

When Professionals Lead: Executive Management, Normative Isomorphism, and Policy Implementation

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ABSTRACT

If professionalism shapes executive behavior significantly, then agencies whose executives belong to a particular profession ought to manage differently from similarly situated executives who do not, and in ways that affect organizational outcomes. Extending theories of normative isomorphism to executive management, this study examines the effects of executives' professions on their management and their agencies' implementation of federal environmental regulations. Examining American local government water utilities, I argue that normative isomorphism causes executives who are engineers to manage their agencies differently from nonengineers. Illustrative case studies show how professions shape executive management. Since professional engineers were influential in the development of the Safe Drinking Water Act (SDWA), its regulations reflect the dominant norms of the engineering profession. Analysis of data from a survey of utility executives and the Environmental Protection Agency shows that utilities that are headed by professional engineers violate the SDWA significantly less frequently than do utilities led by nonengineers. Results demonstrate normative isomorphism in executive management and highlight the significance of professionalism in policy design and implementation.

INTRODUCTION

Do public executives who belong to a specific profession manage their agencies differently from generalists or members of other professions? Building on theories of professionalism in public administration, this study submits that normative isomorphism helps explain how professions shape executive management and, ultimately, public policy outcomes.

The idea that professionalism affects bureaucratic behavior has a long history and is well established in public administration research (Friedrich 1940; Mosher 1968, among many others). Professional socialization can cause bureaucrats to hold different values about what are good and bad policies, and so shape preferences (Brehm and Gates 1997; Meier and O'Toole 2006; Watson and Meiksins 1991). Because professions define career opportunities, professions may cause bureaucrats to make decisions that are consistent with professional norms pursuant to career advancement

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(Dewatripont, Jewitt, and Tirole 1999; Teodoro 2011; Wilson 1989). Building on DiMaggio and Powell's (1983) seminal article, I argue that these aspects of professionalism create isomorphic pressures on public agency executives. In public administration scholarship, *isomorphism* refers to a general tendency toward homogenization across organizations. But DiMaggio and Powell identified three specific social mechanisms—*coercive*, *mimetic*, and *normative*—that drive organizations to become more similar. This inquiry focuses on normative isomorphism, aiming to isolate and assess its effects on executive management in public agencies.

Voluminous research on “upper-echelon theory” in business administration demonstrates that executives' experiences and values significantly influence the organizations that they lead (Hambrick 2007). However, compelling, comparative evidence of professionalism's effect on public agency executive behavior and subsequent agency outcomes has been elusive. If professionalism conditions executive behavior in government agencies, then executives who belong to a particular profession ought to manage differently from laypersons or members of other professions, and in ways that affect organizational outcomes.

The empirical subjects of this study are local government water utilities in the United States. American water utilities' executives lead similar organizations that produce similar services, but hail from a variety of professions, and therefore provide leverage on the effects of executive professionalism. In particular, this study analyzes utilities' compliance with the US Safe Drinking Water Act (SDWA). Professional engineers were influential in the development of the SDWA, and its regulations reflect the dominant norms of the engineering profession. Governments select candidates to lead their water utilities in part based on their professional qualifications. I argue that utility executives who are engineers tend to place greater emphasis on water quality in managing their agencies than do nonengineers, and so channel greater normative isomorphic force to their organizations. One consequence of this normative isomorphism is that agencies with professional engineers in their executive offices will tend to prioritize SDWA compliance. Using illustrative case studies and analysis of data from American water utility executives, I show that executives' professions affect their agencies' compliance with SDWA requirements in ways that are consistent with normative isomorphism. These results highlight the significance of professionalism in policy design and implementation.

This article begins with a brief, synthetic review of research on isomorphism and professionalism in public administration. A pair of illustrative case studies shows how an executive's profession can translate into management priorities. Building on these cases and existing theory, I argue that normative isomorphism causes executives whose professional priorities align with those of a regulatory regime to emphasize compliance in their management. An empirical evaluation of this theory follows with an analysis of SDWA compliance by US local governments. I report my findings and conclude with a discussion of their implications for professionalism, public management, and the design of effective public policy.

ISOMORPHISM AND EXECUTIVE PROFESSIONALISM IN PUBLIC ADMINISTRATION

DiMaggio and Powell's seminal 1983 article identified three mechanisms that cause organizations to tend toward homogeneity: “(1) *coercive* isomorphism that stems from political influence and the problem of legitimacy; (2) *mimetic* isomorphism resulting

from standard responses to uncertainty; and (3) *normative* isomorphism, associated with professionalism” (1983, 150; italics in original). Although these mechanisms are distinct, DiMaggio and Powell worried that their effects would prove difficult to distinguish empirically—a point to which I return later. The present inquiry focuses on normative isomorphism, which occurs when professions cause individuals in organizations to conform to the dominant behaviors of their professional communities through a variety of social rewards and sanctions, including selection, socialization, and access to employment opportunities (DiMaggio and Powell 1983; Halffman 2005). Consequently, organizations that employ professionals tend to converge in form and behavior.

Professionals are persons with specialized formal education, whose labor value is reducible to their expertise in providing some knowledge-based service (Abbott 1988; Wilensky 1964). Professionals form organizations to facilitate information exchange, self-regulate, seek legal protection for their labor markets, and establish training and licensure regimes for new professionals (Abbott 1988; Larson 1977; Mosher 1968). Professionals are supposed to observe ethical principles held in common with their fellows, and the process of selection, education, and accreditation imbues individuals with professional norms (Friedrich 1940; Polanyi 1957).¹

The influence of professionalism in public management has been a frequent subject of scholarship since the emergence of public administration as a discipline. For professionals in government, the profession is an “external reference group” that shapes preferences and incentives for behavior (Wilson 1989, 60). Researchers have identified several ways in which professional norms might shape public administrators’ decisions through socialization (Brehm and Gates 1997; Kaufman 2006; Meier and O’Toole 2006; Watson and Meiksins 1991) and career incentives (Dewatripont, Jewitt, and Tirole 1999; Teodoro 2011; Wilson 1989), in areas from forestry (Kaufman 2006) to military service (Janowitz 1960) to social work (Lipsky 1980). Normative isomorphism can be an especially potent influence on public organizations because many government agencies face ambiguous and multiple goals and so will look to professional communities for guidance (Frumkin and Galakiewicz 2004; Villadsen 2011; Wilson 1989). Although research on professionalism in public administration has focused mostly on street-level personnel, recent studies have demonstrated that professionalism also affects executive behavior in ways that are consistent with normative isomorphism. For example, Pitts et al. (2010) show that school superintendents adopt professionally sanctioned policies in their districts; Teodoro (2011) finds similar behaviors among police executives.

However, systematic evidence of professionalism’s effect on executive management has been elusive. A significant challenge in pursuit of such evidence is that

1 The main profession of interest in this study is engineering. Whether public administration is itself a distinct profession is a matter of long and ongoing debate (Bertelli and Lynn 2006). Public administration bears some of markers of professionalism (e.g., specialized degrees, accreditation, organizations to facilitate information exchange) but also lacks some (e.g., licensure, peer oversight, labor market restrictions). The core ethical principles of public administration remain more contested and less coherent than archetypal professions like medicine and law (see Svava 2012). In the end, it may be more useful to think of professionalism as a continuous variable rather than a binary one, and of public administration as a partially professionalized occupation.

professionalized bureaucratic agencies tend to be dominated by a single profession, so the executives who advance to the leadership of professionalized agencies are almost always members of the same professions that populate the agencies' ranks. That is, fire chiefs are almost always professional firefighters, social service agency directors are social workers, military commanders are officers, and so on. Studies of professionalism in agencies that are dominated by single professions are limited inasmuch as they provide little to no variation in profession across executives. For example, the samples of executives that Pitts et al. (2010) and Teodoro (2011) analyze are made up of single professions, and so cannot provide direct evidence that belonging to a particular profession affects executives' behavior or organizational outcomes. Put simply, a convincing analysis of normative isomorphism as a *variable* that affects executive management requires that professionalism *vary* among executives.

To that end, some studies have examined differences in behavior linked to differences in profession within single agencies. Wilson (1989) recounts examples of ambiguities and conflicts within organizations caused by differences in profession among personnel. Brown and Harris (2000) link differences in profession within the Forest Service to differences in attitudes toward the organization's goals. Kitchener (2002) shows how differences in professional norms pitted the traditional values of the medical professions against efficiency-focused "managerialism" in the mergers of academic health centers. Unfortunately, this research remains restricted to case studies, limiting their generalizability. Research on the effects of professional diversity at the executive level remains thin, as well. Given the significance of executive management to organizational innovation and performance (Beal and Yasai-Ardekani 2000; Hambrick 2007; Meier and O'Toole 2002; Wilson 1989, among many others), systematic research on normative isomorphism at the executive level seems worthwhile. Ashworth, Boyne, and Delbridge (2009) find that isomorphic pressures are strongest on organizational culture and strategy, where executives can have significant influence (Wilson 1989). Thus, the most important manifestation of normative isomorphism at the executive level might be in the ways that executives shape organizational culture. Do executives' professions shape their management in ways that affect organizational culture, and, ultimately, outcomes?

EXECUTIVE MANAGEMENT IN A PROFESSIONALLY DIVERSE POLICY AREA

Identifying normative isomorphism in public executive management requires examination of a multidisciplinary context; environmental policy is one such context. Environmental policy problems are inherently multidisciplinary, and so agencies that administer environmental policies employ people from a variety of professions, including scientists, lawyers, physicians, and engineers, among many others (Brown and Harris 2000; Taylor 1984). The executives who lead environmental agencies may (though do not necessarily) hail from similarly varied professions. If normative isomorphism is at work in agencies' executive ranks, then it should be observable as differences in management behavior and organizational outcomes across similar agencies that are led by executives from different professions.

Water Utility Management

Water utility management is an excellent field in which to assess the impact of executive professionalism because it is a relatively “open” labor market: there are few barriers to entry to utility management and there is no single dominant career path that aspiring executives must follow. The provision of municipal drinking water is a highly technical and capital-intensive endeavor, but no specific educational credentials are required for appointment to most water utility executive jobs. Some utility executives began their careers as high-school educated, street-level operators and worked their way up through the ranks. Others are newcomers to the water industry, with backgrounds in other agencies or the private sector. The executives who lead water utilities come from a variety of professions: engineering is the modal profession of utility executives, but less than a third of them are professional engineers (see [table 1](#)). The ranks of utility executives include scientists, accountants, and attorneys, as well as management generalists. Utility management, therefore, offers empirical traction on the effects of executive professionalism across agencies that are providing essentially the same service under the same regulatory regime. A variety of local governments run water utilities in the United States, including general purpose municipalities, counties, and special districts. Utility chief executives are at-will employees of the governments that they serve; they are hired and/or fired by mayors, city councils, or legislative boards depending on the utility’s governance structure. Although they usually are appointed by politicians, utility executives are, by and large, full-time career administrators, not partisan appointees.

Governments hire professionals as executives in part because a profession connotes a set of norms along with technical acumen ([Mosher 1968](#)). If normative

Table 1
Descriptive Statistics

	Percent	95% Confidence Interval		Mean	SD	Minimum	Maximum
Binary variable							
Engineer	25.4	13.1	37.6				
Purchased water source	16.2	4.4	27.9				
Continuous/cardinal variables							
Total health violations, 2002/11				1.6	4.7	0	31.0
Total monitoring violations, 2002/11				24.4	56.0	0	374.0
Health violations during executive tenure				1.0	4.0	0	31.0
Monitoring violations during executive tenure				16.5	49.6	0	216.0
Tenure (years)				8.9	7.4	0.5	28.0
Education (years)				14.6	2.3	12.0	21.0
Population ^a				44,000.0	186,000.0	3,400.0	4,070,00.0
Percent nonwhite population				21.2	19.0	2.0	81.1

Note: $N = 110$. Parameters reflect poststratification weighting.

^aPopulations rounded to nearest thousand to maintain confidentiality.

isomorphism conditions executive management significantly, then executives who are members of a particular profession should manage in markedly different ways from nonprofessionals or members of other professions, and these differences should be reflected in behaviors and outcomes.

ILLUSTRATIVE CASES: PROFESSIONAL VALUES IN EXECUTIVE MANAGEMENT

Case studies of executives in a pair of medium-sized utilities, North Penn Water Authority (NPWA; Pennsylvania), and Sugar Land Public Utilities (Texas), show how professionalism informs executives' approaches to their jobs and their agencies' priorities. These two medium-sized utilities serve similar, fast-growing suburban communities, and have strong records of financial and water quality performance; one is led by a professional engineer, the other by a generalist. These cases are illustrative, not demonstrative; they offer a sense of how normative isomorphism works—that is, how professional norms reverberate (or do not) throughout an agency from the top-down—but they are not generalizable in a strict research design sense. Rather, these cases are meant to lend texture and causal leverage to the quantitative analyses that follow.

Research for each of these cases included interviews with the chief executive, senior and mid-level managers, and program staff, as well as visits to utility facilities and observation of field and plant staff. The key data of interest for the present study come from interviews. Early in each interview, the respondent was asked: “what is the most important thing that you’re working on right now?” Answers to these questions are interpreted as representative of the respondent’s job priorities. Together, these responses reflect on the organization’s understanding of its mission, where normative isomorphic pressures are expected to be most clearly manifested (Ashworth, Boyne, and Delbridge 2009); if executive professionalism has normative isomorphic effects, it ought to be reflected in employees’ perceptions of their priorities.

Anthony Bellitto and NPWA

NPWA is a special district with a staff of 51 full-time employees that serves a population of about 84,000 in a suburban area northwest of Philadelphia. It is governed by a 10-member board. Anthony Bellitto Jr. has been its executive director since 1998. Before coming to NPWA, Bellitto served as a division chief in New York City and had worked as a consulting engineer. Bellitto holds advanced degrees in civil and environmental engineering and identifies strongly as a professional engineer. He has published essays in engineering journals on ethics and the role of engineering in improving society (Bellitto 1982, 1983). The suffix “P.E.” (Professional Engineer) appears after Bellitto’s name on virtually every official document that NPWA produces—a subtle but consistent sign of his professional identity.²

Bellitto’s professional priorities are also evident when he discusses his organizational priorities. “Everybody knows that water quality is job number one,” he said. Bellitto

2 Placing “P.E.” after one’s name in official communications is a frequent but not universal practice among engineers, akin to a professor including “PhD” after his or her name.

frames water quality professionally: that is, both in technical terms and as an ethical imperative. “We really care, we really take it seriously—making sure that you never have to worry about contaminants . . . Everybody knows that’s the number one thing.”

Under Bellitto’s leadership, NPWA became a charter member of the Partnership for Safe Water, a voluntary program sponsored by the US Environmental Protection Agency (EPA) and several industry organizations to promote drinking water quality. NPWA maintains its own water quality laboratory, complete with a management-level director with a PhD and a staff of four, even though many utilities of NPWA’s size outsource water quality testing to commercial laboratories. A senior NPWA manager pointed out that the quality lab offers value beyond its scientific work: the lab’s director is also “a champion for water quality” in the organization.

Interviews with personnel at every level of NPWA demonstrated a unified focus on water quality. When asked about his most important current work at NPWA, a senior manager spoke with pride about his organization’s focus on water quality, with specific reference to regulatory compliance: “We manage to AWWA³ standards, not quarterly earnings,” he said. “We don’t want to just meet EPA requirements, we want to go beyond them.” Similarly, when mid-level and front-line personnel discussed their current work priorities, their answers consistently included references to water quality (emphases added):

Water quality is our main concern.

We’re trying to grow the business in a way that allows us to maintain *water quality*.

The most important message we want to convey is that our number one priority is always *water quality*.

First, last, and always *water quality*.

The fixation on water quality is striking in its consistency among NPWA staff, including communications and information technology personnel whose day-to-day work has little to do with drinking water production. Devotion to water quality appears to have become what James Q. Wilson (1989) has called a “sense of mission” at NPWA.

SuEllen Staggs and Sugar Land Water Department

Sugar Land is a rapidly growing suburb of Houston. Its water utility has 48 employees and serves a population of 82,000. The utility is a department of a city government that operates under a council-manager charter. SuEllen Staggs was Sugar Land’s director of utilities from 2005/13.⁴ Staggs is not an engineer, but rather is an administrative generalist. She holds a degree in art history and began her career in retail marketing. After earning a MBA, she took a marketing position with a private utility firm and eventually was promoted to a management position. In 1998, the utility that she worked for was purchased by the City of Sugar Land and Staggs was hired as assistant director before being promoted to director in 2005.

In many ways, Staggs’ priorities have been outside of the organization that she leads. Sugar Land is one of the fastest-growing utilities in a region that suffers from

3 The American Water Works Association, the leading drinking water professional organization in the United States.

4 In 2013, Staggs left Sugar Land to become a division manager at San Jacinto River Authority.

perennial water scarcity, and so Staggs has been heavily involved in regional resource planning. “I know that I’m good at the public interaction and long-range planning, so I tend to be personally involved in those processes—I enjoy that work,” said Staggs. She is also active at city hall, working on behalf of the utility with the city manager and elected officials. “SuEllen does a great job of advancing our cause,” said her assistant director. “It’s easy for [utilities] to be forgotten. She makes sure that we get our fair share. She’ll go to meetings and functions that I’d chew my arm off to avoid.” In O’Toole and Meier’s (1999) terms, Staggs’ main efforts are in exploiting the environment to secure resources and buffering her organization from external forces.

“I know what my strengths are, and I make sure that I have staff around me who complement those strengths,” Staggs said. With her limited technical training, Staggs surrounds herself with experts on utility operations and water quality, and then relies upon their advice and guidance. Senior and mid-level managers at Sugar Land reported that Staggs invited them to participate in policy-level discussions. Street-level workers report a high degree of trust in their executive to provide resources and protect them. “[Staggs] gets us what we need to do the job,” said one field operator. “Management doesn’t challenge or question my judgment when I make decisions or deal with customers,” he added.

In contrast to NPWA, no consistent theme arises from employees’ reported priorities. Rather, each person’s job priorities tend to follow function. When asked to identify their most important current efforts, individuals who work on treatment discussed water quality, those who worked on the distribution system talked about maintenance and operation of infrastructure, and so on. As a generalist, Staggs’ preference to trust in others’ expertise and to focus her efforts externally is consistent with an organization with a broader, more diverse sense of its goals.

Professionalism and Executive Management

These cases show how two similarly situated executives’ professions—one an engineer, the other a generalist—appear to influence their organizations in ways that have little to do with technical acumen. Each individual’s professional qualifications were well established before he or she accepted the executive position, and it seems reasonable to infer that their respective backgrounds and past behaviors caused their governments to hire them. At the same time, the needs and priorities of NPWA and Sugar Land Utilities were at least somewhat known at the time that Bellitto and Staggs were hired, and so it is also reasonable to infer that each perceived the executive position as an opportunity to manage according to his or her respective preferences.

For NPWA, the result was an executive who promoted a nearly monotonic devotion to water quality defined in regulatory terms, not through his technical expertise but rather through management. Bellitto’s professionalism channeled normative isomorphic force to NPWA in a variety of overt and subtle ways: maintaining an in-house water quality laboratory, committing his organization to the Partnership for Safe Water, and cultivating water quality as a sense of mission. In Sugar Land, the result of the job matching process was an executive whose focus was outside of the organization, and who entrusted her subordinates to define their own priorities accordingly. Staggs could have applied in Sugar Land the management decisions that created NPWA’s

quality-focused sense of mission, but as a generalist, Staggs was not a conduit of normative isomorphism for water quality in the way that a professional engineer might be. It is important to emphasize that Sugar Land implemented the SDWA very effectively under Staggs' management—Sugar Land had a perfect SDWA compliance record during her tenure as director. However, Staggs did not imbue her organization with a water quality-focused sense of mission. In Wilensky's (1964) terms, water quality was a matter of technical expertise in both utilities, but was also elevated to a "service ideal" at NPWA. Normative isomorphism was less pronounced in cultural terms at Sugar Land than it was at NPWA, notwithstanding their respective SDWA compliance records.

As illustrations, these cases are most useful in helping to understand other kinds of data. To examine how normative isomorphism shapes organizational outcomes in a more generalizable way, I turn to data on a larger sample of utilities and their implementation of drinking water quality regulations.

SAFE DRINKING WATER POLICY AND ENGINEERING

The present examination focuses on local government water utilities, their executives, and their compliance with the SDWA. Under the SDWA, the EPA establishes technology-based water quality standards, which state agencies administer. State administration consists of monitoring utilities and enforcing their compliance with quality standards. Local governments have little formal role in the administration of the SDWA *as governments*, but local governments operate more than 32,000 drinking water systems that are regulated under SDWA, and local governments provide drinking water to over 80% of the US population.⁵ Consequently, effective implementation of the SDWA begins with local public administration.

Engineering and Environmental Regulation

In many ways, the norms of professional engineering are hardwired into major American environmental laws of the 1970s, including the 1970 Clean Air Act, 1972 Clean Water Act, 1970 SDWA, and 1976 Resource Conservation and Recovery Act. Professional engineers were heavily involved in the development of these laws (Ackerman and Hassler 1981; Halfman 2005; Milazzo 2006; Powell 1999); not coincidentally, each of these laws mandates the measurement of pollution and technology-based solutions. In casting environmental issues as technological problems that require technological solutions, these federal environmental laws are consistent with a dominant culture of professional engineering that values quantitative assessment, technology, and systems design over solutions that require social control or cultural adaptations (Johnston, Lee, and McGregor 1996; Layton 1986; Robinson and McIlwee 1991; Wilson 1989).

To the extent that federal environmental policies embody the norms of the professionals who developed them, professions are likely to affect the local implementation of those policies (Tummers, Steijn, and Bekkers 2012). Professional influence over federal

⁵ Data on water systems in the United States are available from the Safe Drinking Water Information System: <http://www.epa.gov/enviro/facts/sdwis/>.

environmental policy may cause professional engineers who lead local utilities to place a higher priority on compliance with federal regulations than do nonengineers due to normative isomorphism. Following upper-echelon theory (Hambrick 2007) and in keeping with the illustrative cases, local water utility compliance with the SDWA should be greater under executives who are professional engineers than under executives who are not. In this instance, normative isomorphism causes the engineer-led organization to adhere more closely to the SDWA's normatively congruent policy regime. This closer adherence occurs not because engineer-led agencies are more technically sophisticated than those led by nonengineers or because nonengineers dismiss SDWA compliance as unimportant, but rather because executives who are engineers are more likely than nonengineers to prioritize SDWA compliance at an organizational level through their management.

A simple hypothesis follows: *local government utilities that are headed by engineers will comply more strictly with the SDWA than similar utilities that are led by nonengineers.*⁶ Although isomorphism implies similarity, comparing variation in SDWA implementation across similar agencies whose executives hail from different professions helps to isolate normative from coercive and mimetic isomorphism in the present analysis. The SDWA's technology-based standards and procedural requirements impose similar coercive isomorphic pressures on all water utilities. Mimetic isomorphism is also similar across water utilities because they provide a common basic service and face similar technological tools and constraints. It is reasonable to assume, therefore, that coercive and mimetic forces are either constant or randomly distributed across American water utilities. By contrast, normative isomorphic forces should vary depending on the profession of the utility's top executive. Engineering's normative isomorphism may affect any organization to the extent that it employs professional engineers, but executives are especially influential in setting and maintaining organizational culture (Wilson 1989). Thus, the present analysis helps distinguish normative from coercive and mimetic isomorphism empirically.

SDWA Compliance

The SDWA establishes limits for contaminants that threaten human health. If a utility's drinking water exceeds these limits, it commits a *health violation*. The SDWA also establishes water quality testing, reporting, and public communication protocols. Monitoring requirements vary as a function of a utility's size, its source of supply (groundwater versus surface water), and other aspects of its system. Utilities must publish annual drinking water Consumer Confidence Reports and announce violations in a timely manner. Failures to comply with these requirements are *monitoring violations*.

Analysis of both health and monitoring violations is valuable because the two types of violation reflect professionalism's technical and normative dimensions, respectively. In professional terms, health violations are both technical and normative failures inasmuch as they violate the SDWA's core purpose and the norms of professional engineering. But health violations are problematic as measures of management effects

⁶ This hypothesis is consistent with DiMaggio and Powell's (1983) hypothesis A-5, which relates professional labor markets to isomorphism: "The greater the reliance on academic credentials in choosing managerial and staff personnel, the greater the extent to which an organization will become like other organizations in its field" (155).

because they may occur for reasons that are beyond the control of administrators. For example, a poorly maintained treatment facility can lead to health violations, but water sources also vary in initial quality and vulnerability to pollution in ways that can cause health violations and are largely beyond the control of executives (Levin et al. 2002).

For this reason, monitoring violations are perhaps better indicators of normative isomorphism than health violations because they are more directly attributable to organizational culture and an agency's sense of mission. Monitoring violations are organizational failures that are attributable in whole or in large part to management. Monitoring violations typically occur when utility personnel fail to gather water samples with the required frequency, analyze samples adequately, report violations in a timely manner, or communicate water quality information to the public. The means to comply with monitoring requirements all fall within the public executive's traditional POSDCRB span of control (Gulick 1937).⁷ Utilities that are headed by engineers might commit fewer health violations due to the executive's technical acumen, not normative pressures. But maintaining monitoring and reporting protocols does not require a high degree of technical expertise. Differences in monitoring violations between utilities that are headed by engineers and those that are not suggest an effect of normative isomorphism rather than technical expertise. Consequently, the executive's profession is expected to affect monitoring violations more strongly than it affects health violations.

DATA AND MODEL

The present study uses data from a survey of water utility executives, analyzed in combination with SDWA compliance data from the EPA, the 2010 US Census, and other sources. Data on utility executives are drawn from a 2011 survey of American water utility executives by the Water Research Foundation (WaterRF). A total of 169 executives participated for a response rate of 56.3%; 120 interview participants completed the online questionnaire, for a completion rate of 71.0%. Removing cases with item-missing data left a useful sample of 110 utilities for analysis. An appendix to this article offers additional details on the WaterRF's survey methodology.⁸

Dependent Variables

The phenomenon of interest here is compliance with the SDWA, measured separately as health violations and monitoring violations committed by a utility during an executive's tenure as head of that utility. SDWA compliance is an excellent measure of organizational outcomes in the present study because the compliance data source is independent from the executive survey, thus avoiding common source bias (Meier and O'Toole 2013). Data for 10 years of SDWA health violation and monitoring violation records (2002/11) for each sampled utility were gathered from the EPA's SDWA enforcement database.⁹ Health violations and monitoring violations are poorly

⁷ Planning, Organizing, Staffing, Directing, Coordinating, Reporting and Budgeting (Gulick 1937).

⁸ The supplementary appendix is available on request from the JPART editorial office.

⁹ SDWA compliance data are available at http://www.epa-echo.gov/echo/compliance_report_sdwa.html.

correlated in the sample ($\rho = -.05$, $\text{sig} = .79$), indicating that significantly different factors cause each type of violation. Using data on executive career path gathered from the survey, I counted the total number of each type of violation that occurred during each executive's tenure. Executives who had served for more than 10 years at the time of survey administration (about 25% of the sample) were assigned all 10 years' violations. Thus, the dependent variables are health violations and monitoring violations in utility u from 2011 to 2011- t , where t is the lesser of number of years that the executive j has led the utility or 10 years. In this way, an executive only receives "blame" for violations that occur under his or her administration.¹⁰ Table 1 reports descriptive statistics for health and monitoring violations, as well as the independent and control variables used here. Notably, there are far fewer health violations overall than monitoring violations among the sampled utilities.

Independent Variable

The key independent variable of interest here is the utility executive's profession, which I measure with a dummy coded one if the executive is an *engineer* and zero if he or she is not. Academic credentials are central elements of any profession because they help establish a labor market (Abbott 1988; Mosher 1968), and professional education has a potent socializing effect on members of a profession (Athanasidou 1971; Schleaf 2006). Executives who hold one or more academic degrees (typically BS or MS) in engineering are coded one for engineer, regardless of whether or not they are currently licensed professional engineers; executives who do not hold formal degrees in engineering are coded zero.

Controls

Other executive characteristics also might affect SDWA compliance. Most obviously, SDWA violations are expected to be strongly correlated with executive *tenure*: the longer that an executive leads a utility, the more likely it is that monitoring violations will occur on his or her watch. I include executives' *tenure*, measured in years, in the present models. Conventional wisdom suggests that management should improve as an administrator's level of education increases (Cho et al. 2005), although empirical research on the effects of executive education on organizational performance has yielded little evidence that executive education has any significant relationship with management quality (Gottesman and Morey 2010; Jalbert, Rao, and Jalbert 2002). Nonetheless, *education* is expected to be negatively correlated with SDWA violations.

¹⁰ A 2011 Government Accountability Office audit found that states tend to under-report violations to the EPA (Government Accountability Office 2011). However, the Government Accountability Office did not identify systematic bias in state under-reporting. The present analysis assumes that under-reporting is randomly distributed and so does not bias the models employed here. Even if under-reporting is nonrandomly distributed, it is difficult to imagine that state-level under-reporting is significantly correlated with the professions of utility executives. Consequently, under-reporting is likely to be manifest in the error term, which raises the risk of Type II error, but should not cause biased estimates in statistical models.

I gauge education as the highest level of formal education completed, measured in years (i.e., bachelor's degree = 16 years, master's degree = 18 years, and so on.).

Past research has identified several additional correlates of SDWA compliance. SDWA violations are expected to increase with utility size because larger utilities tend to have larger, more complex infrastructure systems and are subject to greater scrutiny from state regulatory overseers (Botelho, Costa Pinta, and Rodrigues 2005; Rahman et al. 2010). I control for utility size with the *log population* served by each utility. Research on environmental justice suggests that enforcement of environmental regulation declines as a community's income falls and its racial and ethnic minority population increases (Konisky and Schario 2010; Lavelle and Coyle 1992; Lynch, Stretesky, and Burns 2004). Median household income and unemployment rates were statistically and substantively insignificant in models of SDWA violations, but I include a control for *percent nonwhite population* in each utility's service area according to the 2010 US Census. Finally, some utilities do not produce their own potable water, but rather purchase wholesale water supplies from other utilities. These utilities do not operate their own treatment plants or supply reservoirs, are exposed to fewer potential contaminants, and so are subject to less scrutiny under the SDWA. Hence, utilities that rely on *purchased water* are expected to violate the SDWA less frequently.

Controls for governance structure and other institutional variables were non-significantly correlated with both types of violations and did not substantially alter the effects of other variables, so they also are excluded from the present analyses. Differences in state-level SDWA enforcement are among the potential causes of variation in violations. Ideally, violations would be estimated with a hierarchical model that includes both state- and local-level variables. Unfortunately, the size of the present sample precludes analysis of state-level variation. Similarly, an ideal specification would control for the presence of other engineers in each utility (e.g., by measuring engineers as a percentage of total employees) in order to isolate executive management effects from normative isomorphism due to the presence of professionals in an agency. Data on the number of engineers employed in each utility were not available.

A Note on Endogeneity

Two concerns about potential endogeneity are worth discussing briefly. First, the present analysis employs cross-sectional data and so raises the specter of reverse causality. Fortunately, the main independent variable of interest (the executive's profession) necessarily precedes the dependent variable (SDWA violations during the executive's tenure), and so reverse causality is not a serious concern here.

A different and more profound endogeneity concern is that the executive's apparent influence is actually a consequence her context, not her independent choices as an administrator. In a review of research on upper-echelon theory, Hambrick (2007) notes the possibility that:

...executives indeed take actions that mirror their profiles, but it's not because of their biased information processing (as upper echelon theory posits). Instead, the causal chain is propelled because the board (or other hiring body) believes that these executives have precisely the right characteristics needed for the conditions at hand.

In turn, the executives' actions are due more to their *mandate* than to any unwittingly biased information processing on their part. (338, italics added).

Applied to the present analysis, a concern for “mandate endogeneity” is that executives who are engineers emphasize water quality in their management because they were hired to manage consistently with their professional priorities. Just so, nonengineers behave differently because they were hired with other characteristics in mind. Recent research on public agency executive succession indicates that such a mandate typically accompanies executive hiring (Hamidullah, Wilkins, and Meier 2009; Maranto and Wolf 2013; Teodoro 2011).

However, a mandate effect does not present an endogeneity concern in this instance; indeed, the idea of an executive mandate is entirely consistent with the theory advanced here because *engineering as a profession* is the exogenous variable at work, and normative isomorphism is the hypothesized causal mechanism. Executive management is a joint consequence of a government's hiring decision and a person's decision to accept a job. In the present analysis, governments appointed engineers (or nonengineers) as executives in part because they were engineers (or nonengineers). Simultaneously, individual engineers (or nonengineers) accepted the executive jobs in part because they presented opportunities to apply engineering principles (or other principles). Hambrick's (2007) concern for mandate endogeneity is most piquant when evaluating upper-echelon theories that turn on executive cognition, which is by definition endogenous. Professions exists prior to and apart from the individuals who accept agency executive jobs and the governments that hire them—neither Anthony Bellitto nor the NPWA invented the profession of engineering. The present analysis tests whether professionalism affects agency outcomes in a way that is consistent with normative isomorphism.

Model

The dependent variables in this analysis are discrete event counts that occur over a fixed period of time, and so negative binomial regressions are appropriate to estimate the number of violations that occurred during each administrator's tenure. As noted earlier, the two types of violations are quite different under the SDWA—health violations reflect contaminations that potentially threaten public health, whereas monitoring violations are strictly procedural. However, the theory advanced here argues that executive management influences variation in both types of violations. Rather than modeling each type of violation in isolation, I employ seemingly unrelated regression (SUR) with a negative binomial estimator similar to the procedure suggested by Martin and Smith (2005). Although this method does not capture the efficiency gains that SUR offers in ordinary least squares estimation (Zellner 1962), it allows for direct hypothesis testing on parameters across the two models. Here, I use SUR to test whether the effect of engineering on health violations is similar to its effects on monitoring violations, following the method advanced by Clogg, Petkova, and Haritou (1995).

Notably, the distributions of both health and monitoring violations are heavily skewed because the modal value in the data set is zero: 84% of the executives analyzed

had no health violations and 55% had no monitoring violations during their tenures at the helm of their present utilities.¹¹ It is possible that the causes of variation in the number of violations differ from the causes in the likelihood of a violation occurring in the first place. All of the independent variables applied here are expected to affect the likelihood of zero counts in the same ways that they would affect the distribution of nonzero counts; indeed, negative binomial models fitted with zero inflation generated effects and fits that were very similar to nonzero-inflated models. In the interest of simplicity, I report only the results of the nonzero-inflated models. Because the data are drawn from a stratified sample, I employ poststratification weights and robust standard errors to correct for bias introduced by the sampling method.¹² Table 2 reports the results of the SUR negative binomial models for health and monitoring violations.

RESULTS AND DISCUSSION

The effect of executive profession on compliance with the SDWA is pronounced in both sets of estimates and statistically significant by conventional standards ($p < .05$) in the model of monitoring violations: utilities that are headed by *engineers* commit fewer SDWA violations than utilities led by nonengineers. With other variables evaluated at their means, the models estimate that an executive who is an engineer will experience .08 fewer health violations and 1.28 fewer monitoring violations during her tenure than will a nonengineer.

As expected, the substantive and statistical significance of engineering are greater in the model of monitoring violations than in the model of health violations. This difference is likely due in part to the greater frequency of monitoring violations. However, it is also likely due to the different effects that professionalism has on each type of violation. Designing, building, and maintaining modern water systems are technically complicated tasks that an engineer might be expected to perform more effectively than a nonengineer, and so the effect of professionalism on health violations could partly be a consequence of expertise. By contrast, monitoring and reporting protocols do not require a high degree of technical acumen, so it does not seem likely that engineers' technical training accounts for the significant effect of executive profession monitoring violations. It seems more likely that, on average, executives who are engineers simply emphasize water quality and SDWA compliance in the management of their utilities, much as Bellitto did at NPWA. That is, engineering appears to have an independent effect on executive management through normative isomorphism.

Model results for some of the controls merit brief mention here. Tenure on the job is weakly correlated with health violations, but as expected, it is significantly and positively associated with monitoring violations. This difference is consistent with the idea that the causes of health violations are less directly connected with executive management than are the causes of monitoring violations. The effects of executive education are inconsistent across the two models. The number of health violations declines as the administrator's education increases, but monitoring violations increase

11 These proportions reflect poststratification weighting.

12 Details on poststratification weighting are included in the [supplementary appendix](#).

Table 2
Seemingly Unrelated Models of SDWA Violations

Variable	Health Violations During Executive Tenure			Monitoring Violations During Executive Tenure			Test of Cross-Model Equivalence	
	Coefficient (Robust SE)	p	Marginal Effect ^a	Coefficient (Robust SE)	p	Marginal Effect ^a	X ²	p
Engineer	-2.88 (1.70)	.09	-.08	-1.73 (.62)	<.01	-1.28	.40	.52
Tenure	-.03 (.12)	.76	-.00	.25 (.02)	<.01	+.23	5.46	.02
Education	-1.29 (.48)	<.01	-.05	.28 (.11)	<.01	+.27	9.81	<.01
Log population	2.28 (1.00)	.02	+.09	.32 (.17)	.06	+.31	3.66	.06
Percent nonwhite population	.04 (.01)	<.01	+.00	-.04 (.19)	.04	-.04	19.99	<.01
Purchased water source	-5.02 (1.67)	<.01	-.09	-2.50 (.54)	<.01	-1.32	2.18	.14
Intercept	-5.14 (5.63)			-7.65 (2.26)				
Log pseudo-likelihood	-59.24			-143.66				
Wald χ^2	32.56			221.37				
McFadden's pseudo-R ²	.18			.21				

Note: N = 110.

^aEstimated change in number of violations expected from one unit change in the value of a variable, with other variables evaluated at their means.

as administrator education increases. These findings echo earlier research on the inconsistent effects of executive education on organizational performance.

Some utility-level variables also generated interesting and statistically significant effects. As expected, both health and monitoring violations increase as utility size increases. *Percent nonwhite population* is positively correlated with health violations, which may validate the expectations that emerge from the environmental justice literature. However, percent nonwhite population is negatively correlated with monitoring violations, which suggests that utilities with larger nonwhite populations are perhaps better managed but subject to greater environmental risks than are utilities with smaller nonwhite populations. These demographic results should be regarded with some caution, however, as the substantive sizes of the effects are small. As expected, purchased water is strongly and negatively correlated with both types of violations.

Cross-Model Analysis

Tests of cross-model independence also yield important findings. The models of health and monitoring violations produced nearly orthogonal point estimates. If professionalism affects the incidence of health violations and monitoring violations in similar ways, then the effects of engineer should be similar in the two models, and differences in the effects of the other covariates should explain the divergent predictions of the two types of violations. Table 2 reports cross-model equivalence tests for each independent variable (see Clogg, Petkova, and Haritou 1995). Each χ^2 tests a “null hypothesis” of equivalent effects for each variable in both models, and so a significant χ^2 for a given variable indicates that the variable has significantly different effects in the two models. An insignificant χ^2 fails to reject this null hypothesis, and so implies that the variable’s effects are probably similar across models.

The cross-model independence tests indicate that executive tenure and education have nonequivalent effects in the two models, as do utility size and percent nonwhite population. These significant differences help account for the nearly orthogonal predictions produced by the two models. The χ^2 value for purchased water falls short of conventional statistical significance ($p = .14$), suggesting that purchased water has a somewhat similar effect in both models, but does not allow outright rejection of equivalent effect. The equivalence test for engineer profession is a marked contrast: with a χ^2 of just .40 ($p = .52$), the effect of executive profession appears to be similar across models, despite the two models’ very different point estimates. In other words, executive professionalism apparently influences the incidence of both types of SDWA violations similarly, even if the other causes of violations are different.

Limits and Directions for Future Research

The present analysis contributes to the literature on professionalism in public administration with its attention to the executive level. This analysis also demonstrates one way in which normative (as opposed to coercive or mimetic) isomorphism can influence public management and policy outcomes. Much more work is needed to understand how executive professionalism shapes public administration.

An obvious avenue for further exploration is to search for evidence of normative isomorphism in other types of organizations where executives differ in profession. Hospitals are one example: only about 3% of US hospitals are led by professional physicians, and some observers have complained of a “caducean ceiling” that blocks physicians from top executive positions in ways that affect hospital operations and performance (Falcone and Satiani 2008; Kaplan 2006; Weber 2002). Do physicians manage hospitals differently from nonphysicians, as Kitchener (2002) claims? Do these differences affect hospital performance? If they do, then the implications for health care administration are potentially significant.

Organizations that have evolved in their top management ranks over time offer more contexts in which to study executive professionalism. For example, over several decades, the US Forest Service has evolved from domination by foresters to a much more professionally diverse organization. Today foresters form a professional plurality within the Forest Service, but they are no longer in the majority as scientists, engineers, and other professionals now are a majority of the agency’s personnel (Brown and Harris 2000), and ideological heterogeneity has accompanied professional heterogeneity within the bureau (Tipple and Wellman 1991). Every Forest Service Chief from its iconic founder Gifford Pinchot (1905/10) through John McGuire (1972/79) was a professional forester. In 1979, R. Max Peterson, an engineer, became the first Forest Service Chief who was not a forester. Three of the six subsequent Forest Service executives have hailed from nonforestry professions.¹³ Do executives who are professional foresters manage differently from those who are not? Have organizational practices and performance reflected changes in executive profession in the Forest Service?

Finally, the approach employed here offers an opportunity to evaluate empirically a topic of perennial interest: public administration as a profession. A finding that executives who hold MPAs behave differently from non-MPA executives, with markedly different policy results, would affirm public administration as a profession empirically even as scholars continue to debate its status theoretically.

CONCLUSION

This study has argued that professionalism influences public executive management through normative isomorphism and demonstrated that, on average, public utilities that are headed by professional engineers commit fewer regulatory violations than those that are not. Although the claim that “professionalism matters” is hardly novel, the evidence marshaled here affirms and clarifies professional influence in a new way by demonstrating an effect of normative isomorphism at the executive level, across similar agencies whose leaders hail from different professions, with independent data on outcomes. DiMaggio and Powell (1983) emphasized that their three isomorphic mechanisms were distinct, but worried that they might be impossible to distinguish empirically; the present results indicate that normative isomorphism extends to the public executive’s office in a way that is distinct from other mimetic and coercive isomorphism.

¹³ Short biographies of the Forest Service’s past Chiefs are available at <http://www.foresthistory.org/ASPNET/People/Chiefs.aspx>.

The present study also contributes to our understanding of the policy process by demonstrating one way in which executive professionalism affects regulatory implementation: professional engineering in the executive ranks of local government utilities leads to greater compliance with federal drinking water regulations. Such a reinforcing effect of normative isomorphism means that professionalism can bolster public policies, at least to the extent that policies align with the predominant norms of a profession charged with its implementation.

But what professionalism helps, it also can hinder. It would be a mistake to interpret this study's findings as an unqualified triumph for professional engineering or professionalism generally. The normative isomorphism that amplifies the SDWA when engineers are in charge of its administration occurs in part because the SDWA reflects the dominant norms of professional engineering. Professionalism may just as easily frustrate or negate policies that contravene the dominant sensibilities of a profession charged with their implementation. For this reason, executive professionalism is an important element of the policy process, and one worthy of consideration in policy design.

SUPPLEMENTARY MATERIAL

Supplementary material is available at the *Journal of Public Administration Research and Theory* online (www.jpart.oxfordjournals.org).

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