



Published in final edited form as:

J Empir Res Hum Res Ethics. 2010 September ; 5(3): 67–83. doi:10.1525/jer.2010.5.3.67.

The Importance of Organizational Justice in Ensuring Research Integrity

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Abstract

The professional behavior of scientists, for good or ill, is likely associated with their perceptions of whether they are treated fairly in their work environments, including their academic department and university and by relevant regulatory bodies. These relationships may also be influenced by their own personal characteristics, such as being over-committed to their work, and by the interactions between these factors. Theory also suggests that such associations may be mediated by negative or positive affect. We examined these issues using data from a national, mail-based survey administered in 2006 and 2007 to 5,000 randomly selected faculty from biomedical and social science departments at 50 top-tier research universities in the United States. We found that perceptions of justice in one's workplace (organizational justice) are positively associated with self-report of "ideal" behaviors and negatively associated with self-report of misbehavior and misconduct. In contrast, researchers who perceive that they are being unfairly treated are less likely to report engaging in "ideal" behaviors and more likely to report misbehavior and misconduct. Over-commitment to one's work is also associated with negative affect and interacts with perceptions of unfair treatment in ways that are associated with higher self-report of misbehavior. Thus, perceptions of fair treatment in the work environment appear to play important roles in fostering — or undermining — research integrity.

Keywords

scientific misbehavior; misconduct; exemplary professional behavior; integrity; organizational justice; over-commitment; path model; mediation; moderation; mediated moderation

Many think of scientific misconduct in terms of individuals who fabricate, falsify data, or plagiarize. Indeed, the U.S. federal government's definition of misconduct (Office of Science and Technology Policy, 2000) is restricted to these three misbehaviors, known by the acronym FFP. Media reports typically focus on the misdeeds of a particular scientist accused of one or more of these errant actions. From this perspective, those who wish to promote and

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There are no conflicts of interest for any of the co-authors of this manuscript.

protect the integrity of science should focus on education in the responsible conduct of research and the fostering of personal morality.

While this approach to scientific misconduct remains evident in literature and practice (Bebeau, 2000; Fischer & Zigmond, 2001), recent research has taken a more expansive view of the behaviors that can compromise the integrity of science. The move from a narrow focus on *misconduct* to consideration of a wider range of *misbehaviors* (De Vries, Anderson, & Martinson, 2006) has led to further research on how the scientific workplace influences the ways researchers work. The report, *Integrity in Scientific Research: Creating an Environment That Promotes Responsible Conduct* (Institute of Medicine and National Research Council Committee on Assessing Integrity in Research Environments, 2002), and the studies on which it is based exemplify this broader approach.

Subsequent research has explicitly examined the ways in which federally-defined misconduct (FFP) and a wide range of “lesser” but still problematic, questionable or undesirable behavior (e.g., carelessness, violations of regulations, conflicts of interest, questionable publication practices) are related to departmental climate, how departmental decisions are made, normative structures, socialization, expectations for obtaining external funding, and other contextual factors. We have taken this approach in our research, documenting associations between scientists' perceptions that principles of fair treatment have been violated in their work environments and their own self-reported misconduct and misbehavior (Anderson et al., 2007; Anderson, Ronning, De Vries, & Martinson, 2007; De Vries, et al., 2006; Martinson, 2007; Martinson, Anderson, Crain, & de Vries, 2006; Martinson, Anderson, & De Vries, 2005; Martinson, Crain, Anderson, & De Vries, 2009).

In the analysis presented here, we examine associations between the self-reported behavior (both negative and exemplary) of biological, medical, life science and social science researchers and their perceptions of organizational justice and injustice. Since human subjects research is most prevalent within these areas of science, the professional behavior of these researchers should be of interest to all those concerned with the ethical treatment of human subjects. At least since the publication of the Belmont Report, questions of justice and “fairness of distribution” of risks and benefits have been central considerations in the use of human subjects in research. We believe that the fair and just treatment of researchers is also a pertinent consideration. This research extends our earlier work by considering perceived organizational justice at several levels: the scientist's academic department, the university setting, and the broader scientific field (represented by external regulatory oversight). Our data suggest that strategies to foster research integrity and reduce misconduct must include attention to promoting justice in academic workplaces.

Theoretical background

When scientists examine the environmental factors that may influence scientists' behaviors, they most often focus on academic departments and the immediate, everyday work environment. Yet the work of science takes place in an overlapping hierarchy of other contexts that constitute the “research environment,” (Anderson, 1999; Institute of Medicine and National Research Council Committee on Assessing Integrity in Research Environments, 2002), and that larger environment likely has a powerful influence on the work of individual scientists. Open-systems theories (Katz & Kahn, 1966; Pfeffer & Salancik, 1978; Thompson, 1967) and, more specifically, Thompson's classic theoretical work on organizational environments, provide a means of specifying the relevant dimensions of the external environment, which we refer to as the “task environment” (Thompson, 1967).

In the work of academic scientists, the task environment includes funding agencies, regulatory bodies, academic disciplines and their societies, other universities, the overall academic employment market, communications media, organized public groups, and other elements of the extra-university environment related directly to academic science. A small body of work has documented the high value that researchers place on fairness on the part of their human subjects review boards (IRBs) (Keith-Spiegel, Koocher, & Tabachnick, 2006), and that perceptions of unjust treatment by IRBs may lead to intentional deception on the part of researchers (Keith-Spiegel & Koocher, 2005), thereby undermining the protection of human subjects. The 2002 Institute of Medicine report on integrity in scientific research recognized the likely influence of such environmental factors on the work of science (Chapter 3), yet little empirical research exists on how the task environment, defined this way, challenges or promotes the integrity of academic science. Moreover, there is no empirical work that simultaneously examines the task environment of science and the local environments of institution and department.

Several complementary theoretical frameworks have informed and continue to inform our research (Martinson, et al., 2006; Martinson, et al., 2009). The first of these is general strain theory (GST) (Agnew, 1992), which has, since its initial proposal in 1992, become one of the major theories of crime (Agnew, 2006). While GST came into being as a framework for understanding juvenile delinquency and crime, it offers useful insights into how, under specific conditions of person-environment interaction, illicit behavior can arise, even among those who generally behave properly. In brief, GST makes three suppositions: (1) several types of strains or stressors (blockage of positively-valued goals, loss of positively-valued stimuli, and exposure to negatively-valued or aversive stimuli) are posited to affect individuals in ways that make illicit behavior more likely; (2) these strains or stressors generate negative affect in the individual -- states such as anger and resentment but possibly also anxiety, depression, or fear; and (3) individuals try to cope with these negative feelings through various means, including cognitive strategies (such as minimizing or ignoring their importance), emotional strategies, or behavioral strategies, which may include both legitimate and illegitimate behavior (Agnew, 1992).

Negative affect is theorized to be a mediator of the effects of strain on behavior. In addition, GST posits that some individuals are more easily provoked than others, and more likely than others to behave badly in response to strains. This idea suggests the potential importance of moderator variables (e.g., excessive intrinsic drive, or "over-commitment" to work). Moreover, strains themselves may also have undesirable effects on other conditioning variables, such as reducing social control or giving individuals the means to justify their untoward behavior and encouraging beliefs that are conducive to deviant behavior (Agnew, 2006).

How might over-commitment moderate the relationship between such stressors and behavioral outcomes? Researchers have shown that over-commitment is related to multiple dimensions of human stress response and coping systems (Bellingrath & Kudielka, 2008; Preckel, Känel, Kudielka, & Fischer, 2005; Vrijkotte, van Doornen, & de Geus, 2004; Wirtz, Siegrist, Rimmele, & Ehlert, 2007). Several features of over-commitment are of interest here. First, over-commitment may be associated with higher levels of negative affect. Second, perceptions of organizational justice/injustice may differentially affect individuals who are more over-committed to their work, relative to individuals who are not over-committed. Finally, over-commitment to work may be associated with differential behavioral coping responses to work-related stressors. In a prior study, we found an interaction between perceptions of procedural injustice and over-commitment (which we referred to them as "i.e., "intrinsic drive"), such that self-report of one or more of the "top 10

most serious” research-related misbehaviors increased as both perceptions of procedural injustice and over-commitment increased (Martinson, et al., 2006).

The second general theoretical framework we apply here is organizational justice theory, developed largely within the field of social psychology. We have provided an in-depth discussion of organizational justice theory as applied to understanding research integrity elsewhere (Martinson, et al., 2006); here, we provide a brief overview of that discussion. Organizational justice is an umbrella term used to refer to individuals’ perceptions about the “fairness” of decision-making and resource distribution within organizations and the behavioral consequences of those perceptions (Adams, 1965; Clayton & Opatow, 2003; Colquitt, Conlon, Wesson, Porter, & Ng, 2001; Folger & Cropanzano, 1998; Greenberg, 1988; Pfeffer & Langton, 1993; Tyler & Blader, 2003). Included in this term are long-running distinctions between multiple types of justice, with two subtypes — procedural and distributive justice — being most extensively studied. Procedural justice refers to individual perceptions about the fairness of decision-making processes (Leventhal, 1980; Thibaut & Walker, 1975) Distributive justice refers to the outcomes of those procedures with respect to the distribution of resources (Adams, 1965; Leventhal, 1976, 1980). In the context of academic research in the U.S., the most salient decision-making and distribution processes are those of tenure and promotion committees, regulatory oversight bodies (e.g. IRBs and Institutional Animal Control and Use Committees or IACUCs), peer review committees for research grant proposals, and peer review of manuscripts. If our insights about the importance of organizational justice in science are correct, then one of the most important things that the research enterprise must do to ensure research integrity is to ensure the fair treatment of those whose careers and livelihoods hinge on the decisional outcomes of each of these bodies/processes.

Organizational justice theory highlights specific elements implicated in GST. Specifically, perceived injustices can be seen as potential sources of strain; they can block individuals from attaining positively-valued goals and can be seen as aversive stimuli, either of which can generate negative affect such as anger and anxiety. Depending on other moderating or conditioning factors (e.g., individuals’ provokability and coping skills, the presence of adequate social support, levels of social control), attempts by individuals to alleviate or cope with such negative affect may result in misbehavior in research and other conduct that runs counter to normative expectations in science.

On the other hand, when scientists perceive the presence of organizational *justice*, we expect them to be more likely to behave according to high standards of research integrity. Such perceptions may signal the absence of an important strain but may also indicate perceived social support in one’s environment and may facilitate normative behavior through fostering normative beliefs (Agnew, 2006).

The data we report here, drawn from a cross-sectional, representative sample of faculty at 50 of the top research universities in the United States, allow us to extend the findings from our first study examining associations between perceptions of injustice in research environments and undesirable behaviors. Several innovations move this work beyond our initial study. First, in this study, we asked respondents to report not only on their misbehavior but also on their *positive or ideal behavior*, and we assess whether this positive behavior is associated with perceptions of organizational justice in their work environments (as opposed to its *absence*, experienced as perceptions of organizational injustice). Second, in our first study, we used global assessments of organizational *injustice*; here we use more specific measures of the perceived *presence of organizational justice* with respect to specific domains of scientific work. Third, our inclusion of measures of both positive behavior and the presence of organizational justice are particularly important, because our previously-observed

associations between misbehavior and perceived injustice may have resulted, at least in part, from *post-hoc* rationalization. One can easily imagine that some individuals might rationalize their misbehavior by blaming their working environments, but it is not so easy to imagine individuals trying to explain their positive behavior by reference to positive aspects of those environments. Finally, our analytic framework here is grounded in state-of-the-art statistical techniques for assessing the presence or absence of theoretically indicated mediating and moderating factors.

Hypotheses

Our primary goal is to test predictions derived from our combination of GSTGST (Agnew, 1992) with organizational justice theory (Clay-Warner, 2001; Clayton & Opatow, 2003; Colquitt, et al., 2001; Tyler & Blader, 2003). Specifically, we investigate: (1) whether perceptions of organizational justice or injustice are associated with either ideal behaviors or misbehaviors, (2) the extent to which such associations are, or are not, mediated by negative or positive affect, and (3) the extent to which “over-commitment” to work may operate as either a moderator, or as a “mediated moderator” (Baron & Kenny, 1986) of these associations.

METHOD

Data collection

In late 2006 and early 2007, we mailed a survey to 5,000 faculty members randomly selected from 500 departments across 50 randomly selected, U.S., top-tier research universities. We asked respondents to report their own behaviors, ranging from “ideal” (e.g., disclosing conflicts of interest, following regulations), to “questionable” (e.g., inadequate record-keeping, cutting corners to complete a project), to outright misconduct (e.g., falsification or fabrication of data). Human subjects review boards of HealthPartners Research Foundation and the University of Minnesota reviewed and approved this project before we began recruitment.

We constructed our sampling frame through a multistage process by randomly identifying 10 faculty in each of 10 departments in each of 50 universities. We have published details of this process previously (Martinson, et al., 2009).

To ensure anonymity, we never linked survey responses to the identities of universities, departments, or individuals. However, we coded each survey with randomly chosen numbers to denote those mailed to the same de-identified institutions and departments. Of the 5,000 surveys mailed, 4,915 were deliverable and 1,703 yielded usable data, for a response rate of 35%.

Measures

Misbehaviors and ideal behaviors. The key outcomes were faculty members’ self-reports of behaviors they had engaged in that could be either detrimental to or supportive of research integrity. We asked survey respondents to indicate whether they had engaged in any of 30 specified misbehaviors during the previous 3 years. The misbehavior items were refinements of items from previous research (Martinson, et al., 2005). From these items we constructed six outcome variables (both composite measures and single items): the “top 10” most serious misbehaviors, misconduct, neglect or carelessness, misappropriation, circumvention of federal regulations, and careless or inappropriate peer review.

To compare the current results with those in our earlier study, we created a composite roughly comparable to the “*Top 10*” most serious misbehaviors reported in 2005

(Martinson, et al., 2005). The *misconduct* composite encompassed three items to assess fabrication or falsification of data and plagiarism (FFP) (Office of Science and Technology Policy). The “*neglect*” composite represented four neglectful or careless behaviors, and two items asked about *misappropriation* of resources or proprietary information. Three items pertained to the *circumvention of federal regulations* regarding treatment of humans, animals, or materials related to research, and a single item assessed “*careless peer review*.” We considered respondents to have engaged in misbehavior if they reported having engaged in any single misbehavior at least once in the previous 3 years.

We also asked respondents to report how often they personally engage in each of 10 behaviors reflecting ideals of ethical behavior in science as addressed in Steneck’s *ORI Introduction to the Responsible Conduct of Research* (Steneck, 2004). Responses to these items were all highly skewed towards the favorable end of the scale (“not applicable,” “never,” “seldom,” “about half the time,” “usually,” and “always”), so each item was categorized as to whether the respondent reported “always” engaging in an ideal behavior or any other response, exclusive of “not applicable.” We constructed four ideal-behavior composites to represent whether the respondent “always” engaged in all of the applicable behaviors included in the composite or did not “always” engage in at least one of the behaviors. We named these composites as follows:

1. “*playing by the rules*” (e.g., “I comply with regulations and laws that govern research on human subjects,” “I properly disclose financial conflicts of interest in my research”),
2. “*following the Golden Rule*” (e.g., “When working with trainees, I set clear rules for things such as performance expectations and intellectual credit,” “I monitor trainees’ work to ensure that they are developing into responsible researchers,” and “At the outset of collaborative projects, I encourage the establishment of clear agreements regarding intellectual ownership of the research results or products”),
3. “*maintaining confidentiality and data integrity*” (e.g., “I manage data in ways that maintain data integrity and confidentiality,” and “I preserve the anonymity and intellectual rights of the persons whose work I review”), and
4. “*avoiding favoritism*” (e.g., “On my publications, all co-authors can explain the contributions that justify their authorship”, “I recuse myself from reviewing grants and publications submitted by close colleagues”).

We have published elsewhere the specific wording for all questions tapping ideal behaviors and those comprising the misbehavior composites (Martinson, et al., 2009).

Organizational justice—Key to our hypotheses regarding the etiology of both positive and negative behaviors is the perception of organizational justice. Five organizational-justice composites measured respondents’ perceptions that procedural and distributional justice principles guided decisions made in their departments, universities, and regulatory oversight review boards (IRBs & IACUCs), and with respect to peer review of manuscripts and grant applications. Each of these represents an important area in which scientists engage in exchanges with others in their work (i.e., the “task environment”). One can view perceptions of justice in these domains as evidence of favorable working conditions and environments.

In contrast, perceptions of a lack of justice or violation of justice principles in these domains likely reflect blockage of positively-valued goals, the loss of positively-valued stimuli, or exposure to negatively-valued or aversive stimuli, which may set the stage for coping responses, including illicit or other undesirable behavior. Each composite was computed as

the mean of respondents' agreement rating (1=strongly disagree to 7=strongly agree) with each item in the composite, with higher values indicating more justice. A sixth composite assessed procedural injustice from six items measuring agreement with the assertion that success in academia is driven more by politics, positioning, or prestige than by merit or accomplishment (Ladd & Lipset, 1978). Again, the composite score was the mean agreement with the items (1=strongly disagree to 7=strongly agree) but with higher numbers reflecting more perceived *injustice*.

Over-commitment—We used a measure of over-commitment to capture individual differences between researchers that may moderate the relationship between perceptions of organizational justice/injustice and behavior, either directly or indirectly through positive or negative affect (Siegrist, 2001; Siegrist, Peter, Junge, Cremer, & Seidel, 1990). Over-commitment was represented as the mean agreement (1=strongly disagree to 7=strongly agree) with six items (e.g., “People close to me say I sacrifice too much for my job,” “As soon as I get up in the morning, I start thinking about work problems”). Higher numbers indicate greater over-commitment.

Positive and negative affect—We hypothesized that a combination of justice perceptions and over-commitment would result in an affective response among scientists that could be associated with their misbehaviors or ideal behaviors. While the theories that guided this work spoke more directly to the likelihood that perceptions of injustice and over-commitment could be related to negative affect and misbehavior, we wanted to explore whether perceived justice could be directly (or in combination with over-commitment) associated with positive affect and ideal behaviors. Two composites derived from the PANAS (Positive Affect Negative Affect Schedule) (Watson, Clark, & Tellegen, 1988) assessed negative affect (i.e., distressed, upset, scared, nervous, afraid) and positive affect (i.e., excited, enthusiastic, alert, inspired, determined). Respondents rated how well each adjective described how they had felt over the past week (1=very slightly/not at all, 5=extremely), and each composite was the mean response to ratings of the five constituent adjectives.

Covariates—We measured self-reported characteristics to better describe the respondents and to include as covariates. They included sex, race, academic field, and number of years elapsed since first receiving a doctoral degree.

Statistical analysis

The modest response rate of 35% raised concern about response bias. On the basis of measures available for all individuals in our original sampling frame, we used respondent, department, and university characteristics to identify subgroups that differed in how likely each individual was to respond to the survey (i.e., their propensity of responding) (Crain et al., 2008). Then we used the resulting propensity scores to estimate whether the likelihood of responding to the survey was correlated with each key outcome (Groves, 2006; Groves et al., 2008). Additional diagnostic analyses assessed whether weighting to correct for non-response was appropriate (Little & Vartivarian, 2003). Survey response likelihood was virtually unrelated to the misbehavior outcomes, making response weights inappropriate for modeling the misbehavior outcomes (Little & Vartivarian, 2003). In contrast, response likelihood was positively associated with endorsing ideal behaviors, so we weighted the analyses involving ideal behaviors, to adjust for this potential response bias (Little & Vartivarian, 2003).

We hypothesized mediated relationships in which organizational justice and over-commitment (or their interaction), were associated with affect and, in turn, affect was

associated with behavior. Assessing such mediated relationships requires a four-step statistical estimation process. In what follows, we describe each of these steps in sequence, following the same logic in presenting the results to follow.

The first step in assessing the viability of these mediated relationships was to determine whether there were significant direct associations between organizational justice, over-commitment and behavior (Baron & Kenny, 1986; MacKinnon, 2008). These direct associations are represented by the paths marked 'c' in Figure 1. Paths c1 and c2 are the "main effects" (associations) of organizational justice and over-commitment, respectively, with behavior, while c3 represents their interactive association with behavior.

We estimated multilevel logistic regression models in which we predicted one of the behaviors (of the group of six misbehaviors and four ideal behaviors) from one of the six organizational justice composites, over-commitment, and the interaction of six organizational justice composites, over-commitment and the interaction of organizational justice and over-commitment. The three coefficients that these models estimated correspond to paths c1–c3. We also adjusted for four respondent characteristics: years since attaining a doctorate, sex, race/ethnicity, and field of study. There was a subset of models in which there were significant associations between organizational justice, over-commitment or their interaction, and behavior. We explored these models further to assess whether the direct associations could be mediated by affect (e.g. to what extent can the association between a measure of organizational justice and a behavioral outcome be said to operate through a pair of indirect associations: between organizational justice and affect on the one hand, and between affect and the behavior outcome on the other.) The results of exploring this subset of models are displayed in Tables 2 and 3 and discussed further below.

The second step in the analysis plan was to identify the organizational-justice composites, over-commitment, or interactions that were related to positive or negative affect. The logic of a mediated model is that if affect mediates the direct associations between organizational justice, over-commitment and behavior, then the organizational justice and over-commitment measures that were directly related to behavior must also be related to affect. The goal of this step, then, was to estimate coefficients corresponding to paths a1, a2 (main effects) and a3 (interactive effect) in Figure 1 to determine whether this logic held. We estimated multilevel regression models that predicted negative affect from the composites (justice, commitment, interaction) that, in the first step, were found to be associated with misbehavior, and in the first step, as well as models that predicted positive affect from composites associated with ideal behavior.

The third step in the analysis plan was to identify significant associations between affect and behavior, accounting for the associations between organizational justice, over-commitment, and behavior. This relationship is represented by path b1 in Figure 1. Among the models in which we learned that organizational justice and over-commitment were related to both behavior and affect we estimated multilevel logistic regression models predicting the likelihood that respondents engaged in misbehavior as a function of negative affect, controlling for appropriate organizational justice measures, over-commitment, the justice-by-over-commitment interaction, and the four covariates. We estimated comparable models predicting the likelihood of engaging in each ideal behavior from positive affect and the remaining constructs.

For the multilevel logistic models predicting behavior, we specified a binomial error distribution with a logit link function, nested faculty within academic departments, and used residual pseudo-likelihood estimation and subject-specific linearization. Inverse response propensity weights were applied to the ideal behavior models but not the misbehavior

models. For the multilevel models predicting negative affect we specified a normal error distribution with an identity link function and nested faculty within departments. We treated all estimated parameters as fixed effects, with random intercepts estimated for each department using PROC MIXED or GLIMMIX in SAS 9.1.3.

The final step in assessing the empirical support for our mediated hypothesis was to calculate the strength of the mediated relationships from organizational justice or over-commitment through affect to behavior, and determine which were statistically significant. We carried out this final step only where there was sufficient evidence from prior analytic steps to assert that mediation was theoretically plausible: organizational justice or over-commitment predicted behavior (c paths from first step); organizational justice or over-commitment predicted affect (a paths from second step); and affect predicted behavior (b path from third step).

The strength and significance of the indirect associations between organizational justice, over-commitment and their interaction with behavior were estimated using the product of coefficients approach (MacKinnon, Warsi, & Dwyer, 1995; Sobel, 1982). This approach multiplies the coefficient of an 'a' path (e.g., justice to affect) by that of a 'b' path (e.g., affect to behavior) to estimate the strength of the indirect relationship, $a*b$, of justice with behavior by way of affect. Significant 'a' and 'b' coefficients were taken from models summarized in Tables 2 and 3 in which the three conditions for mediation were met to estimate the strength of each indirect effect of organizational justice, over-commitment, or their interaction on behavior via negative or positive affect. We calculated asymmetric 95% confidence intervals around the indirect associations to determine which were statistically significant. These calculations were carried out using PRODCLIN (MacKinnon, 2008; MacKinnon, Lockwood, & Williams, 2004), and 95% CIs that did not overlap zero denoted statistically significant mediation.

RESULTS

In demographic profile, the respondents tended to be non-Hispanic white men who earned their first doctorate about two decades ago. By design, they were distributed relatively evenly across five academic disciplines (see Table 1). Mean responses to the measures of organizational justice, procedural injustice, and over-commitment tended to be just above the midpoint of the rating scales and demonstrated consistent variance estimates. The measures of organizational justice with respect to the department and university were highly correlated with each other ($r=.59, p<.001$) but less correlated with the other measures of organizational justice (range of $r = .12-.23$) or injustice (range of $r = -.24, -.25$). Nor were the remaining measures of organizational justice highly correlated with each other (range of $r = .08-.29$).

Elsewhere, we have published the prevalence of many of the misbehavior composite measures listed in Table 1 (Martinson, et al., 2009). The prevalence of the composite measures of misappropriation of resources or proprietary information (25% of respondents) and circumvention of federal research regulations (18%) have not been previously published. The overwhelming majority of respondents indicated that they "always" engaged in most individual ideal behaviors (Martinson, et al., 2009). Less consistently, though, did they always comply with all behaviors in a composite. Nearly nine in 10 (89%) reported that they always complied with pertinent regulations, and three in four (74%) said that they always respected confidentiality of others' work and maintained appropriate data integrity. Only about half (53%) consistently followed all of the good authorship practices, and only one in four (23%) always made *a priori* agreements with colleagues and trainees.

Direct associations of organizational justice and over-commitment with behavior

The primary research questions concerned whether misbehaviors or ideal behaviors are more likely to be reported when individuals perceive a high degree of organizational justice (hereafter referred to as OJ) in their environments, by individuals who are over-committed (hereafter referred to as OC,) or whether OC moderates the associations between perceptions of OJ and behavior. Table 2 (columns c1, c2 and c3) summarizes the significant direct associations between these constructs and misbehavior, while Table 3 summarizes the comparable associations with ideal behavior. Because we estimated 60 regression models at this stage of the analysis, it is possible that several of the associations deemed significant using the typical criterion of $p < 0.05$ are simply due to chance. We have not displayed the results of models in which there were no significant relationships between these predictors and behavior, and our interpretation of results will focus on over-arching patterns in the data rather than specific models.

The most conceptually interesting associations were the significant interactions between OJ and OC in predicting misbehavior (Table 2, column c3) and ideal behavior (Table 3, column c3). For the sake of illustration, we see in the first row of Table 2 that there was a significant association between perceptions of OJ in one's department and the likelihood of having engaged in neglect ($c1 = -.441, p \leq .01$) as well as an interaction between department-based OJ and OC ($c3 = .089, p \leq .05$). The pattern of effects that this model predicts is displayed in Figure 2a. Respondents who were highly over-committed were most likely to have reported that they had engaged in neglect, but the likelihood of reporting neglect was not related to their perceptions of justice (solid line). Among those with moderate OC scores, perceiving more OJ was related to a lower likelihood of reporting that they had behaved neglectfully (dashed line). The negative relationship between OJ and neglect was most pronounced among the respondents who reported the lowest levels of OC (dotted line). The model in which OJ at one's university and OC predicted neglect showed a similar pattern of results (Table 2, row 2).

The OJ by OC interactions that were significantly associated with the "top ten" (Table 2, rows 4 and 5), misconduct (Table 2, rows 7–11), and careless peer review (Table 2, row 13) behavior composites was of a slightly different pattern (Figure 2b). In these interactions, perceiving more OJ was related to a lower likelihood of misbehavior among participants who were less over-committed. Among those with moderate OC, this relationship was negative but less pronounced. However, perceiving more OJ was related to a higher likelihood of misbehavior among the participants who were most over-committed. The primary difference between these two patterns is whether justice is unrelated (Figure 2a) or positively related (Figure 2b) to misbehavior among respondents who were most over-committed.

The three interactions that significantly related to engagement in ideal behavior also demonstrated a conceptually intuitive pattern of results (Table 3, rows 1, 4, 7). Ideal behavior was most likely to be reported by respondents who are low in OC, and it became more likely as perceptions of OJ increased. We also observed this positive relationship between OJ and ideal behavior, albeit less pronounced, among those with moderate OC. Respondents who were relatively high on OC were least likely to engage in ideal behaviors, and the likelihood of ideal behavior was not related to OJ perceptions. The relationships between organizational justice, over-commitment and ideal behavior were effectively a mirror image of, and conceptually similar to, the pattern of results displayed in Figure 2a.

Significant direct relationships involving OJ or OC emerged in several models. Simple, direct associations between OJ perceptions and misbehavior emerged in three models (Table 2), while three models showed relationships between OJ perceptions and ideal behavior

(Table 3). Greater perceptions of injustice were related to higher likelihoods of engaging in one of the top-10 most serious misbehaviors ($c1=.666, p\leq.05$); perceiving more OJ at one's university was related to a lower likelihood of violating federal regulations ($c1=-.568, p\leq.05$), and perceiving more OJ with respect to the Institutional Review Board (IRB)/Institutional Animal Care and Use Committee (IACUC) was related to a lower likelihood of misappropriation ($c1=-.394, p\leq.05$). Perceived injustice was associated with a lower likelihood of avoiding favoritism ($c1=-.589, p\leq.05$). Observing the Golden Rule was more likely as OJ with respect to manuscript review increased ($c1=.417, p\leq.05$), and playing by the rules was more likely with higher perceptions of OJ from the IRB/IACUC ($c1=.736, p\leq.01$). There were also main effects of OC on several misbehaviors (Table 2, column c2) and one ideal behavior (Table 3, column c2). Neglect, misconduct and careless peer review were more common and avoiding favoritism less common, among respondents who were more over-committed.

The models summarized in columns c1 to c3 of Tables 2 and 3 demonstrated that there were direct associations between organizational justice, over-commitment and behavior in 22 of the 60 models estimated. The remaining models, not summarized in Tables 2 or 3, did not provide empirical support for a mediational hypothesis. The general pattern in the direct effects of organizational justice and over-commitment on behavior was that perceptions of OJ may be most strongly related to desirable behavior among those who are less over-committed, and that the strength of this relationship may be dampened (or even reverse) as OC increases.

Direct associations of organizational justice and over-commitment with affect

We now turn to the results of the second step of the analysis, in which we assess whether the constructs that significantly predicted behavior also predict affect. Perceived injustice was associated with a lower likelihood of avoiding favoritism. Observing the Golden Rule was more likely with higher perceptions of justice with respect to manuscript review, and playing by the rules was more likely with higher perceptions of justice from the IRB/IACUC. There were also main effects of intrinsic drive on several misbehaviors (Table 2, second column) and one ideal behavior (Table 3, second column). Neglect, misconduct, and careless peer review were more common (and avoiding favoritism less common) as respondents reported higher over-commitment.

Once we identified the 22 models in which organizational justice (OJ) and over-commitment (OC) were related to behavior, we assessed how affect could mediate these associations by predicting affect from the constructs that were significantly associated with behavior. Again, the most theoretically and empirically compelling pattern of results emerged with respect to the interactive associations of OJ and OC with affect. For each of the models in which OJ and OC had an interactive association with misbehavior, there was also a significant interactive association with negative affect (Table 2, column a3, rows 1, 2, 4, 5, 7–11, 13).

These interactions showed a consistent pattern in which reports of negative affect were lowest among participants with relatively low OC and that, among these participants, OJ was not related to negative affect (Figure 2c, dotted line). Among participants with moderate OC, negative affect tended to be higher overall but was progressively lower as perceived OJ increased (dashed line). Finally, among those with the highest OC, reports of negative affect were relatively high but became markedly lower as participants perceived more OJ (solid line). None of the models predicting positive affect (Table 3, column a3) was significant.

The results of these models offered support for the hypothesis that negative affect is a viable mediator of the associations of organizational justice and over-commitment with

misbehavior. The lack of effects for positive affect, however, makes a comparable hypothesis regarding positive affect and ideal behavior untenable.

Direct associations of affect with behavior

Having established that organizational justice and over-commitment were similarly associated with both negative affect and misbehavior, we next assessed the direct associations between negative affect and misbehavior. We estimated a final set of models to quantify the relationship between negative affect and misbehavior, controlling for significant OJ by OC interactions. Negative affect was positively associated with both neglect and the top 10 most serious misbehaviors (Table 2, column b1, rows 1–5) but was not related to circumventing federal regulations, misconduct, misappropriation, or careless peer review. More negative affect was associated with a higher likelihood of reporting that one had engaged in neglectful behavior or one of the top 10 most serious misbehaviors.

Indirect associations of organizational justice, over-commitment and negative affect with misbehavior

The final step in our analysis was to calculate the strength and significance of the indirect association of organizational justice and over-commitment with misbehavior by way of negative affect for the 5 models that met all three of the empirical criteria for mediation. Returning to our previous example (Table 2, row 1), the interactive association of OJ and OC with negative affect was significant ($a_3 = -.033$, $p \leq .01$), as was the association between negative affect and neglect ($b_1 = .210$, $p \leq .01$). The strength of the indirect effect was also significant, $a_3 * b_1 = -.007$, $p \leq .05$. This meant that the organizational justice by over-commitment interaction was significantly associated with negative affect; this variation in negative affect was in turn associated with an increased likelihood of neglect. It also meant that a significant proportion of the direct associations between OJ, OC and misbehavior could be explained by negative affect.

In total, there were four models in which the interactive associations between OJ and OC with neglect and top ten misbehaviors were partially, and significantly, explained by negative affect (Table 2, column $a_3 * b_1$, rows 1, 2, 4, 5). In the first of these, (row 1) OJ in the department, OC, and their interaction were related to negative affect that in turn was associated with the neglect composite. For respondents low in over-commitment, more perceived organizational justice did not relate to negative affect but was directly related to a lower likelihood of reporting neglectful behavior. For those moderate in over-commitment, there were only weak relationships among OJ, OC, affect, and neglectful behavior. For those highest in over-commitment, perceptions of organizational justice in one's primary department were not *directly* related to neglectful behavior. Justice was, however, associated with less negative affect, and less negative affect was associated with less neglectful behavior. The remaining three interactions showed similar patterns of effects. There was a simple and direct association involving OJ among participants relatively low in OC. The perception of more justice was related to less neglect and top-10 most serious behaviors. Among those moderate in OC, OJ was only weakly related to negative affect and these misbehavior composites. Organizational justice was not *directly* related to misbehavior at all among those highest in OC. Rather, perceptions of OJ were related to less negative affect, which was in turn related to less misbehavior.

Of the remaining models with interpretable direct associations of organizational justice or over-commitment with misbehavior or ideal behavior, none had the potential to be mediated by affect. Our data suggest that negative affect might mediate the relationship between organizational justice and research related behavior, but only for some scientists (i.e., those

who are most over-committed) and for some relatively common misbehaviors (i.e., neglect, top ten most serious).

DISCUSSION

A number of broad observations arise from our results. First, as we have recently noted (Martinson, et al., 2009), in this sample of largely mid-career scientists employed at top research universities in the United States, we observe self-report of substantial levels of a range of behavior antithetical to high-quality science combined with suboptimal levels of ideal research-related behavior. In particular, these scientists seem to be doing least well with respect to the social and interpersonal aspects of their roles as employees, colleagues, and mentors. Since the majority of these researchers are engaged in conducting human-subjects-based research and many of the behaviors about which they reported may be adversely affecting the quality or integrity of that research, these findings should be of concern to all of us.

Second, as theoretical frameworks for understanding scientists' behavior, general strain theory and organizational justice theory receive qualified support in our findings. Given the number of models considered here and the correlations between perceptions of organizational justice at the department and university levels, it is more productive to consider the overall patterns of results rather than to interpret individual findings. Consistent with our initial hypotheses, perceptions of organizational justice in science are positively associated with increased likelihood of reporting "ideal" behavior and decreased likelihood of reporting misbehavior and misconduct. In contrast, perceptions of violations of organizational justice in science are associated with lower likelihood of reporting "ideal" behavior and increased likelihood of reporting misbehavior and misconduct.

Third, respondent reports of having engaged in the corrosive misbehavior composites (i.e., neglect, top-10 most serious) were associated with the intersection of intrapersonal (over-commitment) and environmental (organizational justice/injustice) constructs, which are partially mediated by negative affect. More serious and markedly less frequently reported misconduct also appears related to the intersection of intrapersonal and environmental constructs, but not at all to negative affect.

Fourth, the local environment of one's department, university, and associated regulatory oversight bodies appear to play important roles in fostering (or undermining) research integrity. To the extent that these entities are perceived to treat researchers fairly, we should expect to observe more salutary behavior on the part of scientists. The pattern of significant associations of misconduct (predominantly plagiarism) with four of our five measures of organizational justice composites leads us to conclude that this particular behavior is more related to one's generic perceptions of justice and fair treatment in the science enterprise, rather than to specific perceptions about a particular sub-component (e.g. within one's department, or with respect to the regulatory bodies overseeing one's work).

Fifth, the observation of numerous associations between justice perceptions and misbehavior that are not mediated by negative affect leads us to consider whether other factors might mediate these relationships. One possibility is that perceptions of unfair treatment may alter behavior through cognitive problem-solving or learning pathways, independent of any impact on affect. Thus, rational actors might simply accept such violations as relatively immutable features of their work environments, adopting compensatory tactics and strategies to achieve their desired goals. Such pathways are still consistent with general strain theory which, as noted in the introduction, posits that strains and stressors themselves have undesirable effects on behavior through reductions in informal social control or by

making it easier for individuals to justify their untoward behavior (Agnew, 2006). A third possibility suggested by recent research on the rat brain is that chronic stress may bias decision-making toward more routinized or repetitive behavior and away from more creative problem-solving (Dias-Ferreira et al., 2009).

The finding of neutral to positive associations between perceptions of organizational justice and unwanted behavior among those who are most highly over-committed is at odds with a finding from our previous study. There, we observed increased likelihood of reporting having engaged in one of more of the top-10 most serious misbehaviors among those reporting both over-commitment (high intrinsic drive) and perceptions of procedural injustice (Martinson, et al., 2006).

Differences in the two studies' samples may be partially responsible for these differences, though we can only speculate. We conducted our prior study in early- to mid-career scientists who had recently received either postdoctoral funding or an initial independent research award from the National Institutes of Health, regardless of their employing institution. They were, on average, about 5 and 11 years out, respectively, from completing their doctorates. In contrast, our current sample represents faculty from first-tier U.S. research universities who are substantially farther along in their careers (on average, 21 years out from completing their doctorate).

We speculate that over-committed individuals may be more likely than others to “internalize” stressors, responding by driving themselves harder still. It may be that, in this sample, those expressing high levels of over-commitment have internalized the strains of their work situation and may no longer experience them as largely external stimuli. For these individuals, the presence of organizational justice in their work environments may appear less relevant or at least mean something different than it does for others. Their own intrinsic driven-ness — their internal demon — may be a more salient source of strain. This would be consistent with our observation that high over-commitment is significantly correlated with high reported negative affect in this sample. Moreover, our results suggest that over-commitment itself clearly does not protect against unwanted behaviour.

Limitations

Caution is warranted when interpreting differences between findings here and those of our first study — particularly with respect to the aggregate level of self-reported top-10 misbehavior. This is because of inherent differences in the targeted samples as well as refinements to our behavioral items between the two studies. As in our first study, our dependence on self-report leads us to believe that there may be some under-reporting of misconduct and misbehavior, despite our assurances of respondents' anonymity.

Some of the theoretical expectations about factors we believe are operative are only crudely testable using the kind of cross-sectional design we were able to apply in this study. General Strain Theory implicates potentially transitory affective states as part of the pathway whereby environmental stressors or strains may lead to untoward behavior. We intended the positive and negative affect composites to measure such transient states, whereas we intended the over-commitment composite to measure a more stable characteristic of respondents. However, because we measured both cross-sectionally and did not assess the affect measure, in particular, contemporaneously with opportunities to engage in the behavioral outcomes assessed, they should not be considered a measure of an enduring trait or a passing state. This theoretical ambiguity is not unique to this cross-sectional self-report data collection, but the reader should recognize the empirical and conceptual limitations it imposes on the present work.

Contrary to our first study, we did not find any significant associations in these data between a measure of identity as a scientist and any of the other measures of interest. This lack of association may be due to an inadequate measure of identity but may also be due to less identity variation in this sample of mid-career, academic faculty employed at top research-intensive universities. It is likely that those without a strong identity as a scientist would have been selected out of the career track leading to such positions, meaning that they are simply not represented in our sample.

Best Practices

Our findings are generally consistent with theoretical expectations suggesting that reducing individuals' exposure to strains such as organizational injustice should reduce the occurrence of non-normative behavior. Recently, various commentators have argued that many scientists, particularly younger, less well-established scientists, may perceive the current distribution of resources and rewards in science as unfair (Babco & Jesse, 2003; Butz et al., 2003; Freeman, Weinstein, Marincola, Rosenbaum, & Solomon, 2001a; Juliano, 2003; Juliano & Oxford, 2001; National Research Counsel, 1994; Teitelbaum, 2003). Perceptions of fair resource distribution processes are expected to increase tolerance for perceptions of unfair distributional outcomes of resources (i.e., rewards) (Lind & Tyler, 1988). Thus, ensuring that distributional processes are perceived to be fair may be a fruitful way to foster normative behavior and reduce unsanctioned behaviors in science (Collins, 2010; Committee on Alternative Models for the Federal Funding of Science, 2008; Kaiser, 2005, 2008a, 2008b).

More specifically, the observed associations of individuals' over-commitment to work with undesirable behavior raises the question in our minds of whether such over-commitment may be partially driven by the "tournament model" nature of the science enterprise, which has been argued to generate potentially problematic levels and types of competition in science (Freeman, et al., 2001a; Freeman, Weinstein, Marincola, Rosenbaum, & Solomon, 2001b). In the past several years, a number of leading voices in science have drawn attention to the increasing competition for research funding, and declining "success rates" for grant applications, with many also expressing concerns that insufficient funding was making its way to younger and more junior scientists in particular (Collins, 2010; Committee on Alternative Models for the Federal Funding of Science, 2008; Kaiser, 2005, 2008a, 2008b). It has been argued that one of the best ways to gain an edge in such a competition is to work longer, harder and faster than one's competitors. It is plausible that some of the careless, neglectful behavior observed in our study is a manifestation of attempts by researchers to get and stay one step ahead in this race. Speculatively, if the nature of the competition for rewards in science is generating such dysfunction in terms of over-committed, demoralized (negative affect) researchers who are engaging in untoward behavior, this would seem to be an area for urgent science policy change.

For behaviors associated with justice violations at the department and university levels, interventions at those levels need to be considered. Such interventions might focus on a department's decision-making procedures to ensure fairness, transparency as appropriate, and collegial buy-in. Of particular interest would be department-level decisions about workloads, teaching and service assignments, hiring, promotion, tenure, and salaries (Anderson, 1996; Anderson, Louis, & Earle, 1994; Louis, Anderson, & Rosenberg, 1995; Whitbeck, 2004). Our findings also point to the salience of organizational justice in broader contexts, suggesting other types of interventions. At the *institutional* level, decision-making and procedures affect scientists' work largely through policies, review (e.g., IRB/IACUC, grant management) (Keith-Spiegel & Koocher, 2005; Keith-Spiegel, et al., 2006) and project- or issue-specific negotiations and rulings. Again, appropriate transparency and fairness are paramount, but this also indicates a need for closer attention to communication

of procedure, policy dissemination, and procedures for redress. As one example, Francis Collins, current Director of the NIH, has recently argued that an "... issue that needs attention, though it will be controversial, is whether institutional incentives in the current system that encourage faculty to obtain up to 100% of their salary from grants are the best way to encourage productivity" (Collins, 2010). We would also question the ultimate wisdom of the evolution over the past 25 years in university and medical school policies leading to many fewer tenured positions for researchers, and the increasingly common phenomenon of tenure without salary guarantees (Bunton & Mallon, 2007).

At the level of the *task environment*, yet other responses are indicated. Recommended interventions might target publication, grant, and review processes, again with attention to procedural transparency and fairness, in a way that does not compromise confidentiality or blind review. Recent examinations of peer review processes have suggested some specific areas for improvement that are consistent with our findings. These include improvements such as reducing the role of chance (Johnson, 2008; Mayo et al., 2006), and increasing the speed and efficiency of peer review for federal grant making (Couzin, 2007; Miller & Couzin, 2007).

Finally, because so many of the issues involved here appear related, in one way or another, to the increasingly intense competition for research resources ---, federal grant funding in particular -- we agree with Francis Collins that "...it is time for NIH to develop better models to guide decisions about the optimum size and nature of the U.S. workforce for biomedical research" (Collins, 2010).

Research Agenda

Scientists are engaged in exchange relationships with a variety of others in their work. These include colleagues and administrators in their departments and institutions of employment, but also regulatory agents in the form of IRBs and IACUCs, along with multiple others in the external task environment, including peer reviewers, journal editors, grant reviewers, funding agencies, project officers, competitors and the like. Thus, it is important to examine perceptions of organizational climates with respect to multiple sub-components of the scientific environment.

Our results suggest that there is ample room for institutional self-improvement at the global level of the institution, with respect to regulatory bodies, or within departments and centers. Appropriate targeting of educational interventions or organizational-change initiatives to promote institutional self-regulation and research integrity requires the ability to collect reliable data on baseline conditions, to assess areas needing improvement, and to subsequently assess the impact of specific initiatives.

Important next steps in the research agenda include the development and dissemination of tools that will allow universities and other research institutions to collect reliable, valid, comparable and actionable data to stimulate and facilitate internal discussions and inform training initiatives and other activities to promote research integrity. Once such tools are in hand, a useful next step would be the creation of a national repository to which institutions would be encouraged to contribute their data, most likely in an institutionally de-identified format. The existence of such a data warehouse would facilitate the development of national standards, against which institutions and their various subunits could compare themselves to assess their performance in multiple dimensions of the research integrity climate.

There is a need to create the necessary infrastructure to make such periodic self-assessments both feasible and affordable to institutions. Their value to university leadership would be further bolstered by providing tools to create data summaries and meaningful comparisons

for reporting back to department heads and others to facilitate identification of existing best practices and areas in which improvements are needed.

Educational Implications

Because multiple features of the research environment may lead to blockage of valued goals for researchers, it is likely that most will feel unfairly treated at some point or points during their career. Among those, some proportion will perceive more enduring patterns of unfair treatment, such as those reported to us in this study. While some may come naturally by the coping mechanisms and resources needed to navigate a less than friendly environment without falling into bad behavior, others will not. Thus, it is important for young scientists to learn both to anticipate such challenges, and how to respond to succeed in their careers without compromising the integrity of their scientific work. Training programs or other efforts by mentors and exemplars might be developed to better equip scientists to successfully cope with strains conducive to non-normative behavior. Such efforts might even teach young scientists to advocate for positive changes in those features of the workplace that create goal blockages.

Acknowledgments

This research was supported by Award Number R01-NS052885 from the National Institute of Neurological Disorders and Stroke and the DHHS Office of Research Integrity through the collaborative Research on Research Integrity Program. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institute Of Neurological Disorders and Stroke, the National Institutes of Health, or the Office of Research Integrity.

Award Number R01-NS052885 from the National Institute of Neurological Disorders and Stroke and the DHHS Office of Research Integrity through the collaborative Research on Research Integrity Program.

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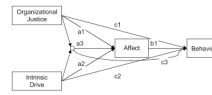


Figure 1.
Hypothesized path model.

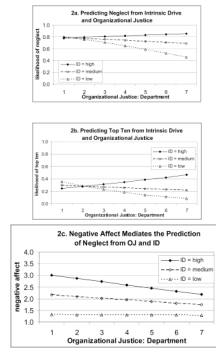


Figure 2.

Table 1

Raw Distributions of Key Analytic Variables among N = 1,701 Respondents

	M / %	SD	<i>α</i>
Female	35.2%		
Racial or Ethnic Minority	14.5%		
Years since doctorate	21.2	12.1	
Field of study			
Biology	23.7%		
Chemistry	18.1%		
Allied health sciences	22.3%		
Medicine	15.7%		
Social Sciences	20.3%		
Predictors			
Organizational Justice			
Department	4.62	1.53	.95
University	3.78	1.43	.95
IRB/IACUC	5.19	1.56	.94
Manuscript review	5.24	1.48	.96
Grant funding review	4.57	1.63	.96
Procedural Injustice	4.99	0.93	.73
Intrinsic Drive	4.28	0.91	.76
Misbehaviors			
Neglect or carelessness	60.4%		
Misappropriation	25.1%		
“Top ten” misbehaviors	23.4%		
Circumventing federal requirements	17.5%		
Misconduct (FFP)	8.0%		
Careless, inappropriate peer review	8.2%		
Ideal Behaviors			
Compliance with regulations	88.9%		
Confidentiality and data integrity	73.9%		
Good authorship practice	53.3%		
Collegial agreements	23.4%		

Table 2

Path coefficients and standard errors from regression models predicting misbehaviors from organizational justice (OJ) and intrinsic drive (ID), negative affect from organizational drive and intrinsic drive, misbehavior from negative affect (NAff) and estimated indirect effects.

	Misbehavior			Negative Affect			Misbehavior			
	OJ	ID	OJ*ID	OJ	ID	ID	NAff	a1*b1	a2*b1	a3*b1
Neglect										
OJ: Department	-.441** (.166)	-.147 (.186)	.089* (.038)	.063 (.059)	.456*** (.065)	-.033** (.013)	.210** (.078)	.013	.096***	-.007*
OJ: University	-.547*** (.186)	-.089 (.176)	.092* (.043)	.134* (.063)	.499*** (.060)	-.052*** (.015)	.202** (.080)	.027*	.101*	-.011***
OJ: IRB/IACUC	.110 (.191)	.511* (.245)	-.053 (.044)	-.042 (.068)	.327*** (.085)	-.001 (.015)	.173* (.082)	-.007	.057*	.000
Top Ten										
OJ: Department	-.552*** (.197)	-.263 (.212)	.121** (.044)	.061 (.058)	.455*** (.065)	-.033** (.013)	.184* (.080)	.011	.084*	-.006*
OJ: Manuscript	-.483* (.207)	-.195 (.249)	.089* (.046)	.098 (.063)	.504*** (.079)	-.037** (.014)	.156* (.080)	.015	.079*	-.006*
OJ: Injustice	.666* (.343)	.680 (.406)	-.085 (.077)	-.138 (.093)	-.065 (.110)	.070*** (.022)				
Misconduct										
OJ: Department	-1.06*** (.323)	-.711* (.335)	.230*** (.072)	.062 (.058)	.455*** (.065)	-.033** (.013)	.137 (.125)			
OJ: University	-1.08*** (.381)	-.479 (.318)	.227** (.083)	.132* (.063)	.496*** (.059)	-.051*** (.015)	.138 (.127)			
OJ: Manuscript	-.925** (.326)	-.645 (.382)	.186** (.073)	.096 (.063)	.501*** (.079)	-.037** (.014)	.107 (.123)			
OJ: Grant	-.929*** (.323)	-.599 (.339)	.197** (.072)	.130* (.060)	.565*** (.067)	-.054*** (.014)	.153 (.130)			
OJ: Injustice	1.62** (.617)	1.655* (.737)	-.262* (.135)	-.138 (.093)	-.067 (.110)	.070*** (.022)				
Regulations										
OJ: University	-.568* (.264)	-.252 (.226)	.088 (.060)	.135* (.064)	.500*** (.060)	-.053*** (.015)	.038 (.095)			
Peer Review										
OJ: Manuscript	-.809** (.305)	-.532 (.358)	.159** (.068)	.102 (.064)	.510*** (.080)	-.038** (.014)	.077 (.119)			
OJ: Injustice	.969 (.538)	1.221* (.622)	-.186 (.119)	-.131 (.094)	-.056 (.111)	.068*** (.022)				
Misappropriation										
OJ: IRB/IACUC	-.394* (.202)	-.440 (.249)	.071 (.046)	-.043 (.068)	.326*** (.085)	-.001 (.016)				

* p≤.05,

500 ≤ d

'10 ≤ d
**

NIH-PA Author Manuscript

NIH-PA Author Manuscript

NIH-PA Author Manuscript

Table 3

Path coefficients and standard errors from regression models predicting ideal behaviors from organizational justice (OJ) and intrinsic drive (ID), positive affect from organizational drive and intrinsic drive, misbehavior from positive affect (PAff) and estimated indirect effects.

	Ideal Behavior			Positive Affect			Ideal Behavior		
	OJ	ID	OJ*ID	OJ	ID	OJ*ID	PAff	OJ*ID	PAff
avoiding favoritism									
	c1	c2	c3	a1	a2	a3	b1	a1*b1	a3*b1
OJ: University	.506** (.183)	.131 (.167)	-.102* (.042)	.139* (.069)	.005 (.065)	-.017 (.015)			
OJ: Manuscript	-.130 (.174)	-.513* (.219)	.053 (.040)	.024 (.067)	-.063 (.084)	.002 (.015)			
OJ: Injustice	-.589* (.267)	-.799** (.315)	.114 (.061)	.022 (.099)	.111 (.117)	-.030 (.023)			
golden rule									
OJ: University	.585** (.211)	.310 (.201)	-.122** (.049)	.100 (.071)	-.024 (.066)	-.008 (.016)			
OJ: Manuscript	.417* (.214)	.279 (.272)	-.078 (.049)	.012 (.067)	-.057 (.084)	.002 (.015)			
playing by the rules									
OJ: IRB/IACUC	.736** (.298)	.312 (.333)	-.122 (.066)	.103 (.073)	-.015 (.090)	-.007 (.017)			
OJ: Manuscript	.693* (.301)	.460 (.360)	-.144* (.068)	.021 (.072)	-.047 (.090)	.002 (.016)			

* p≤.05,

** p≤.01,

*** p≤.005