Disciplinary Differences in Conflict of Interest Policy Communication, Attitudes, and Knowledge

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Abstract: *Research institutions are charged with developing and managing conflict of interest (COI) policies regarding the design, conduct, and reporting of research. Prior research indicates that university researchers may not understand the purpose of these policies and may resent the time taken to demonstrate compliance. Policy communication is not a simple issue, nor is it a process clearly defined in the COI context. Accordingly, this study investigates multiple aspects of policy communication across disciplines to shed light on policy communication practices as well as on how communication relates to policy knowledge and attitudes. Specifically, this study investigates COI policy communication, knowledge, and attitudes at a large university and compares differences across disciplines. Using the framework of structurating activity theory, the study also analyzes how norms for ethical conduct differ across disciplines and correlate with policy communication, knowledge, and attitudes. A total of 246 participants representing health sciences and non-health sciences disciplines participated in an online survey regarding the institution's COI policies. Results indicate that attitudes toward the COI policies are positive across disciplines and that policy knowledge is higher than mid-range. However, policy communication is low across disciplines, with non-health sciences participants reporting lowest levels of communication about the policy. Implications and recommendations are offered for future research and research administration practice.*

Keywords: *conflict of interest, policy communication, policy attitudes, policy knowledge, structurating activity theory*

Introduction

Financial conflicts of interest (COI) in research exist when an investigator potentially benefits financially from the research in which that individual is involved. One common conflict occurs when an investigator establishes a financial relationship with an industry partner through receipt of industry-sponsored research, gifts, or remuneration from consultation, speaking engagements, etc. Several studies suggest that industry partnerships can cause conscious or subconscious bias on study design, data collection and analysis, and reporting of results, no matter the nature of the relationship (Bekelman, Li, & Gross, 2003; Berger, 2015; Bes-Rastrollo, Schulze, Ruiz-Canela, & Martinez-Gonzalez, 2013; Lexchin, Bero, Djulbegovic, & Clark, 2003; Sah & Fugh-Berman, 2013). Another common conflict of interest occurs when an investigator generates intellectual property through research. Generating intellectual property alone does not cause a financial conflict of interest, but a conflict does arise if an existing industry partner or a university-funded start-up company commercializes the intellectual property. Although remarkably little research exists on conflicts of interest involving start-up companies, financial and commitment conflicts are an obvious concern, especially if the researcher also holds an equity interest in the company (Smith, 2011).

The volume of industry-physician relationships and number of start-up companies appears to be increasing. According to Ornstein, Weber, and Nguyen (2013), pharmaceutical and medical device companies made payments to physicians of $4 billion from 2009-2013. That figure was nearly matched ($3.53 billion) between August 2013 and December 2014 (Groeger, Ornstein, Tigas, & Jones, 2015).[1] Similarly, the number of university start-up companies created per year increased from 330 in 2003 to 647 in 2012 (Valdivia, 2013).[2] These data together demonstrate that as industry-physician relationships and university investments in start-ups and licensing of intellectual property increase, so do the number of potential conflicts of interest related to research.

The increasing likelihood of conflicts of interest and lack of transparency of physician's industry relationships have received the attention of government regulators, leading to policy changes. In 2008, Senator Chuck Grassley (R-IA) called for policy revisions concerning industry payments to individual physicians. This led to the Physicians Payments Sunshine Act (2010) and the Department of Health and Human Services adopting new regulations to Public Health Services funding, which included changes to the National Institute for Health (NIH) conflict of interest policy in 2011. Some of the new NIH regulations set standards on investigators' industry relationships and intellectual property. Because the NIH is the largest research funding agency outside of the Department of Defense (White House Office of Science and Technology Policy, 2014), changes to its COI policy have had a major impact on COI policies and procedures of the nation's universities and colleges that seek NIH grant funding. The new NIH COI policy holds universities accountable for ensuring that researchers comply with federal regulations. As a result, many research universities made significant changes to their COI policies and procedures in 2012 based on NIH standards.

Implementation of a new university COI policy (COIP) is challenging. The policy must be robust enough to account for an array of possible conflicts of interest, including the aforementioned

examples, as well as accommodating a diverse population of researchers. Universities with closely associated medical schools face an extraordinary challenge if the university desires a unified and comprehensive COIP. Clinical researchers at medical schools may have more industry-related conflicts based on the large amounts of money pharmaceutical and medical device companies give to physicians. Furthermore, attitudes, objectives, motivations, and philosophies may differ between researchers in different fields. A comprehensive COIP must be communicated effectively to such a diverse audience. This may mean different communication strategies customized to unique audiences, or one strategy that transcends the differences between researchers across all fields with conflicts of interest (which may or may not be field-related). Clearly, much remains to be understood about how COIPs are perceived, interpreted, and communicated, and with what consequences. Prior research indicates that three key concerns for COIPs are communication, knowledge, and attitudes, which we discuss below.

Communication

Policy making, implementation, and compliance are communicative practices. Policy practice is not linear, but rather implies a circuit of communicative behaviors that might include attending to potential unintended consequences of policy provisions, addressing ambiguities in the policy text, and managing paradoxes inherent to the academic research context (LeGreco, 2012). Canary, Blevins, and Ghorbani (2015) found that the bulk of organizational communication research on policy communication represents an information transfer perspective to policy communication among practitioners. Lee and Garvin (2003) suggest that practitioners ought to move away from such notions of information transfer and toward methods of informational exchange, including reciprocity and valuing open, two-way communication channels.

Policy communication requires a high degree of openness, clearly explaining every phase of the process, and being open about expectations by developing relationships based on mutual trust (Janse & Konijnendijk, 2007). However, conflicting pressures from multiple parties may lead to reservations about the COI process, and result in secrecy rather than transparency. Frankel (1996) warns that secrecy will persist if researchers continue to view it as a necessary strategy for maintaining industry ties. Furthermore, concerns for proprietary gain can subvert traditional processes of openness and sharing among scientists. Industry partnerships and agreements place restrictions on researchers that in many cases lead to unwillingness or inability to share information, including data, findings, and methods. Marchington, Rubery, and Grimshaw (2011) advise that when implementers are faced with difficult undertakings across organizational boundaries, they should be keenly aware of issues of alignment, integration, and consistency. That is, when a governing body has not aligned meaning and goals with members, and members are poorly integrated into systems of knowledge sharing (or if the system does not support integration), problematic inconsistencies may ensue. To address this, Beachy, Berger, & Olson (2014) concluded from their Institute of Medicine roundtable on COI management that goals of communicating to the public about COI are to promote innovation, meet client needs, and increase and maintain public trust.

Clearly, policy communication is not a simple issue, nor is it a process that has been clearly defined in the COIP context. Accordingly, this study investigates multiple aspects of policy

communication across disciplines to shed light on such practices as well as on how communication relates to policy knowledge and attitudes.

Knowledge

If researchers are to be expected to comply with policy, they should be informed as to what a conflict is and what will be required if they are deemed to have a potentially conflictual relationship. As researchers are informed, their knowledge of COI processes increases. Gabler (2010) notes, "Social learning [is] the source of policy integration. Learning implies actors' improved understanding of alternative ideas, reflected in changes to frames that underlie identities, interests, policies, and institutions" (p. 83). Lipton, Boyd, & Bero (2004) provide several useful pieces of advice. Implementers should know which gaps in knowledge exist to understand how to properly assess what information needs to be conveyed. Lipton et al. (2004) found that while researchers report a desire for self-regulation and personal integrity, they approach policy only to the extent that it applies to them. They likely underappreciate their responsibility to understand the scope and implications of conflicts of interest.

For the most part, researchers understand why COIPs exist, and understand appropriate procedures to ensure conflicts are managed (Lipton et al., 2004). However, many are not aware of the actual impact of financial incentives in research, and faculty researchers generally lack understanding of specific details regarding COIPs (Glaser & Bero, 2005; Lipton et al., 2004). This is may be due to COIPs lacking detail regarding what constitutes COI and how it should be managed, or simply not being readily accessible to organizational members (Ancker & Flanagin, 2007). When the policy is available, those who are affected by the policy may develop the requisite knowledge for using it effectively, increasing compliance rates (Zelisko, Baumann, Gamble, Laporte, & Deber, 2014). Gabler (2010) asserts that researchers become strongly integrated with policy mandates when stakeholder goals are congruent and the institution provides opportunities for complex and reciprocal learning. In a recent study, Sacco, Bruton, Hanjal, & Lustgraaf (2015) found that participants who had taken college-level ethics courses demonstrated more sensitivity to the importance of disclosing financial COIs than those without such education. Although participants in that study were students rather than researchers, results indicate the influence of knowledge development opportunities on responses to research ethics issues. Overall, prior research indicates that researchers may have cursory knowledge of COIPs but details that could influence compliance are often lacking. Studies have more often focused on attitudes toward policies rather than objective levels of knowledge. Accordingly, we discuss policy attitudes below.

Attitudes

Prior research reveals several themes in researcher attitudes about COI and related policies. For example, Mecca, Gibson, Giorgini, Medeiros, Mumford, & Connelly (2015) interviewed researchers across disciplines to gauge their attitudes about conflict of interest scenarios they were presented. Their analysis revealed five attitudinal themes: disclosure, self-removal, accommodation, denial, and recognition of complexity. By far the most prevalent attitude was that conflicts are adequately managed by disclosure. Although disclosure is important, the authors note that researchers do not seem to understand other aspects of COI that may *not* be

adequately managed by disclosures. Their findings comport with Glaser and Bero's (2005) review of published research about COI attitudes. Glaser and Bero's analysis indicates a high reliance on disclosure, which likely reveals "a lack of awareness of the actual impact of financial incentives on themselves and other researchers" (p. 553). Results of that review of research also indicate that researchers believe that financial obligations influence how other researchers report findings, but not themselves. Glaser and Bero warn that if bias is unexamined, disclosure may not be enough to manage conflicts. Yet, Glaser and Bero (2005) explained that researchers approve of industry ties when they are indirectly related to research. Their review of empirical studies assessed researcher attitudes toward industry-research ties, not COI policy specifically, which is the focus of our present study.

A strength of this prior work is that it represents researchers across disciplines. However, little has been done to compare attitudes across disciplines. It is entirely plausible that researchers in different disciplines will have varying attitudes about conflicts of interest, policy solutions, and oversight in the research arena. For example, physicians who engage in industry relationships have been shown to rationalize potential conflicts of interest based on "(1) a sense of entitlement to accept industry gifts, and (2) a sense of invulnerability to the biasing effects of conflicts of interest" (Sah, 2012, p. 482). Sah's work indicates that the prevailing attitude among many physicians was that they felt as though they worked extremely hard in medical school; therefore, they deserved the gifts. Other studies have identified a "bias blind spot" in which individuals claim not to be biased by industry relationships, but they acknowledge those same relationships would bias their peers (Dana & Loewenstein, 2003; Pronin, Lin, & Ross, 2004; Sah & Fugh-Berman, 2013).

Viewing policy as a conglomeration of symbolic appeals, Frankel (1996) emphasizes how policy text "performs important symbolic functions" (p. 1302) in an effort to comfort anxious stakeholders. In reality, though, faculty often feel alienated through COI management processes (Lipton et al., 2004). For example, Lipton et al. found that many researchers believe that only researchers with active financial industry ties should be obligated to know the details of their institution's COIP. In a survey of hundreds of faculty across multiple campuses of the University of California, Lipton et al. (2004) obtained results regarding attitudes toward COIP in 10 departments that reported more financial conflict disclosures than others. Findings show that faculty members have complex, contradictory feelings about university-industry relationships. Most view campus policies as irrelevant, and some expressed anger over the process of policy implementation. Although departmental comparisons were not part of the Lipton et al. (2004) analysis, it could be that such attitudes might differ across researchers from different disciplines. In the following section we discuss theoretical reasons for investigating disciplinary differences in the COIP process and offer our hypotheses and research question that guided the analysis.

Theoretical Framework

Structurating activity theory (SAT; Canary, 2010b) provides a robust theoretical framework for examining differences in policy perspectives and policy communication processes. SAT integrates broad social constructs from structuration theory (Giddens, 1984) with system-specific constructs of cultural-historical activity theory (Engeström, 1999). Developed to explain

cross-system policy processes at multiple levels, SAT proposes that organizational members, and non-members, function in inter-related *activity systems* throughout policy processes. These systems are collectivities of people, practices, and resources that orient toward an object over time, such as developing a particular type of technology or educating a particular set of students. Broad social structures of *signification* (involving meaning), *legitimation* (involving norms), and *domination* (involving authority over people and resources) both enable and constrain activity accomplishment. At the same time, system-specific elements of *subjects* (particular people), *rules* (norms), *community* (all members of the system), material and symbolic *mediating resources* (e.g., tools and language), and *division of labor* (authoritative and task-related) shape (or *mediate*, according to SAT) how activity is accomplished and, as a result, influence eventual outcomes.

Key propositions of SAT indicate its appropriateness for this study. In particular, proposition two of the theory states, "Elements of systems of ongoing activity mediate situated action and interaction, such that system elements shape how and what policy knowledge is constructed within and between activity systems" (Canary, 2010b, p. 34). This study both applies and tests proposition two by focusing on conflict of interest policy processes in different disciplinary activity systems. Because a university includes many intersecting activity systems, each with their unique blend of people, practices, and resources oriented around discipline-specific objects as well as institution-wide goals, proposition five also guides this study: "Policy knowledge constructed between systems is mediated by elements of intersecting activity systems" (Canary, 2010b, p. 37).

Previous research applying SAT in policy contexts has demonstrated ways in which communication is central to developing knowledge and attitudes about policies (e.g., Canary & McPhee, 2009; Canary, Riforgiate, & Montoya, 2013). SAT-based research has also indicated ways in which policy-related systems can differ in their policy communication processes, knowledge development, and accordingly in their policy-related outcomes (Canary, 2010a). Additionally, prior studies indicate that broad structures such as the legitimation of policy to structure practice and the authority of experts are reproduced through policy interpretation and implementation (Canary & McPhee, 2009). In the context of institutional conflict of interest policy, then, we would anticipate that different academic disciplinary activity systems would have different policy communication processes that might result in differing levels of policy knowledge and varying attitudes toward the conflict of interest policy. The explanatory mechanism for these differences would be different mediating elements that shape activity in different disciplinary activity systems.

Furthermore, different activity systems might have various logics for deciding what constitutes good or bad, right or wrong behavior, known as ethical climates (Victor & Cullen, 1988). These climates would shape activity accomplishment as part of the rules of activity systems, guiding what is viewed as normative for how to accomplish activity. Prior research has identified five primary ethical climates that exist to varying degrees in different organizations and professions (Martin & Cullen, 2006): (1) *caring climate* emphasizes considering what is best for others in the organization, what is best for the overall organization, and what is best for the customer or public; (2) *law and code climate* emphasizes obeying laws or following professional standards; (3) *rules climate* emphasizes organization-specific rules and procedures as guidelines for behavior and decisions; (4) *instrumental climate* emphasizes both protecting one's own personal interests over others' as well as protecting interests of the organization above other considerations; and

(5) *independence climate* emphasizes members relying on their own personal morals and ethics to guide behavior and decisions (Victor & Cullen, 1988). Although prior SAT-based research has not investigated ethical climates as a type of system rule, this study extends SAT by examining how norms for ethical conduct might differ across different disciplinary activity systems and accordingly shape how members of different activity systems communicate about the conflict of interest policy as well as their policy knowledge and attitudes.

One way to operationalize activity systems in a research setting such as a university is to divide disciplines by those orienting around health sciences, such as oncology, and those orienting around non-health sciences, such as engineering. Although this is a broad conceptualization of activity systems, health sciences are focused on discovery and innovations involving patients or health outcomes whereas non-health sciences are focused on discovery and innovations not necessarily related specifically to people or to health. Accordingly, participants as well as other system elements may lead to different perceptions about and processes related to conflict of interest policies. The following hypotheses are posed to test SAT propositions about activity system differences. Due to the lack of prior research on ethical climates from an SAT perspective, we also pose a research question to examine the role of ethical climates in these different disciplinary activity systems.

Hypotheses and Research Question

H1: Disciplinary differences exist for COIP communication.
H2: Disciplinary differences exist for COIP knowledge.
H3: Disciplinary differences exist for COIP attitudes.
RQ1: How are ethical climates associated with policy communication, knowledge, and attitudes?

Method

The current quantitative study is part of an ongoing longitudinal program evaluation and process improvement project concerning COIP procedures at a large research university in the western region of the United States. The current study involved an online survey distributed through the university's email system to researchers identified as belonging to departments with more than four individuals who disclosed external financial relationships as recorded in the university's research administration system. The online survey was anonymous, with reminder emails sent twice to the entire sampling frame to improve response rates. As an incentive to participate, participants could enter a drawing for one of five $100 gift cards by going to a separate website, if they chose.

Participants

Recruitment emails were sent to faculty, graduate students, and post-doctoral researchers in 51 academic departments, with 3,016 researchers in the sampling frame. After the initial email invitation and two reminder emails sent at two-week intervals, 249 participants completed at least some portion of the online survey. After removing three cases that only included demographic responses, the final sample was 246 participants.

There were 142 participants from health sciences disciplines and 84 participants from non-health sciences disciplines (20 participants did not report departmental affiliation). Several positions

were represented in the sample, including professors ($n = 60$), associate professors ($n = 26$), assistant professor ($n = 36$), physician ($n = 26$), clinical professor ($n = 5$), post-doctoral researcher ($n = 14$), graduate assistant ($n = 48$), adjunct associate professor ($n = 4$), adjunct professor ($n = 1$), and other ($n = 6$). Participants reported various lengths of time at the university: 0-5 years, $n = 92$; 6-10 years, $n = 55$; 11-15 years, $n = 29$; 16-20 years, $n = 16$; more than 20 years, $n = 46$; missing, $n = 8$. A majority of participants indicated they had received COI training in the past ($n = 139$), while 56 reported not having COI training and 41 participants did not know if they had COI training or not. Most participants reported working with the Office of Sponsored Projects ($n = 146$). A total of 46.3% of participants reported conducting human subjects research ($n = 114$) and 50% reported that they do not conduct human subjects research ($n = 123$). A majority of participants ($n = 152$) reported that they do not have a COI managed by the COI office, whereas 69 participants indicated they are currently managed for COI and 18 participants indicated they do not know. Most participants reported English is their native language ($n = 196$) and most participants were male ($n = 169$), with 62 female participants, 1 transgender, and 14 not responding.

Measures

Policy communication. The Policy Communication Index (PCI; Canary, Riforgiate, & Montoya, 2013) was used to measure five communication processes and an overall indicator of frequency of policy communication. At the request of the institution's COI committee, one additional context-specific item was added concerning communication: "I get written instructions about the COI policy from other in-department staff." The PCI includes 20 items with Likert-type response choices ranging from 1 ("never") to 5 ("very often"). The PCI includes five sub-scales: meeting discussions (Cronbach's $\alpha = .91$), human resources communication (Cronbach's $\alpha = .72$), coworker interactions (Cronbach's $\alpha = .88$), supervisor/coworker written instructions (Cronbach's $\alpha = .85$), and personal expressions (Cronbach's $\alpha = .88$). For this study, wording of items for the human resources communication sub-scale were changed to reflect research administration staff rather than human resources staff so results of this sub-scale are interpreted as "Research Administration Communication." With the additional requested item, there were 21 items used to measure policy communication.

Policy knowledge. Policy knowledge was measured in three ways. An eight-item Likert-type measure of self-reported policy knowledge used in previous research (Canary et al., 2013) measured participants' perceptions of their knowledge about the COIP. Participants rated statements on a 1-5 scale ranging from "strongly disagree" (1) to "strongly agree" (5). This measure demonstrated high reliability (Cronbach's $\alpha = .90$). We also developed six study-specific items to measure participants' knowledge about the purpose of the COIP, which consisted of participants discriminating between statements that do and do not apply to the COIP. This was a summed score of their correct answers. Six additional items were developed to measure participants' knowledge of the scope of the COIP, also measured by summing participants' correct answers.

Policy attitudes. Policy attitudes were measured with seven Likert-type items used in previous policy research (Canary et al., 2013). Responses range from 1 ("strongly disagree") to 5 ("strongly agree"), with higher scores indicating more favorable attitudes toward the focal policy. This measure demonstrated acceptable reliability, Cronbach's $\alpha = .83$.

Ethical climate. The Ethical Climate Questionnaire (ECQ; Victor & Cullen, 1988) was used to measure perceptions of how decisions and actions are determined to be right or wrong, desirable or undesirable, good or bad, within the whole university. There are 26 Likert-type items in the ECQ that identify five distinct types of ethical climates: caring (Cronbach's $\alpha = .76$), law and code (Cronbach's $\alpha = .81$), rules (Cronbach's $\alpha = .76$), instrumental (Cronbach's $\alpha = .83$), and independence (Cronbach's $\alpha = .73$). Responses range from 1 ("completely false") to 6 ("completely true")

Data Analysis

Independent samples *t*-tests were used to test for group differences predicted in Hypotheses 1, 2, and 3. The Research Question was answered by first conducting an independent samples *t*-test to assess group differences in ethical climates. Then, a Pearson's correlation analysis was used to analyze associations among variables.

Results

Policy Communication

Hypothesis 1 predicted that there would be disciplinary differences in conflict of interest policy communication. Hypothesis 1 was supported. Results are reported for the overall PCI scores as well as for the five constitutive sub-scales. Table 1 presents statistical results for tests of Hypotheses 1, 2, and 3.

Table 1. Group Means for Policy Communication, Knowledge, and Attitudes

Variable	Health Sciences (*n* = 142) Mean (SD)	Non-Health Sciences (*n*= 84) Mean (SD)	*t* statistic (significance)
PCI	2.18 (.73)	1.86 (.59)	3.60 (*p* < .001)
MEET	1.94 (.74)	1.73 (.73)	2.00 (*p* < .05)
HRCOM (Research Admin)	2.51 (.81)	2.19 (.71)	2.98 (*p* < .01)
COWORKER	2.12 (.94)	1.79 (.74)	2.87 (*p* < .01)
WRITTEN INST	2.27 (.90)	1.95 (.85)	2.57 (*p* < .05)
PERS EXP	2.04 (.94)	1.62 (.81)	3.39 (*p* < .001)
SELF REPORT KNOW	3.61 (.72)	3.33 (.91)	2.44 (*p* < .05)
KNOW SCOPE	3.25 (.89)	3.25 (1.12)	.03 (*n. s.*)
KNOW PURP	4.11 (1.02)	4.04 (1.06)	.54 (*n. s.*)
ATTITUDE	3.70 (.63)	3.67 (.62)	.34 (*n. s.*)

Policy Communication Index. Equality of variances was found to be violated for the PCI, $F(1, 218) = 4.14, p = .043$. Owing to this violated assumption, we used a t statistic not assuming homogeneity of variance. The t-test revealed that health sciences participants ($n = 137$) reported higher levels of overall policy communication ($M = 2.18, SD = .73$) than non-health sciences participants ($n = 83; M = 1.86, SD = .59$), $t(218) = 3.60, p < .001$.

Meeting Communication. Health sciences participants reported significantly more meeting communication about the COIP ($M = 1.94, SD = .74$) than non-health sciences participants ($M = 1.73, SD = .73$), $t(218) = 2.00, p < .05$.

Research Administration Communication. Health sciences participants reported significantly more communication from research administration staff ($M = 2.51, SD = .81$) than non-health sciences participants ($M = 2.19, SD = .71$), $t(218) = 2.98, p < .01$.

Coworker Interactions. Equality of variances was found to be violated for this sub-scale, $F(1, 203) = 4.45, p = .036$. Owing to this violated assumption, a t statistic not assuming homogeneity of variance was computed. The t-test revealed that health sciences participants reported more coworker interactions about the COIP ($M = 2.12, SD = .94$) than non-health sciences participants ($M = 1.79, SD = .74$), $t(203) = 2.87, p < .01$.

Written Instructions. Health sciences participants reported significantly higher levels of written instructions about the COIP ($M = 2.27, SD = .90$) than non-health sciences participants ($M = 1.95, SD = .85$), $t(218) = 2.57, p < .05$.

Personal Expressions. Health sciences participants reported significantly more personal expressions about the COIP ($M = 2.04, SD = .94$) than non-health sciences participants ($M = 1.62, SD = .81$), $t(217) = 3.39, p = .001$.

Policy Knowledge

Hypothesis 2 predicted that differences would exist between groups for COIP knowledge. Hypothesis 2 was partially supported. We report results for the three knowledge measures separately.

Self-Reported Knowledge. Equality of variances was found to be violated for self-reported knowledge, $F(1, 145) = 9.11, p = .003$. Owing to this violated assumption, a t statistic not assuming homogeneity of variance was computed. The t-test revealed that health sciences participants reported higher levels of perceived policy knowledge ($M = 3.61, SD = .72$) than non-health sciences participants ($M = 3.33, SD = .91$), $t(145) = 2.44, p < .05$.

Knowledge of Policy Scope. There were no significant group differences for knowledge of the COIP scope (see Table 1).

Knowledge of Policy Purpose. There were no significant group differences for knowledge of the COIP purpose (see Table 1).

Policy Attitudes

Hypothesis 3 predicted that differences would exist between groups for COIP attitudes. No significant attitudinal difference was found between health sciences and non-health sciences researchers for attitudes toward the COIP (see Table 1). Hypothesis 3 was not supported.

Ethical Climates and Policy Variables

The research question asked about associations between ethical climates and policy communication, knowledge, and attitudes. First, group differences were explored to examine whether ethical climates differed across disciplines in similar ways to policy communication and knowledge. Two significant group differences emerged. Health sciences participants indicated stronger perceptions of the law and code climate ($M = 4.83$, $SD = 72$) than non-health sciences participants ($M = 4.51$, $SD = .83$), t (214) = 3.01, $p < .01$. This climate is characterized by decisions that are guided by laws and professional codes of conduct (Victor & Cullen, 1988). Health sciences participants also indicated stronger perceptions of the rules climate ($M = 4.40$, $SD = .77$) than non-health sciences participants ($M = 4.17$, $SD = .79$), t (215) = 2.11, $p < .05$. This climate is characterized by decisions that are guided by organization-specific rules and procedures.

Next, a Pearson correlational analysis was conducted to explore how the five ethical climates associate with policy communication, knowledge, and attitudes variables. Table 2 presents the correlation matrix for ethical climate and policy communication variables. Table 3 presents the correlation matrix for ethical climate, knowledge, and attitude variables.

Table 2. Correlations, Ethical Climates and Policy Communication

	CARING	LAWCODE	RULES	INST	IND	MEET	HRCOM	COWKR	WRTNINST	PERSEXP	PCI
CARING	1	.496**	.517**	.062	.313**	.419**	.333**	.273**	.315**	.209**	.371**
LAWCODE	.496**	1	.586**	-.042	.293**	.241**	.241**	.221**	.174**	.110	.238**
RULES	.517**	.586**	1	.031	.196**	.191**	.137*	.189**	.187**	.098	.193**
INST	.062	-.042	.031	1	.288**	.139*	.109	.191**	.119	.273**	.198**
IND	.313**	.293**	.196**	.288**	1	.270**	.072	.302**	.142*	.257**	.251**
MEET	.419**	.241**	.191**	.139*	.270**	1	.571**	.718**	.561**	.664**	.846**
HRCOM	.333**	.241**	.137*	.109	.072	.571**	1	.511**	.541**	.471**	.746**
COWKR	.273**	.221**	.189**	.191**	.302**	.718**	.511**	1	.600**	.792**	.888**
WRTNINST	.315**	.174**	.187**	.119	.142*	.561**	.541**	.600**	1	.517**	.786**
PERSEXP	.209**	.110	.098	.273**	.257**	.664**	.471**	.792**	.517**	1	.850**
PCI	.371**	.238**	.193**	.198**	.251**	.846**	.746**	.888**	.786**	.850**	1

Note: ** Correlation is significant at the .001 level (2-tailed); * Correlation is significant at the .01 level (2-tailed).

Table 3. Ethical Climates, Knowledge, and Attitudes Correlations

	KNOWSR	ATT	KNOWPURP	KNOWSCOP	CARING	LAWCODE	RULES	INST	IND
KNOWSR	1	.493**	.159*	.017	.077	.142*	.148*	-.072	-.096
ATT	.493**	1	.274**	.004	.075	.181**	.187**	-.257**	-.107
KNOWPURP	.159*	.274**	1	.007	-.148*	.048	.054	-.189**	-.067
KNOWSCOP	.017	.004	.007	1	-.133*	-.124	-.074	.052	-.030
CARING	.077	.075	-.148*	-.133*	1	.496**	.517**	.062	.313**
LAWCODE	.142*	.181**	.048	-.124	.496**	1	.586**	-.042	.293**
RULES	.148*	.187**	.054	-.074	.517**	.586**	1	.031	.196**
INST	-.072	-.257**	-.189**	.052	.062	-.042	.031	1	.288**
IND	-.096	-.107	-.067	-.030	.313**	.293**	.196**	.288**	1

Note: ** Correlation is significant at the .01 level (2-tailed); * Correlation is significant at the .05 level (2-tailed)

The overall index for policy communication, PCI, was positively and significantly correlated with all five ethical climates (Table 2). More specifically, meeting communication and coworker interactions were positively and significantly correlated with all five ethical climates (Table 2). The law and code as well as rules climates were the only two climates not positively correlated with personal expressions at a significant level. In a similar vein, the instrumental and independence climates were the only two climates not positively correlated with human resources (research administration) communication at a significant level. We discuss implications of this set of results in the Discussion section.

Measures of policy purpose and scope were not positively correlated with any ethical climate at a significant level (Table 3). However, both purpose and scope knowledge were negatively correlated with the caring climate ($r = -.15$ and $r = -.13$, respectively) and purpose knowledge was also negatively correlated with the instrumental climate ($r = -.19$). Perhaps predictably, the law and code as well as rules climates were positively correlated with the self-report measure of policy knowledge at a significant level ($r = .14$ and $r = .15$, respectively), although no other climates significantly correlated with that measure. Those two climates also positively correlated with policy attitudes at significant levels ($r = .18$ and $r = .19$, respectively). The instrumental climate (with an emphasis on protecting one's own interests and those of the organization) negatively correlated with policy attitudes at a significant level ($r = -.26$).

Discussion

The goal of this study was to build on previous COIP research by theoretically investigating policy communication, knowledge, and attitudes across disciplines. Previous studies of researcher attitudes toward COIP have not examined the nuances of different ways the policy

is communicated nor different types of knowledge researchers have concerning the policy. By conceptualizing health sciences and non-health sciences as distinct activity systems, this investigation also considered how different ethical climates of researchers' disciplinary systems might associate with their policy communication, knowledge, and attitudes. There are several important implications for COI policy research and research administration practices. These are discussed below, followed by a discussion of study limitations and suggestions for future research.

Although it was hypothesized that group differences exist for COI policy communication, knowledge, and attitudes, the most compelling differences clearly emerged for communication processes. Health sciences researchers indicated that they communicated more about the COIP in all five modes than non-health sciences researchers. One explanation for this may be that health sciences researchers as a whole tend to have more interaction with industry in the form of sponsored research and external relationships such as consulting and speaking engagements. Therefore, health sciences researchers are required to engage with the policy more often. Indeed, significantly more health sciences participants than non-health sciences participants reported having significant external financial relationships ($\chi^2 = 9.61, p < .05$) and significantly more health sciences participants than non-health sciences participants reported having COIs managed by the university ($\chi^2 = 7.70, p < .05$).

It is important to note, however, that the amount of communication for both groups was low, with health sciences participants only meeting the mid-point for research administration communication. All other methods for communicating policy were below the mid-point on the five-point scale. This could be due to the fact that the COIP is not something researchers deal with on a daily basis. This finding does comport with other research about organizational communication concerning national-level policies (Canary et al., 2013), indicating that policy communication by its very nature may simply be a low-frequency occurrence in organizations.

Another interesting finding regarding policy communication and attitudes emerged during correlational analyses. Although not hypothesized in this study, policy attitudes were negatively correlated with coworker interactions ($r = -.15, p < .05$). This finding is consistent with results of the Canary et al. (2013) study that used the federal Family and Medical Leave Act (FMLA) as the focal policy. Results of these two studies may be pointing to a characteristic of coworker interactions about policies in general, that such informal interactions may foster negativity toward policies that are implemented from upper administration or external authorities. It seems, however, that communication with administrators who are able to interpret and provide guidance on policies, such as human resources or research administration staff members, has the opposite effect. In the current study, policy attitudes positively correlated with research administration communication ($r = .14, p < .05$). This is similar to the Canary et al. (2013) study that found positive correlations between policy attitudes and human resources communication about the FMLA.

This study also contributes to understanding how different disciplines view guidelines for behavior and decision making within the same institution. Participants were asked to respond to the ethical climate questions based on their perceptions of the way things are at their institution, not their particular department or school. As such, it is not surprising that no group differences emerged for three of the five ethical climates. However, researchers associated with the health

sciences identified stronger climates characterized by following laws, professional codes, and institutional rules than non-health sciences researchers. This finding helps shed light on the higher communication scores for the health sciences participants. It could be that the higher frequency of communicating about the COI policy produces perceptions that actions and decisions within the broader organization are governed more by laws, policies, and procedures than by personal moral codes or concern for the greater good.

Results for how ethical climates associate with policy communication, knowledge, and attitudes also have implications for theory, research, and research administration practice. This is the first study to investigate associations between ethical climates and policy processes. We highlight here the more intriguing results that warrant further empirical attention. One such finding is the lack of significant correlation between personal expressions communication and the two climates most strongly associated with health sciences participants—law and code and rules climates. The other three climates (i.e., caring, instrumental, and independence) all positively correlated with participants sharing their personal expressions about the COI policy. This could point to a hesitancy for people to share personal opinions about policy that they perceive is out of their control or somehow a blanket mandate, which in turn might reflect a broader perception that their work activities are governed more by laws, codes, and procedures than by their individual agency. This conjecture is further supported by the lack of positive correlation between research administration communication and the instrumental and independence climates. With the strong association between this type of communication and policy attitudes, this result might point to a reproduction of a negative view of externally-mandated policies when people perceive that their work is more guided by their own morals and interests than those of other stakeholders or higher authorities. Indeed, the instrumental climate is the only climate to have a significant negative correlation with policy attitudes. Such negative attitudes might be counteracted with more active research administration communication to dispel misperceptions about the policy and its related procedures, discussing ways the COI policy has researchers' best interests in mind as well as the interests of the institution, patients, and the public.

SAT was used to guide this study due to its practical focus as well as its explanatory utility. Particular interest was in applying and testing the two propositions asserting that policy knowledge processes are shaped by elements of intersecting activity systems. Results provide some support for these propositions, although the null findings regarding differences in certain types of policy knowledge and in policy attitudes temper our support for these assertions. Overall, however, it seems an SAT explanation for differences between health sciences and non-health sciences researchers increases our understanding of COIP processes in complex research organizations, such as universities, in several ways. One contribution of our SAT-based analysis is that disciplinary activity systems orienting toward different objects (i.e., patients and health versus other research foci) engage with the COIP at different rates and in different ways. Those involved in health sciences are much more likely to come into contact with compliance procedures of the COIP simply due to the higher rates with which such researchers engage with industry in the research process. Accordingly, their communication frequency about the policy and their level of perceived knowledge about the policy are much higher than those who do not come into contact with the ins-and-outs of the policy as often. This supports the view that system elements, such as

norms for doing research, the object of activity, their mediating resources for conducting research, and such shape policy communication and policy knowledge.

A second contribution of an SAT perspective on the COIP process is to consider the structurating aspect of policy communication. That is, SAT asserts that policy knowledge processes within and across activity systems are constrained and enabled by broader social structures, such as professional norms, societal expectations concerning authority, and meanings assigned to phrases such as "conflict of interest" (Canary, 2010b). At the same time, proposition six of SAT asserts that policy knowledge in turn "produces, reproduces, or transforms social structure" (Canary, 2010b, p. 37). Although the current study was cross-sectional, and therefore limited to analyzing a point in time, these findings may be a spring board for future studies of how communication, knowledge, and attitudes of COI policies serve to reproduce entrenched institutional or disciplinary structures *or* serve as opportunities to begin transforming structures that have constrained productive COI policy processes across intersecting activity systems. For example, policy attitudes were higher than expected for both groups, with a sample mean of 3.65 on a five-point scale. This information could be used to tailor COI communication to capitalize on the positive perceptions of the policy in general and focus communication efforts at ways researchers might perceive the policy *procedures* to be misaligned with their system norms and overall activities. In this way, policy communication could be a way to transform negative connotations of "conflict of interest" as well as a way to reconcile perceptions that authoritative structures of policy requirements contradict professional structures of research activities.

Another way an SAT-based interpretation of results contributes to COIP research and practices is by using activity systems as a way to explain the interplay of ethical climates and policy communication, knowledge, and attitudes. When planning how to communicate about the policy with researchers in various disciplinary systems, research administrators can use findings from this study to consider how to adjust their communication tactics to account for different ethical climates. For instance, when addressing researchers in non-health science disciplines who might be guided more by their own morals ("independence climate") or by the common good ("caring climate") rather than by an overall concern for laws and codes, research administrators might highlight that a COIP helps researchers demonstrate their integrity clearly and publicly and that COIP procedures are meant to protect all parties involved. Additionally, case studies and examples from researchers' own disciplines would be excellent tools for increasing knowledge about COI as well as improving attitudes about engaging with policy procedures. Thus, researchers will be able to align their own system norms, resources, and purposes with those of research administration generally and with the COIP more specifically.

Limitations and Suggestions for Future Research

Although the findings discussed above shed light on nuances of COI policy process and perceptions, there are limitations to the current study. First, this study was conducted at one institution rather than several. Accordingly, group comparisons and measures of variables are limited in their generalizability. Future research can build upon these findings by replicating this study design across multiple institutions. Second, the sample was limited in size. We had hoped to compare group differences at the level of different departments but the response rate

was too low to enable such fine-grained analysis. A follow-up study is in the planning stages that will incorporate changes in the recruitment process to increase response rates. Future researchers interested in obtaining participation by busy researchers may consider creative alternatives to increase participation.

Future research will build upon this study by studying multiple institutions with larger sample sizes. It is important to continue finding ways to improve COI processes and perceptions. Qualitative inquiries might enrich results of this study by seeking open ended answers to questions about COI policy procedures and perceptions. Such qualitative endeavors might identify ways research administrators can improve policy attitudes, increase policy knowledge, and leverage policy communication efforts to benefit their institutions and multiple stakeholders.

Conclusion

To conclude, this study presents a snapshot of how researchers in a large research university perceive, understand, and communicate about their institution's conflict of interest policy. Furthermore, analyses shed light on how perceptions of ethical climates of the university associate with policy attitudes, knowledge, and communication in different disciplinary activity systems. This theoretically-grounded analysis provides a springboard for further empirical research about how researchers engage with conflict of interest policies. Research administrators can use this study as a template for assessments at their own institutions and research organizations as part of program evaluation and process improvement. Additionally, results of this study suggest ways research administrators can connect with researchers in meaningful ways to make COI training and procedures more effective overall.

Endnotes

[1]ProPublica's data do not account for all industry payments, and the data sets include all physicians, not just university-affiliated physicians.

[2]The data are based only on those university technology transfer offices that report to the Association of University Technology Managers.

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