.001	.208	30.60	2,186	.001	.248											
Experience	.469	1,185	.494	.003	.963	1,187	.328	.005	.881	1,187	.349	.005	1.83	1,186	.178	.010	3.23	1,186	.074	.017	.105	1,185	.746	.001	1.21	1,186	.272	.006											
Field by Experience	.528	2,185	.591	.006	2.97	2,187	.054	.031	.659	2,187	.518	.007	1.65	2,186	.195	.017	7.53	2,186	.001	.075	.907	1,185	.406	.010	2.50	2,186	.085	.026											

Note. *F* = *F*-ratio, df = degrees of freedom, *p* = significance level, η^2_p = partial eta-squared effect size estimate.

Table 5
Adjusted Means for Field and Level of Experience on Social-Behavioral Responses

	First Year			Upper Level		
	Mean	Std Error	Mean	Std Error	Mean	Mean
Involving Others in Decision						
Social	2.65	.04	2.67	.06	2.66	
Biological	1.88	.04	1.81	.04	1.85	
Health	2.43	.04	2.38	.08	2.41	
Mean	2.32		2.29			
Retaliation						
Social	1.13	.05	1.18	.08	1.16	
Biological	2.29	.05	2.19	.05	2.24	
Health	1.49	.05	1.70	.11	1.60	
Mean	1.64		1.69			
Deception						
Social	1.22	.06	1.23	.10	1.23	
Biological	1.79	.06	1.63	.07	1.71	
Health	1.59	.06	1.55	.14	1.57	
Mean	1.53		1.47			
Active Involvement						
Social	3.82	.08	3.93	.14	3.88	
Biological	3.45	.08	3.33	.09	3.39	
Health	3.57	.08	3.22	.18	3.40	
Mean	3.61		3.49			
Avoidance of Responsibility						
Social	1.42	.06	1.42	.10	1.42	
Biological	1.90	.06	1.76	.07	1.83	
Health	1.77	.06	2.28	.13	2.03	
Mean	1.70		1.82			
Selfishness						
Social	1.52	.07	1.50	.12	1.51	
Biological	2.17	.07	2.09	.08	2.13	

	First Year		Upper Level	
	Mean	Std Error	Mean	Std Error
Health	1.77	.07	1.96	.15
Mean	1.82		1.85	
Making Closed-Ended Decisions				
Social	2.64	.06	2.73	.10
Biological	3.35	.06	3.35	.06
Health	3.21	.06	2.89	.14
Mean	3.07		2.99	

Table 6

Analysis of Covariance Results for Metacognitive Reasoning Strategy Dimensions

Covariates																																		
Recognition of Circumstances (<i>M</i> = 3.55, <i>SE</i> = .030)					Seeking Help (<i>M</i> = .80, <i>SE</i> = .014)					Questioning One's Judgment (<i>M</i> = 2.22, <i>SE</i> = .016)					Anticipating Consequences (<i>M</i> = 3.47, <i>SE</i> = .030)					Dealing with Emotions (<i>M</i> = 2.94, <i>SE</i> = .030)					Analysis of Personal Motivations (<i>M</i> = 2.76, <i>SE</i> = .027)					Consideration of Effects on Others (<i>M</i> = 3.16, <i>SE</i> = .029)				
	<i>F</i>	df	<i>p</i>	η^2_p	<i>F</i>	df	<i>p</i>	η^2_p	<i>F</i>	df	<i>p</i>	η^2_p	<i>F</i>	df	<i>p</i>	η^2_p	<i>F</i>	df	<i>p</i>	η^2_p	<i>F</i>	df	<i>p</i>	η^2_p	<i>F</i>	df	<i>p</i>	η^2_p						
Intelligence	26.07	1,187	.001	.122					27.47	1,187	.001	.128	28.64	1,187	.001	.133	25.29	1,187	.001	.119	29.16	1,187	.001	.135	26.67	1,187	.001	.125						
Conscientiousness	3.16	1,187	.077	.017									3.24	1,187	.074	.017	3.61	1,187	.059	.019	2.76	1,187	.098	.015	2.88	1,187	.091	.015						
Openness	3.66	1,187	.057	.019					3.76	1,187	.054	.020	4.70	1,187	.031	.025	3.82	1,187	.052	.020	4.21	1,187	.042	.022	2.96	1,187	.087	.016						
Extraversion	3.31	1,187	.070	.017									3.53	1,187	.062	.019									3.96	1,187	.048	.021						
Effects																																		
Field	6.62	2,187	.002	.066	42.24	2,187	.001	.311	49.67	2,187	.001	.347	5.84	2,187	.003	.059	41.25	2,187	.001	.306	46.41	2,187	.001	.332	26.00	2,187	.001	.218						
Experience	.525	1,187	.470	.003	.137	1,187	.711	.001	.161	1,187	.688	.001	.170	1,187	.681	.001	.194	1,187	.660	.001	.000	1,187	.984	.000	.135	1,187	.714	.001						
Field by Experience	2.96	2,187	.054	.031	.480	2,187	.620	.05	1.70	2,187	.186	.018	4.12	2,187	.018	.042	3.02	2,187	.051	.031	2.08	2,187	.128	.022	2.80	2,187	.063	.029						

Note. *F* = *F*-ratio, *df* = degrees of freedom, *p* = significance level, η^2_p = partial eta-squared effect size estimate.

Table 7
Adjusted Means for Field and Level of Experience on Metacognitive Reasoning Strategies

	First Year		Upper Level	
	Mean	Std Error	Mean	Std Error
<i>Recognition of Circumstances</i>				
Social	3.73	.05	3.72	.10
Biological	3.51	.05	3.51	.06
Health	3.51	.05	3.28	.13
Mean	3.58		3.50	
<i>Seeking Help</i>				
Social	0.91	.02	0.96	.04
Biological	0.90	.02	0.86	.03
Health	0.60	.02	0.59	.05
Mean	0.80		0.80	
<i>Question One's Judgment</i>				
Social	2.85	.05	2.92	.09
Biological	3.20	.05	3.21	.05
Health	2.61	.05	2.49	.12
Mean	2.89		2.87	
<i>Deal with One's Emotions</i>				
Social	2.87	.05	2.85	.09
Biological	3.24	.05	3.27	.06
Health	2.80	.05	2.61	.13
Mean	2.97		2.91	
<i>Anticipating Consequences</i>				
Social	3.64	.05	3.65	.10
Biological	3.38	.05	3.41	.06
Health	3.48	.05	3.23	.13
Mean	3.50		3.43	
<i>Analysis of Personal Motivations</i>				
Social	2.80	.05	2.85	.09
Biological	3.03	.05	3.04	.05

	First Year		Upper Level	
	Mean	Std Error	Mean	Std Error
Health	2.48	.05	2.34	.12
Mean	2.77		2.74	
Consideration of Effects of One's Actions				
Social	3.48	.05	3.47	.09
Biological	3.13	.05	3.15	.06
Health	2.96	.05	2.78	.12
Mean	3.19		3.13	

Table 8

Analysis of Covariance Results for Exposure to Unethical Events

Unethical Event Exposure Frequency												
Data Management (<i>M</i> = 4.54, <i>SE</i> = .13)				Study Conduct (<i>M</i> = 12.97, <i>SE</i> = .32)				Professional Practices (<i>M</i> = 10.12, <i>SE</i> = .31)				Business Practices (<i>M</i> = 8.34, <i>SE</i> = .25)
<i>F</i>	df	<i>p</i>	η^2_p	<i>F</i>	df	<i>p</i>	η^2_p	<i>F</i>	df	<i>p</i>	η^2_p	<i>F</i>
<i>Covariates</i>												
Intelligence				5.99	1,187	.015	.031	2.81	1,169	.096	.016	
<i>Effects</i>												
Field	.74	2,186	.479	.008	3.56	2,186	.030	.037	2.06	2,186	.130	.021
Experience	13.12	1,186	.000	.066	23.14	1,186	.000	.110	2.44	1,186	.120	.013
Field by Experience	2.77	2,186	.065	.029	5.72	2,186	.004	.058	5.35	2,186	.005	.053

Note. *F* = *F*-ratio, df = degrees of freedom, *p* = significance level, η^2_p = partial eta-squared effect size estimate.

Table 9
Adjusted Means for Field and Level of Experience on Exposure to Unethical Events

	First Year		Upper Level	
	Mean	Std Error	Mean	Std Error
Unethical Data Management				
Social	3.51	.22	5.21	.36
Biological	4.45	.22	4.91	.23
Health	4.28	.24	4.87	.48
Mean	4.08		5.00	
Unethical Study Conduct				
Social	8.73	.56	14.86	.92
Biological	12.42	.55	14.45	.59
Health	13.11	.59	14.23	1.23
Mean	11.42		14.51	
Unethical Professional Practices				
Social	9.38	.53	12.21	.90
Biological	11.09	.54	9.75	.58
Health	8.42	.55	9.85	1.20
Mean	9.63		10.60	
Unethical Business Practices				
Social	7.08	.45	8.01	.73
Biological	8.53	.42	8.95	.46
Health	8.17	.45	9.30	.95
Mean	7.93		8.75	