Effect of Monitoring and Learning on the Decoupling of TQM Practices:

The Role of Adoption Timing

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Abstract

This paper adds to and refines our understanding of institutional theory, particularly the notion of decoupling. By examining adoption/implementation decoupling across multiple dimensions of a complex administrative innovation, total quality management (TQM), I am able to identify a pattern I call *selective decoupling* by late-adopting hospitals. Specifically, when a powerful national accreditation body started actively inspecting and evaluating one dimension of TQM (the use of quality teams and training), then subsequent adopters had less decoupling (i.e., greater implementation) for this dimension than comparable early adopters had had previously; but when inspection and evaluation were largely ceremonial, as they were during this study's time frame for another TQM dimension (the use of quality tools), then the late-adopting hospitals exhibited *more* decoupling (i.e., less implementation) than had early adopters. This decoupling of tools usage by late adopters was even stronger in situations where implementation may have been particularly burdensome; i.e., in the use of advanced quality tools. These findings, supported by interview and longitudinal survey data, suggest that, when it comes to implementation *after* adoption, institutional forces create subtle but predictable patterns of selective decoupling. In contrast, traditional predictions from organizational learning theory did not appear to explain these results, although there was some evidence of organizational learning by industry regulators.

Most people can think of times when an organization *said* it was going to do something but never actually got around to doing it. Maybe members of the organization forgot, maybe they got distracted by other matters, maybe implementation proved harder than they had expected, or maybe they never really intended to implement much at all. Whatever the reason, the fact remains that, in such cases, organizations become "loosely coupled, building gaps between their formal structures [defined as their stated 'blueprint for activities'] and actual work activities" (Meyer and Rowan, 1977: 341-342). In other words, there is a "decoupling" between rhetoric and reality (Zbaracki, 1998), between formal adoption and actual implementation.

> Given the importance of decoupling to institutional theories, and a considerable body of empirical research over the last two decades that purports to test institutional predictions, it is surprising that relatively little research has been devoted to the phenomenon of organizational decoupling or its specific antecedents (Scott, 1995: 128)…. In fact, prior research examining organizational decoupling as a response to institutional processes has been primarily qualitative and/or case-based. (Westphal and Zajac, 2001: 202)

Moreover, the existing quantitative research on decoupling has focused primarily on relatively straightforward innovations where implementation is easy to determine, such as long-term incentive plans (Westphal and Zajac, 1994, 1998), stock buyback plans (Westphal and Zajac, 2001), and types of college degrees awarded (Delucchi, 2000). In these cases, decoupling is particularly striking because implementation is not that hard. For complex innovations, though, decoupling is more subtle and more complex.

The current study adds to this budding body of research by examining decoupling by hospitals in 1993 and 1997 of a complex administrative innovation, total quality management (TQM). More specifically, this paper asks: what are some of the patterns and antecedents of decoupling among adopters of this complex administrative innovation? Current institutional theory (DiMaggio and Powell, 1983; Scott, 1987, 1995), for example, might predict that late adopters will have more decoupling when it comes time to implementation, because later

adopters often adopt innovations like TQM mainly to appear legitimate (Tolbert and Zucker, 1983; Westphal, Gulati, and Shortell, 1997). On the other hand, organizational learning theory (Argote, 1993; Huber, 1991) might predict the opposite, because late adopters have the unique opportunity to learn from their early-adopting peers and might therefore be predicted to have more TQM implementation. In fact, *neither* prediction turns out to be quite right. The reason for this apparent anomaly is that the existing literatures on decoupling and on TQM have tended to assume that implementation is a single construct; i.e., even studies that measured multiple dimensions of TQM implementation (e.g., Douglas and Judge, 2001; Shortell, O'Brien et al., 1995) combined these dimensions into a single overall measure for hypothesis testing. But what if implementation were consistently different depending on which implementation dimension one examined? By pursuing this line of inquiry, I discovered that, contrary to the conventional wisdom on institutional (and learning) theory, certain groups of adopters systematically followed a pattern of *selective* decoupling, with more decoupling for some implementation dimensions, but less for others. Interestingly, this pattern of selective decoupling appeared to be based on factors in the institutional environment, most notably the actions of a powerful accreditation body. As a result, these findings give us a more sophisticated understanding of institutional theory and decoupling.

For complex innovations like TQM, I define decoupling as any situation where an organization claims to have adopted an innovation but has not implemented it fully. Of course, under this definition, one could argue that all TQM adopters have at least some decoupling, because it is nearly impossible to implement 100% of an innovation like TQM. Indeed, TQM is based in part on the idea that there is always more that can be done to improve the organization. More formally, I define TQM as a collection of management practices and routines that form a structured approach for controlling variability and continuously improving the way an

organization is run (Hackman and Wageman, 1995). In recent years, "TQM may have lost some of its faddish allure, but its core message remains relevant" (Victor, Boynton, and Stephens-Jahng, 2000: 115). This study focuses on the antecedents and patterns of decoupling related to TQM implementation. Because of TQM's very complexity, though, it probably makes more sense to refer not just to the existence of decoupling (e.g., Staw and Epstein, 2000) but rather to the *extent* of decoupling in an organization that has adopted a complex innovation like TQM.

In contrast to the more straightforward innovations studied in previous decoupling research, the opportunity for adoption/implementation decoupling is particularly strong in the case of complex innovations. In the first place, discovering any adoption/implementation decoupling is considerably more difficult than for a straightforward change like an incentive plan. After all, there is no standard accounting report, for example, that will tell an observer that, say, 42% of TQM has been implemented in a given organization. Secondly, even if detected, any such decoupling can always be attributed to difficulties in the firm's ability to implement. The decoupling would thus likely still be seen as a good faith effort (Meyer and Rowan, 1977), since TQM *is* in fact hard to implement (Reger et al., 1994). In other words, bad faith efforts at implementation of a complex innovation like TQM can be quite hard to uncover. Thus, complex innovations allow for much more decoupling and for more complex and subtle patterns of selective decoupling.

HYPOTHESES

What types of organizations are more likely to exhibit decoupling after officially "adopting" a complex innovation? While there has been only limited research to date on decoupling (Westphal and Zajac, 2001)—and even less concerning decoupling of complex innovations—there is a much larger body of research on what leads to the *adoption* (and, presumably, implementation) of administrative innovations. For example, according to

organizational sociology, late adopters of an innovation are more likely to adopt for reasons of institutional legitimacy (Tolbert and Zucker, 1983; Westphal, Gulati, and Shortell, 1997), due to three main institutional forces (DiMaggio and Powell, 1983; Scott, 1995):

- Mimetic isomorphism—everyone else in the industry is doing it
- Coercive isomorphism—customers, suppliers, and regulators are starting to demand it
- Normative isomorphism—it has become accepted practice

As a result, late adopters feel stronger institutional pressures to get on the adoption bandwagon, whether they really want to or not. The reason they might not want to is because "the generalized rules of the institutional environment [e.g., that every hospital must adopt TQM] are often inappropriate to specific situations" (Meyer and Rowan, 1977: 355). With some exceptions (Staw and Epstein, 2000), prior research on TQM implementation *has* found that, on average, implementation leads to increased financial performance (Easton and Jarrell, 1998; Hendricks and Singhal, 2001a, 2001b; Kosko, 2002; Powell, 1995; Shortell, Levin et al., 1995), including for hospitals (Douglas and Judge, 2001; Shortell, O'Brien et al., 1995; Westphal, Gulati, and Shortell, 1997). Nevertheless, some hospitals—under institutional pressure to adopt TQM formally—may still find TQM to be inefficient and overly time-consuming in their specific situations, especially in the short term. This view was confirmed by field interviews at two midwestern hospitals in 1996 (see Qualitative Methods below). So what happens to these reluctant adopters, one might ask, when it comes time to actually implement the complex innovation? Although this question has rarely, if ever, been asked before in the literature, the current study argues that this group of organizations—the late adopters—will have more decoupling: they may still implement some parts of TQM to some extent, but probably not as much as their early-adopting counterparts did.

This proposition—that late adopters of TQM will exhibit more adoption/implementation decoupling than early adopters—is derived from an institutional theory argument. Along these lines, an initial assumption in developing this research study was that outsiders providing institutional pressures on hospitals (e.g., competitors, third-party payees, accreditation groups) would find it difficult, if not impossible, to detect any TQM decoupling; i.e., they would find it too hard to measure the extent of implementation for a complex administrative innovation like TQM. After all, this study uses a confidential survey of hospital senior managers, but most outsiders would presumably find it quite difficult to get this kind of information (Staw and Epstein, 2000). Through field interviews with people at the main hospital accreditation body, however, I discovered that this assumption—that implementation of a complex administrative innovation cannot be actively inspected and evaluated—was wrong, at least in part, for the hospital industry.

In this particular industry, the Joint Commission on Accreditation of Healthcare Organizations (JCAHO) wields a lot of institutional power (Scott, 1987) and declared in the 1990s that all health care organizations must adopt a TQM-like program of continuous improvement (Reeves and Bednar, 1993). Although the Joint Commission is a private entity, it exercises quasi-governmental regulatory power over hospitals. For example, without accreditation, hospitals are ineligible for Medicare reimbursement, which can be 40% of hospital revenues. A hospital's state license may also be dependent on JCAHO accreditation (Joint Commission on Accreditation of Healthcare Organizations, 2001). It stands to reason, then, that if late-adopting hospitals are adopting TQM because the powerful Joint Commission said TQM is required, then the *extent* of their decoupling will likely depend on how much effort the Joint Commission is willing to spend looking for instances of decoupling. One Joint Commission official, reflecting back on the early 1990s, remembered, "We asked [hospitals] what [quality

areas] they were monitoring." In these early attempts to review a hospital's quality improvement efforts, the Joint Commission would ask, "What did you find that needed improvement, and what have you done about what you found?" The result, though, according to one Joint Commission official, was that, 95% of the time, the hospitals would declare that whatever questionable action they had taken that had led to an error and was now under quality review was nonetheless still justified. According to this official, "We'd say, 'Yeah, right.' " To combat this decoupling problem, the Joint Commission issued more stringent Performance Improvement standards in 1995. After that, when a hospital received its once-every-three-years site visit by an accreditation team, the issue of formal quality improvement teams and training was not just raised, but closely inspected and evaluated:

> Yes, we were asking [hospitals], "Tell us how many teams you've got, and set up interviews with them [for our site visit]." As part of our education, the examples we put in the [regulations] books [were of multiple teams].
>
> —Official, Joint Commission on Accreditation of Healthcare Organizations

Moreover, according to another official, "One of the things that we look for is that the medical staff is involved, that it's not just a nurse in charge." Indeed, the other official added, "The message was loud and clear that we expect interdisciplinary participation in this." Since doctors occupy a uniquely privileged and powerful position in hospitals, this focus on integrating doctors into TQM was designed to help integrate TQM itself into the way work gets done in hospitals.

So in 1995 the Joint Commission began intensive inspection and evaluation of decoupling in the areas of quality improvement teams, of training for those teams, and of doctor participation. So what happens to a late-adopting hospital that has officially adopted TQM after 1993 (but whose members may be reluctant to actually implement it) *if an outside body with coercive institutional power actively inspects and evaluates implementation?* Presumably, one would expect to see a lot of implementation. In the case of civil service reforms a century ago,

cities adopted changes to their formal organizational structures quickly when mandated to do so by the state (Tolbert and Zucker, 1983). For hospitals in 1997, this type of coercive mandate was heavily reinforced by active inspection and evaluation of decoupling of quality teams and training—a level of inspection and evaluation not present in 1993.

> Hypothesis 1 (H1): Hospitals that adopted TQM later will have less decoupling in 1997 of quality improvement teams and training (i.e., greater implementation) than will earlier adopters in 1993.

On the other hand, what about those elements of TQM that were *not* actively inspected and evaluated? The use of data analysis tools fell into this category. For a quality improvement team to reach rigorous conclusions, it needs to be able to analyze rigorously any relevant information. In 1997-98, the Joint Commission added an accreditation standard requiring hospitals to use quality improvement tools (i.e., statistical techniques such as control charts and histograms), but quality tools usage was still mostly an example of an "implementation loophole" for hospitals in 1997, when this study's second survey was conducted. For, while "these tools have been an important part of TQM from its earliest applications" (Zbaracki, 1998: 610), the Joint Commission was not yet actively inspecting and evaluating the use of these tools (see appendix for list).

> [In 1995 we issued] much less directive language [about tools use]. We hadn't really hit the statistics [i.e., quality tools] that hard yet [by 1997]. We *had* hit teams and training.
>
> —Official, Joint Commission on Accreditation of Healthcare Organizations

Thus, in the case of TQM implementation by hospitals, the active inspection and evaluation of any decoupling occurred in stages, and covered different elements of TQM over time. In essence, hospitals were expected after 1995 to have trained quality teams, but these teams were not required to do any rigorous data analysis to justify their work or recommendations. In other words, when it came to the use of quality tools, hospitals in 1997 faced only "ceremonial

inspection and evaluation" (Meyer and Rowan, 1977: 359); i.e., encouragement but no enforcement. As a result, we might expect that late adopters in 1997 would exhibit more decoupling for the tools element of implementation than did their early-adopting counterparts.

> Hypothesis 2 (H2): Hospitals that adopted TQM later will have more decoupling in 1997 of quality improvement tools (i.e., less implementation) than will earlier adopters in 1993.

Interestingly, by 1997, the Joint Commission was about to begin the process of asking hospitals to use quality improvement tools as part of their TQM implementation. Some of these early discussions about the upcoming requirements may have trickled down to hospitals looking to satisfy the powerful Joint Commission. The accreditation standard then under discussion mentioned by name five statistical techniques as examples: "run charts, control charts, histograms, Pareto diagrams, cause-and-effect [fishbone] diagrams, and others" (see appendix). We might therefore expect to see less decoupling of these five basic quality tools, even as early as 1997, by those hospitals more inclined to adopt and implement aspects of TQM to please the Joint Commission (i.e., late adopters). In other words, some late-adopting hospitals, because their adoption was likely more motivated by coercive institutional pressures, may see the handwriting on the wall about the five basic quality tools identified by the Joint Commission and start to implement them. In contrast, this institutional argument goes, these late adopters would be much more likely than early adopters to avoid any so-called "other" tools: advanced quality improvement techniques like scatter diagrams, affinity diagrams, and nominal group methods. Moreover, "the use of [TQM] tools diminishes as the tools grow more technical" (Zbaracki, 1998: 624); i.e., advanced tools are less popular among TQM adopters in general. As a result, late adopters may have seen advanced tools as overly burdensome (inefficient) while at the same time feeling confident that any inspection and evaluation would be merely ceremonial. Thus, late adopters may have exhibited a particularly high degree of decoupling when it came to using

these advanced tools.

> Hypothesis 3 (H3): Hospitals that adopted TQM later will have more decoupling in 1997 particularly of advanced quality improvement tools (i.e., less implementation) than will earlier adopters in 1993.

In contrast to the institutional theory perspective presented here—that late adopters of TQM, when not actively inspected and evaluated by regulators, will exhibit more adoption/implementation decoupling than early adopters—the opposite might be predicted by learning theory. After all, early adopters of an innovation have much less guidance on how to increase implementation; e.g., advice on how to convince doctors to serve on quality improvement teams. Late adopters, on the other hand, have the benefit of learning from the experience of others (Argote, 1993; Huber, 1991; Levin, 2000). For example, prior research has found that knowledge transfer occurs within an industry (Lieberman, 1987) and within similar categories of organizations (Henderson and Cockburn, 1996; Lester and McCabe, 1993). So, too, with TQM implementation, this learning perspective might predict that later adopters will absorb and benefit from some of this knowledge on how to implement TQM—knowledge that was not available to early adopters. Although H1 is consistent with this view, traditional learning theory would suggest the following alternatives to H2 and H3:

> H2-ALT: Hospitals that adopted TQM later will have less decoupling in 1997 of quality improvement tools (i.e., more implementation) than will earlier adopters in 1993.

> H3-ALT: Hospitals that adopted TQM later will have less decoupling in 1997 of advanced quality improvement tools (i.e., more implementation) than will earlier adopters in 1993.

In sum, notions of "vicarious learning" (Huber, 1991)—as represented by H2-ALT and H3-ALT—suggest that late adopters will always have less decoupling (i.e., more implementation) than early adopters, because these late adopters will have learned from the experiences and mistakes of those who have gone before. In contrast, the hypotheses derived

from institutional theory (H1-H3) argue for selective decoupling; i.e., decoupling will be reduced when the evidence of it is actively inspected and evaluated and institutional pressures are strong, but decoupling will increase when implementation is monitored only ceremonially, even if institutional pressures for adoption are strong.

The distinction between active versus ceremonial inspection and evaluation of different aspects of the same innovation is a subtle point rarely considered by institutional theorists. For it implies that implementation occurs along multiple dimensions, which may be implemented and monitored differentially. Thus, a key contribution to the literature made by this study is the notion of *selective* decoupling, in contrast to the usual view of decoupling as an either/or or one-dimensional phenomenon. Indeed, this paper predicts that the pattern of decoupling along the two different implementation dimensions identified here—teams and training versus tools use—will be affected differently based on the pattern of institutional monitoring and enforcement.

QUALITATIVE METHODS

Although this study's formal hypotheses were tested using quantitative analysis of survey data (see below), this study also draws upon field interviews in the Discussion section to supplement and elaborate upon the quantitative survey findings. In 1996 the first author interviewed 24 doctors, nurses, and managers (including the CEOs) at two midwestern hospitals. These semi-structured in-person interviews covered primarily issues related to TQM implementation; e.g., personal involvement, barriers and facilitators to progress. Each interview lasted approximately one hour or more. In addition, as alluded to previously, the first author separately interviewed two officials at the Joint Commission in 2000 to discuss the history of the Joint Commission's involvement in hospital accreditation related to TQM implementation.

QUANTITATIVE METHODS

Samples

I relied on data from a survey mailed by the American Hospital Association (AHA) to all community and Veterans Affairs hospitals in the 50 states in 1993 and again in 1997. Westphal et al. (1997) also used this 1993 AHA survey, although not the 1997 one. The AHA sent a single survey to each hospital, to be filled out jointly by the chief executive officer (CEO) and the top quality manager in charge of quality improvement. Regrettably, this approach did not permit the testing of inter-rater reliability, although it did lead to a much better response rate than is typical among surveys of executives. Moreover, pre-testing in 30 hospitals, along with discussion with industry experts, had determined that these two individuals were the most knowledgeable and informed respondents concerning TQM, and the current study's 1996 qualitative interviews of people at all levels also confirmed this view. In 1993, 3,303 hospitals responded (60% response rate); in 1997, for the same population of hospitals, 2,079 responded (40% response rate). An AHA source familiar with both surveys explained to the first author that the lower response rate in 1997 was probably due to several factors unrelated to survey content: (1) an overall decline in response rates during the 1990s for all types of hospital surveys; (2) a longer survey instrument used in 1997 compared to 1993; and (3) a less vigorous follow-up process for non-respondents in 1997.

Since the AHA keeps records of all U.S. hospitals, I was able to compare both samples to the overall population of hospitals in both years. In about half of these tests, there were no statistically significant differences; in the rest, there was some evidence of response bias, although it was similar in both samples and, in any event, the magnitude was fairly small. Specifically, responding hospitals were somewhat larger than the population average (205 versus 181 beds in 1993; 187 versus 173 beds in 1997); slightly more likely to be from the Northeast or

Midwest (47% versus 44% in 1993; 47% versus 43% in 1997); somewhat more likely to be non-profit (90% versus 87% in 1993; 89% versus 84% in 1997); and slightly more likely in 1993 to be approved to train medical residents (24% versus 22% in 1993; but no difference in 1997). There were no differences at all for urban/rural location or health care system membership. Again, while those differences detected here are a potential limitation, they appear to be relatively small in size (e.g., a few percentage points difference) and so do not seem to indicate a major cause for concern.

Respondents in both surveys were asked a single question related to the adoption of "continuous quality improvement/total quality management (CQI/TQM)." They were asked to indicate if they currently had underway a CQI/TQM effort, defined in the survey as adherence to *all* of five different elements (continuous improvement philosophy; structured problem solving; use of teams; employee empowerment; and customer focus). In 1993, even using this fairly strict definition of CQI/TQM, fully 69% of respondents claimed to have adopted CQI/TQM. By 1997, using the same definition, 93% claimed to have adopted CQI/TQM. To be conservative, I included only the survey responses from these TQM-adopting hospitals in the analysis, since this study's focus is on TQM implementation after adoption.

Respondents were also asked how long ago they had adopted TQM. According to Reeves and Bednar (1993), TQM finally began to take off as a trend in health care around 1993, and so that is the dividing line used here. The early-adopter data come from the 1993 survey, and the late-adopter data, from the 1997 survey. Among respondents to the 1993 survey (i.e., the early adopters), 2,139 reported that they had adopted TQM within the previous four years; by 1997, another 767 (i.e., the late adopters) reported that they had adopted TQM during the intervening four years. As described below, it is these two groups that I compared to test the hypotheses. (Note that the 1997 number is smaller in part due to a lower response rate in 1997, along with

industry consolidation from 1993 to 1997.) To have a fair, apples-to-apples comparison of implementation by these early versus late adopters, I needed to exclude from the main analysis the small number of hospitals—2.8% of the 1993 sample—that had adopted TQM before 1989, because they had had five or more years since adoption, whereas late adopters in 1997, by definition, had had no more than four years since adoption. In addition to the main analyses, I also examined the 882 TQM-adopting hospitals (all early adopters, by this study's definition) that answered both surveys.

Outcome Variables

One key element of TQM is the use of small groups to improve quality (Zbaracki, 1998: 610) and the TQM-related training of those group members (U.S. Department of Commerce, 2004). The teams and training measure was therefore based on four items: the percentage of full-time employees (FTEs) participating in quality improvement teams and in formal quality improvement training, and the percentage of active staff physicians participating in teams and in training. I computed these percentages based on respondents' best estimates of the total number of FTEs and of active staff physicians in the organization and the number of FTEs and active staff physicians participating in teams and in training. A possible side-benefit of this technique was that respondents may have given less biased estimates of participation in quality teams and training because they were forced to provide the actual numbers of people involved. I considered higher percentages to be indicators of increased implementation of this TQM dimension, because TQM's rationale is predicated on its being organizationwide in scope, with TQM designed to involve ideally everyone in the organization. Since percentage measures, however, can lead to a problem of heteroscedasticity (unequal variance), a violation of one of regression's assumptions, I applied a variance stabilizing transformation by taking the arcsine of the square root of each of these four items (Neter et al., 1996). The resulting four-item measure

(eigenvalues of 2.2, .8, .7, .3; all factor loadings using principal axis factoring above .4; Cronbach's alpha = .70) reduced considerably any potential heteroscedasticity problem in the regression results, which were substantially similar with or without the transformation in any case.

Of the eight specific TQM tools covered by both AHA surveys, the Joint Commission singled out five tools by name as examples in its 1997 accreditation standard. I classified these five as basic tools and the remaining three, which the Joint Commission did not name, as advanced tools. Consistent with this split, the five basic tools were also the five most popular ones among early adopters in 1993, as well as among late adopters in 1997; i.e., fewer hospitals in both groups reported using any of the three advanced tools. (Despite this lesser popularity of advanced tools, a majority of TQM-adopting hospitals did still use them.) These tools are listed in the appendix, along with definitions based on Brassard and Ritter (1996). While TQM adopters have been known to use additional tools as well, all of the tools covered by the AHA surveys are firmly in the TQM tradition and are considered important indicators of TQM implementation (Zbaracki, 1998).

For each tool, respondents in 1993 were asked to indicate on an ordinal scale: "don't use at all" or "used by a few depts./teams" or "used by many depts./teams" or "don't know." In 1997 the choices were: "don't use at all" or "used by a few groups/teams" or "used by many groups/teams" or "used by all groups/teams" or "don't know." I addressed two potential measurement problems here: (1) it may not be appropriate to assume a continuous scale for these ordinal data (e.g., is "many" exactly twice as big as "few"?), and (2) there were some slight wording differences between the two surveys. To avoid these problems, I converted all responses into the equivalent of a yes/no question for each tool; essentially, "Was this tool used at all or not at all?" This approach, while it did lead to a loss of information, was more prudent from a

statistical and methodological standpoint. For the five basic tools, I then averaged these five yes/no items to construct a measure ranging from 0 to 1 for basic tools use (eigenvalues of 2.8, .8, .6, .4, .4; all factor loadings using principal axis factoring above .4; Cronbach's alpha = .80). For the three advanced tools, I averaged the three yes/no items to construct a measure ranging from 0 to 1 for advanced tools use (eigenvalues of 1.8, .7, .5; all factor loadings using principal axis factoring above .4; Cronbach's alpha = .64). This latter measure's alpha was a bit lower than one might like to see, but it was still within generally accepted limits for a new measure (i.e., above .6).

Predictor Variables

The late adopters measure was a dummy variable, where 0 = earlier (pre-1993) adoption and 1 = later (post-1993) adoption, based on the survey question of when adoption occurred.

The control variable, 2-4 years since adoption, was also a dummy variable, where 0 = fewer than two years since adoption and 1 = two to four years since adoption. Because it can take years to integrate TQM fully into an organization's operations (U.S. Department of Commerce, 2004), we would expect to see less teams and training and less tools usage during the first year or two after adoption as compared to a more mature TQM effort.

Larger hospitals may be more likely to implement a new administrative innovation like TQM due to their greater sophistication, greater access to resources, and the greater institutional pressures placed upon them (DiMaggio and Powell, 1983). Conversely, they may also be more skilled at using decoupling behaviors (Levin and Shortell, 2004). To control for these possibilities and help rule out the alternative explanation that a lack of resources or sophistication explain this study's decoupling results, I also included hospital size, computed as the number of staffed hospital beds (in hundreds). This operationalization of hospital size was consistent with that of Westphal et al. (1997).

I also included two control variables that might relate to general sophistication or access to resources. The first control was a 0/1 dummy variable for teaching hospital, where 1 = approval by the Accreditation Council for Graduate Medical Education to participate in training medical residents. In a follow-up analysis, I replaced this measure with a narrower definition of teaching hospital: a member of the Council of Teaching Hospitals of the Association of American Medical Colleges—these are the major teaching hospitals—and found the same results for the hypotheses. The second control used was a 0/1 dummy variable for rural hospital, where 1 = location in a non-metropolitan area. Such hospitals may have less access to or familiarity with newer innovations like TQM.

Hospitals with network ties to other hospitals may be more savvy about implementing TQM, because they can hear about and learn from the experiences of others (Westphal et al., 1997). I therefore included a dummy variable for hospitals that were a system or alliance member; i.e., they belonged to either a multi-hospital system under common ownership or to a strategic alliance involving contractual arrangements for providing goods and services.

Since market competition might also lead organizations to implement aspects of TQM to a greater extent, I included a measure of competitive pressure by combining four survey items measuring competition into a single factor using principal components factor analysis. The scree test and factor loadings confirmed that all four items loaded highly onto a single factor. The four items were (1) the number of health maintenance organizations (HMOs) in the area; (2) the percentage of patients for which the hospital was paid on a per-capita basis; (3) the number of hospitals that were direct competitors; and (4) the perceived intensity of competition (1-7 scale).

Even though Westphal et al. (1997) did not control statistically for whether hospitals were for-profit or not—since both groups were under strong external pressures to adopt and implement quality practices—I have included this variable, to be prudent, since for-profit

hospitals may have reacted in unique ways to the institutional environment for TQM.

One potential validity concern for all of the above measures is that all the data come from the same survey instrument. Doty and Glick (1998), however, have examined the potential for bias from this "common methods" approach and found that bias is significantly less pronounced when constructs are fairly concrete, as in this study. For example, I relied on implementation measures based not on subjective attitudes (e.g., how much do you feel you've implemented TQM?) but rather on more objective behaviors (e.g., how many people are on quality teams?).

Analysis Techniques

I performed three types of statistical tests: ANOVA (to test for the overall differences between early versus late adopters); hierarchical regression (to test if these differences were statistically significant above and beyond all the statistical controls); and paired two-sample t-test (to test if early adopters changed over time).

I conducted three separate ANOVAs that tested between-subjects effects, with an outcome variable of either teams and training, basic tools use, or advanced tools use. In each ANOVA, I had one fixed effect (late adopters), with one covariate (2-4 years since adoption); I report results of the F-test for the fixed effect. The reason I added the covariate was to hold constant the maturity of each hospital's TQM effort at the time the survey was administered. I then calculated covariate-adjusted outcome scores for early and for late adopters (see Table 2) by plugging the covariate's global mean into the general linear model and parameter estimates (not shown) generated by the SPSS computer program's ANOVA results.

I also analyzed the combined data sample using hierarchical regression. A possible limitation of this approach was that the these results may not generalize to the larger population of hospitals, since only adopters were included (Westphal and Zajac, 2001). This concern is lessened, however, because this paper's hypotheses focus only on adopters of TQM and because,

by 1997, 93% of U.S. hospitals claimed to have adopted TQM.

Lastly, a sub-sample of 882 TQM-adopting hospitals that answered both surveys (i.e., early adopters) was analyzed separately. I conducted this repeated-measures analysis using a paired two-sample t-test. This test computes the differences between values for an outcome variable in 1993 versus 1997 for each case and tests whether the average differs from zero. Thus I compared each outcome variable's mean in 1993 to its mean in 1997 for those early adopters that answered both surveys. This test allowed me to look at the trends among early adopters that occurred during the 1993-1997 period.

RESULTS

Table 1 shows the means, standard deviations, and simple correlations among the variables used in Tables 2 and 3.

[Insert Tables 1-3 about here]

ANOVA Results

As shown in Table 2, later-adopting hospitals had a greater portion of their employees and physicians serving on TQM teams and attending TQM training sessions. This overall effect was statistically significant ($p < .001$) even after controlling for the maturity of the TQM effort (i.e., 0-2 versus 2-4 years since adoption) at the time the survey was administered. The reverse effect, however, occurred for basic tools use ($p = .001$) and for advanced tools use ($p < .001$). Here, it was earlier-adopting hospitals that had higher overall outcome scores.

Regression Results

As shown in Equation 2 of Table 3, late-adopting hospitals had less decoupling (i.e., greater TQM implementation) than early adopters did in the area of teams and training. This effect was consistent with the ANOVA results and was statistically significant ($p < .001$) over

and above the effects of all the control variables. The amount of explained variance (R^2) was not overly large, but the results were highly statistically significant ($p < .001$).

Whereas, in the ANOVA results, early adopters reported using more basic tools than did late adopters, this overall effect disappeared in the regression analysis once I took into account all of the control variables (Equation 4 of Table 3). Thus, net of these controls, time of adoption had no effect on basic tools use. One could argue, though, that decoupling differences between early versus late adopters are interesting in their own right, regardless of any underlying differences in the organizational or market characteristics of each group. In this view, early adopters did indeed use more tools in 1993 than later adopters of TQM did in 1997.

For advanced tools use, early adopters of TQM reported less decoupling (i.e., greater TQM implementation) than late adopters did along this TQM dimension. This effect was consistent with the ANOVA results for advanced tools use and was statistically significant over and above the effects of all the control variables (Equation 6 of Table 3). The amount of explained variance (R^2) was again not overly large, but the results were nonetheless statistically significant ($p = .033$).

Interestingly, for the control variables as well, the overall profile of what predicted greater implementation of teams and training was reversed from what predicted greater tools usage. For example, teams and training was implemented to a greater extent by smaller, rural, for-profit hospitals (Equation 2 of Table 3). By contrast, basic tools use was implemented to a greater extent by larger, urban, non-profit hospitals (Equation 4 of Table 3).

Ruling Out Alternative Explanations

Some might argue that late-adopting hospitals had more decoupling in the area of quality tools use, particularly advanced tools use, because they may have learned from the "mistakes" of

early adopters. That is, according to this explanation, early adopters may have used a lot of advanced tools in 1993 but later came to regret it as too time consuming or not valuable enough. As a result, this argument goes, late adopters absorbed the industry's collective wisdom and knowledge—through a kind of vicarious learning (Huber, 1991; Levin, 2000)—and therefore learned to avoid using too many advanced quality-improvement tools. To rule out this alternative explanation, I compared the 1997 survey responses for early adopters with the 1993 responses of those same hospitals. This paired two-sample t-test allowed me to see if tools use, particularly advanced tools use, decreased (as the alternative explanation would suggest) or not.

Among all early adopters that responded to both surveys, basic tools use increased from 78% in 1993 to 89% in 1997. This *increase* in basic tools use was highly statistically significant ($t_{df=779} = 9.306,\ p < .001$). The same pattern of results occurred for advanced tools use, too (increase from 58% to 66%, $t_{df=692} = 5.051$, $p < .001$). Moreover, in a follow-up analysis, I found this same pattern of results for hospitals of all sizes. Thus, we can strongly reject the alternative explanation: for, in fact, over the years, early adopters were not at all rejecting the use of basic or advanced quality improvement tools, but rather were actually *increasing* their use of these tools from 1993 to 1997.

DISCUSSION

This study adds to the small but growing empirical literature on decoupling. One of the contributions here is an increase in our understanding of how the time of adoption affects the degree of decoupling (i.e., the extent of implementation) after a complex administrative innovation is officially "adopted." Contrary to the initial predictions of institutional theory, late adopters of TQM actually had *more* quality-improvement teams and training in 1997 than early adopters did in 1993 after the same time interval since TQM adoption. However, consistent with

institutional theory after all, late adopters in 1997 used *fewer* quality tools—especially advanced quality tools—than did comparable early adopters. The missing link in these seemingly contradictory findings appears to be the role of a quasi-governmental accreditation agency pushing for TQM in hospitals. This pro-TQM agency, however, could not always inspect and evaluate actively every dimension of implementation. Thus, in refining our understanding of institutional theory, what we see is that decoupling for TQM in hospitals followed a subtle but nonetheless predictable pattern of *selective* decoupling.

When the powerful Joint Commission on Accreditation of Healthcare Organizations started checking in 1995 that hospitals were using quality improvement teams—especially teams that were trained and that included doctors—it apparently had a significant effect in reducing decoupling, even for late adopters of TQM. In fact, it reduced the decoupling so much that these late adopters in 1997 actually had *more* teams and training than early adopters had had back in 1993 (as predicted by H1). This is no small feat. One of the widespread themes in the 1996 qualitative interviews at the two midwestern hospitals was the difficulty people had in finding time to serve on quality improvement teams. This issue—that busy people find it burdensome and overly time consuming to participate in group meetings (Zbaracki, 1998)—was particularly a problem for doctors in these hospitals. “Physicians want recommendations, backed up by data; they don’t want to talk about it and do a lot of work on it,” noted one nurse. Indeed, this phenomenon may be fairly universal: whether it is faculty trying to get out of committee obligations, business school students dreading yet another group assignment, or hospital employees hoping to avoid being on a quality improvement team—few people enjoy having what they see as an “extra” burden on top of their regular work, especially when the “extra” work is as time consuming as group meetings and training sessions. “You can team a process to death,” one nursing manager complained in 1996. Similarly, an anesthesiologist lamented having

to be on a team that had met for 10 months and produced only one piece of paper (his tongue-in-cheek comment: “We had great meetings.”). Thus, rightly or wrongly, at least some people viewed TQM as an institutionally required innovation that nonetheless lowered efficiency—as a result, TQM was an administrative innovation ripe for decoupling (Meyer and Rowan, 1977).

Thus, it was far from easy, and perhaps not even desirable, for an organization to have 100% implementation for TQM teams and training. What this study’s findings suggest, then, is that it took a powerful motivator—in the case of hospitals, the Joint Commission—to persuade organizations to increase their workforce’s participation in quality improvement teams and training. Early adopters back in 1993 did not experience this institutional pressure or active inspection and evaluation of decoupling. Thus, it is the *later* adopters of TQM—the very organizations that institutional theorists would have suspected initially of having a lot of decoupling—that ended up with significantly *less* decoupling along this dimension of TQM implementation. Active monitoring and enforcement by the Joint Commission—with its coercive power—seems a likely explanation for this result.

In contrast, however, when monitoring and enforcement by institutional forces were weak or largely ceremonial, we see the opposite effect: later adopters of TQM were *more* likely in 1997 to exhibit decoupling behavior along the dimension of implementation not under active inspection and evaluation by the Joint Commission (i.e., use of TQM tools). In particular, hospitals that adopted TQM later had more decoupling in their use of basic quality improvement tools, as predicted by H2; however, after I included the control variables, this result did not remain statistically significant. Nevertheless, in the area of advanced quality improvement tools (i.e., tools not mentioned by name as examples in any Joint Commission literature), late adopters consistently had more decoupling than did early adopters, as predicted by H3.

Although not the main focus of this study, it is interesting to note that early adopters of

TQM were also influenced in their later years by institutional pressures to implement TQM. For example, a surgeon interviewed in 1996 admitted that having a Joint Commission site visit in Oct. 1995 to his hospital, which had adopted TQM in 1989, pushed the hospital just before the site visit to implement TQM much more fully. In fact, a repeated-measures paired-sample t-test for the teams and training measure showed a significant increase ($t_{df=551} = 10.583$, $p < .001$) among early adopters from 1993 to 1997.

When decoupling occurs with relatively straightforward innovations, the complete lack of any implementation is seen as an example of "symbolic adoption" (Westphal and Zajac, 1994, 1998, 2001). For example, fully 38% of the firms that adopted stock repurchase plans had not purchased any shares five years after adoption (Westphal and Zajac, 2001). According to the current study's surveys, however, hardly any TQM-adopting hospitals had *no* implementation whatsoever; only 4% of the sample claimed to use none of the eight tools and only 1% reported having no quality teams or training at all. When it comes to complex administrative innovations, then, perhaps it makes more sense to talk about "token implementation." For example, nearly one-fifth of the TQM-adopting hospitals had 5% or fewer of their employees and doctors participating in quality improvement teams or training. These hospitals claimed to have adopted TQM, yet, apparently, more than 95% of their people had never participated in a key dimension of TQM implementation. So while decoupling of a complex innovation may not mean the total absence of implementation after adoption, it may mean that implementation is *nearly* absent, with only a few (token?) behaviors that are perhaps mainly symbolic. For example, at one hospital, several different nurses in 1996 noted that the "critical pathway" (i.e., the standardized plan showing the ideal use and timing of daily interventions for patients with a specific diagnosis or procedure) in their area was mainly for show and not used by the surgeons—an example of a

high degree of decoupling.

Of course, as mentioned earlier, bad faith at implementation is extremely hard to prove when looking at complex innovations. Since one cannot directly observe political intent (Pfeffer, 1981), it is difficult to know if any decoupling is due to difficulties in implementation or simply evidence of symbolic or token adoption without any real intention to implement fully. Indeed, one official at the Joint Commission maintained a more charitable explanation for why late adopters in 1997 seemed to have had more decoupling along certain dimensions of TQM: "They hadn't figured it out yet."

LIMITATIONS AND FUTURE RESEARCH

One limitation of this study is that, although TQM implementation is multi-dimensional, only two dimensions are discussed here: a dimension that *was* actively inspected and evaluated by the Joint Commission in 1997 (quality teams and training) and one that was not (use of quality tools). Future research (e.g., see Douglas and Judge, 2001) could continue to explore more broadly some of the other dimensions of TQM implementation besides just teams and training and tools, such as leadership, strategic planning, and customer focus (U.S. Department of Commerce, 2004).

Another potential limitation is that the survey data here are based on senior managers reporting on behalf of an entire hospital. Besides response bias issues, there may also be implementation differences across different parts of a hospital that are not captured by this approach. Nevertheless, in terms of getting an organizationwide perspective, this study's 1996 qualitative interviews did confirm the 1993 pre-testing finding that senior managers do have the most relevant knowledge to answer the survey questions used here. Moreover, this study uses implementation measures based not on subjective attitudes (e.g., how much do you feel you've implemented TQM?) but instead on more objective behaviors (e.g., how many people are on

quality teams?).

This study implicitly assumes that TQM implementation is progressive; i.e., it can only increase. For the broad population of hospitals during this study's time frame, such an assumption seems generally reasonable, but it may not apply in all situations or contexts (Zbaracki, 1998). For example, the director of quality management at one early-adopting hospital said in a 1996 interview that, while quality was still a central concern, TQM was no longer the priority it once was at that hospital. Future research might explore some of these nuances for TQM adopters that "backslide" or that shift their direction after a merger or takeover.

It may also be worth noting that some of the differences between early and late adopters of TQM are probably not quite as stark as institutional theory would suggest. In its simplest version, organizational sociology views early adopters as having motives that are "pure": the innovation is adopted early on for efficiency reasons, or because it "makes sense." A more sophisticated interpretation, however, would acknowledge that sometimes even early adopters of an innovation adopt for legitimacy reasons; e.g., they want to enhance their reputation as innovative (Staw and Epstein, 2000) or they are under external pressure to change (Arndt and Bigelow, 2000). Nevertheless, these institutional forces may be smaller than those affecting late adopters, who typically face even stronger coercive and mimetic institutional pressures (DiMaggio and Powell, 1983). For "as TQM has spread, its adoption has begun to be driven increasingly by concerns for managerial and firm legitimacy, rather than by instrumental task requirements" (Sitkin, Sutcliffe, and Schroeder, 1994: 560). Future research might examine more of these causes of TQM decoupling, including the influence of network effects (Westphal, Gulati, and Shortell, 1997), particularly for earlier versus later adopters. For example, do organizations located in close physical proximity, or that have interlocking boards of directors, influence their peers' propensity for decoupling?

CONCLUSION

"Institutional theorists have tended to view decoupling as a buffering mechanism whereby organizations maintain external legitimacy through formal practices that embody socially sanctioned purposes, while still preserving informal routines that have evolved over time" (Westphal and Zajac, 2001: 221). A major drawback to decoupling as a long-term buffering strategy, however, is that, eventually, "implementation loopholes" may get closed as regulators undergo their own organizational learning. Interestingly, in the case of hospitals and quality improvement tools, the powerful Joint Commission on Accreditation of Healthcare Organizations did just that in 1997-98, when it begin actively monitoring and enforcing "a standard requiring appropriate statistical techniques."

> [The accreditation site visit team would say], "Show us your data." We also asked, "What data analysis tools are you using?" Sometimes they had none. Those are pretty embarrassing questions until word got out [that we were going to ask about the use of tools].
>
> —Official, Joint Commission on Accreditation of Healthcare Organizations

This high amount of active inspection and evaluation, though, requires a great deal of effort, as well as an infrastructure of (sometimes intrusive) evaluators. The health care industry is somewhat unique in this respect in that it is heavily regulated. For corporations in other parts of the economy, intensive inspection and evaluation of decoupling for complex administrative innovations like TQM is more rare (Staw and Epstein, 2000). There is some inspection and evaluation infrastructure in the form of stock analysts, government regulators, and, perhaps, boards of directors; on the whole, though, detailed implementation measures are hard to find. As a result, one would expect that, for corporate fads (Abrahamson and Fairchild, 1999) that involve complex, multi-dimensional, organizationwide changes, decoupling is probably high among late adopters of such fads.

Whereas past research has found that, when it comes to improving productivity and quality levels, the experience of others and/or the passage of time are helpful, it was the case in this study that improvements in the implementation of TQM did not benefit from this kind of vicarious learning. Part of this lack of learning may be because most TQM adopters "ignore the failures and select the best stories to tell" (Zbaracki, 1998: 612), thereby making it hard for late adopters to learn from the experience of early adopters. In addition, in prior research in the organizational learning literature, there was usually a motivation to improve (Levin, 2000); however, there is not always a strong motivation to learn to implement a complex innovation. Even with good intentions, an organization's leaders or employees may find that competing priorities inevitably lead to a decoupling between stated intentions and actual behavior (Meyer and Rowan, 1977). When the motivation is high—as was likely the case with late-adopting hospitals implementing teams and training under the watchful eye of the powerful Joint Commission—decoupling is diminished; without such active inspection and evaluation, though, decoupling increases, despite the potential opportunity late adopters have to learn from the experience of others. Thus, this study reminds us that an important boundary condition for organization learning theory (Argote, 1993; Huber, 1991) is that the people in the organization must actually want to learn as well as be able to do so (Levin, 2000; Levin and Shortell, 2004).

In sum, those times when organizations *say* they will implement something fully, but end up only partially implementing certain aspects of it, appear to follow a pattern of selective decoupling. This conclusion contrasts with the field's usual, often unstated, view of adoption/implementation decoupling as occurring only along a single dimension. Complex administrative innovations like TQM, however, may be a bit like "umbrella constructs" (Hirsch and Levin, 1999) in that the different elements (e.g., teams and training, tools use) of the overall concept are not always closely related. Interestingly, the selective decoupling that can arise in

such situations appears to depend significantly on the existence of institutional pressures *combined with* mechanisms for actively monitoring and enforcing implementation. Without such active inspection and evaluation, organizations with a penchant for decoupling and for token adoption may find implementation loopholes, as seemed to occur with TQM among certain late-adopting hospitals. And while those loopholes may eventually get closed—as regulators achieve their own organizational learning—complex innovations like TQM are just that, complex. There may yet be more dimensions of the innovation in which a decoupling between adoption and implementation might occur.

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APPENDIX

Teams and Training (4 items, each transformed by arcsine of square root of item)

- Percentage of full-time employees (FTEs) participating in quality improvement teams
- Percentage of FTEs participating in formal quality improvement training
- Percentage of active staff physicians participating in quality improvement teams
- Percentage of active staff physicians participating in formal quality improvement training

Tools Use

Survey items	Definition (for benefit of reader)	
• Pareto diagrams	Graph the causes of a problem from the most frequent to the least frequent	**Basic Tools Use** (5 items)
• Cause and effect "fishbone" diagrams	List and categorize the causes (and sub-causes) of a particular problem	
• Run charts	Show the history and pattern of variation in a variable over time	
• Control charts	Draw lines on a run chart at 3 standard deviations above and below the average	
• Histograms	Show the distribution of a variable (e.g., problem causes) in a bar chart	
• Scatter diagrams	Display the relationship between two variables thought to be related	**Advanced Tools Use** (3 items)
• Affinity diagrams	Generate many ideas and organize them into groupings	
• Nominal group methods	Have all group members identify, clarify, and rank ideas in a structured way	

TABLE 1

Means, Standard Deviations, and Simple Correlations *

Variable	Mean	S.D.	1	2	3	4	5	6	7	8	9	10
1. Teams and Training	.375	.254										
2. Basic Tools Use	.761	.314	.03									
3. Advanced Tools Use	.554	.372	–.01	.61••								
4. 2-4 Years since Adoption	.364	.481	.21••	.21••	.18••							
5. Hospital Size (00s beds)	2.11	1.86	–.26••	.23••	.24••	.06•						
6. Teaching Hospital	.247	.431	–.16••	.18••	.20••	.07••	.60••					
7. Rural Hospital	.383	.486	.22••	–.17••	–.12••	.00	–.46••	–.39••				
8. System or Alliance Member	.629	.483	.01	.14••	.11••	.10••	.21••	.16••	–.18••			
9. For-Profit	.099	.298	.08••	–.08••	–.10••	–.05	–.12••	–.17••	–.05	.17••		
10. Competition	–.089	.965	–.08••	.15••	.12••	.09••	.25••	.19••	–.38••	.18••	.12••	
11. Late Adopters	.254	.436	.21••	.04	–.02	.40••	–.15••	–.10••	.13••	–.02	.02	.09••

• $p < .05$; •• $p < .01$; two-tailed tests.

* N = 1,450.

TABLE 2

Three ANOVA (with Covariate) Results *

Time of Adoption	Teams and Training	Basic Tools Use	Advanced Tools Use
Early Adopters	.356	77.8%	57.0%
Late Adopters	.447	73.0%	46.3%
F =	48.779•••	10.233••	34.836•••
N =	2,246	2,698	2,496

•• $p < .01$; ••• $p < .001$

* Outcome scores shown have been adjusted to account for the effects of the covariate (2-4 Years since Adoption). F-test is for Time of Adoption.

TABLE 3

Regression Results

	Teams and Training		Basic Tools Use		Advanced Tools Use	
Variable	Equation 1	Equation 2	Equation 3	Equation 4	Equation 5	Equation 6
2-4 Years since Adoption	.124••• (.012)	.105••• (.014)	.102••• (.014)	.103••• (.016)	.114••• (.018)	.131••• (.019)
Hospital Size	–.030••• (.004)	–.029••• (.004)	.024••• (.005)	.024••• (.005)	.035••• (.006)	.034••• (.006)
Teaching Hospital	.013 (.017)	.014 (.017)	.022 (.020)	.022 (.020)	.057• (.025)	.055• (.025)
Rural Hospital	.068••• (.014)	.063••• (.014)	–.054•• (.017)	–.053•• (.017)	–.017 (.021)	–.014 (.021)
System or Alliance Member	.007 (.013)	.008 (.013)	.061••• (.015)	.061••• (.015)	.038• (.018)	.037• (.018)
For-Profit	.063•• (.020)	.060•• (.020)	–.078••• (.023)	–.078••• (.023)	–.075• (.029)	–.074• (.029)
Competition	–.005 (.007)	–.008 (.007)	.015 (.008)	.015 (.008)	.020• (.010)	.022• (.010)
Late Adopters		.052••• (.015)		–.003 (.018)		–.047• (.022)
N =	1,673	1,673	1,938	1,938	1,788	1,788
R^2 =	.136	.142	.115	.115	.107	.110
adjusted-R^2 =	.132	.137	.112	.112	.104	.106

• $p < .05$; •• $p < .01$; ••• $p < .001$; two-tailed tests. Unstandardized coefficients shown, with standard errors in parentheses.