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Time and Performance: A Three-Part Study Examining the Relationships of Job Experience, Organizational Tenure, and Age with Job Performance

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TIME AND PERFORMANCE: A THREE-PART STUDY EXAMINING THE RELATIONSHIPS OF JOB EXPERIENCE, ORGANIZATIONAL TENURE, AND AGE WITH JOB PERFORMANCE

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ABSTRACT

Theoretical and empirical research suggests that job experience, organizational tenure, and age have non-linear relationships with performance. Considered simultaneously, there should exist an inverted U-shaped relationship between time and performance. This paper includes three studies — a meta-analysis, a cross-sectional sample, and a longitudinal sample—to test these hypotheses. Together, the three studies provide complementary evidence supporting the hypotheses. The set of results has implications for theory, research on dynamic performance, and human resource management practice.

It has been long-studied, and now well-documented, that individual job performance is dynamic (i.e., it changes over time) (Deadrick, Bennett, & Russell, 1997; Deadrick & Madigan, 1990; Henry & Hulin, 1987; Hofmann, Jacobs, & Baratta, 1993; Hoffman, Jacobs, & Gerras, 1992; Hulin, Henry, & Noon, 1990; Ployhart & Hakel, 1998). However, despite the fundamental importance of predicting job performance to industrial-organizational psychology and organizational practice, the field still knows relatively little about the nature of individual job performance changes over time (Ployhart & Hakel, 1998). Although there is nothing inherently causal about time (Hulin et al., 1990), some changes in job performance may be attributed to effects approximated by temporal variables (Deadrick et al., 1997; Hofmann et al., 1992, 1993). Variables such as job experience, organizational tenure, and employee age serve as easily obtainable proxies for other constructs like job knowledge, physical skills, and organizational socialization, and thus play crucial roles in human resource research and practice. For example, theoretical models of work performance and behaviors frequently include job experience, organizational tenure, and employee age (Ackerman, 1992; Campbell, 1990; Giniger, Dispenzieri, & Eisenberg, 1983; Rhodes, 1983; Salthouse, 1979; Schmidt, Hunter, & Outerbridge, 1986; Tesluk & Jacobs, 1998). Empirical research often employs these variables as controls approximating job-related abilities, human capital characteristics, or motivational factors (e.g., Forteza & Prieto, 1994; Quiñones, Ford, & Teachout, 1995; Lawrence, 1996; Tesluk & Jacobs, 1998; Warr, 1994). In practice, job experience and seniority (i.e., organizational tenure) often play a significant part in human resource decisions (Campion, Cheraskin, & Stevens, 1994; Gatewood & Feild, 2001; Olsen & Berger, 1983; Quiñones et al., 1995; Tesluk & Jacobs, 1998). In sum, understanding the relationships of job experience, organizational tenure, and employee age with performance is of critical concern for theory, research, and practice. To contribute to the field's understanding of generalizable changes of performance over time, this paper examines the nature of the relationship between performance and time over the span of employees' careers.

This paper explores how the temporal variables of job experience, organizational tenure, and employee age relate to employee job performance. The study uses theoretical work on the effects of job experience, research on organizational socialization, and the decremental theory of aging to explain (a) the relationship of these temporal variables with job performance, and (b) how an inverted U-shaped relationship between time and performance results when these relationships are considered simultaneously. This study then performs a multi-method investigation to test the issues raised herein. First, using meta-analyses, this paper tests if the variety of past findings of these relationships may be attributable to non-linear relationships. Second, this paper performs analyses on a sample of employees who have spent their careers within a single organization to illustrate the nature of the relationship between time and performance. Third, this study examines the simultaneous effects of job experience, organizational tenure, and employee age by modeling employees' performance trends using a longitudinal sample. The sum of the present study's results should help inform dynamic performance research on the theoretical need and practical value of including temporal variables as predictors of individual change patterns. The results should also inform various fields on the implications of temporal variables as predictor or control variables, particularly when used in the prediction of job performance. Furthermore, the results should contribute to practice by helping forecast employee performance.

DYNAMIC PERFORMANCE AND TEMPORAL VARIABLES

Job Experience

Experience can be defined as the culmination of context-based events that an individual perceives (Quiñones et al., 1995). This definition provides a distinction between knowledge accumulated through education and the process of actually performing a job. Within the context of a job, experience entails the accumulation of job-specific knowledge from action, practice, and perception of the tasks and duties associated with a specific job.

While the concept of experience seems straightforward, recent research into the implications of its measurement shows it to be multifaceted (Quiñones et al., 1995; Tesluk & Jacobs, 1998). Thus, despite much research using such approximations and terms for work experience as job tenure, job experience, organizational tenure, and seniority interchangeably (Hofmann et al., 1992), in-depth treatments of the variable suggest it varies by level of specification (e.g., task, job, work-group, organization) and measurement (e.g., amount, time, type, density) (Quiñones et al., 1995; Tesluk & Jacobs, 1998). It is beyond the scope of this study to address every potential specification of experience. This paper focuses on experience with a job (or set of highly similar jobs) involving multiple duties, which hereunto is referred to as job experience, and experience with the organization (i.e., organizational tenure) to be discussed later. Furthermore, as the focus here is on the relationships between temporal variables and performance, job experience is examined through the quantitative measure of time (in years).

Several theories lend understanding to the relationship between job experience and performance. Human Capital Theory suggests that employees make investments of experience in themselves, which enhance their ability, and thus influence job performance (Ehrenberg & Smith, 2000). Learning theory also predicts that job experience enhances job ability (Weiss, 1990). Both perspectives suggest that job performance changes over time because individuals accumulate job experience. As job experience leads to the accumulation of relevant knowledge, skills, and abilities, performance should improve. From this basis, models of performance posit that job experience has a positive affect on job performance (e.g., Campbell, 1990; Hunter, 1983; Schmidt, Hunter, & Outerbridge, 1986). Providing a detailed treatment of this hypothesis, Schmidt et al. (1986) showed job experience influences job knowledge and task proficiency, which in turn affect job performance. Their model also suggested that the effect of experience may not be linear. Schmidt and colleagues argued that the relative advantage of one year of job experience is significantly greater at lower levels of job experience than at higher levels

(McDaniel et al., 1988; Schmidt et al., 1986), a finding that has been replicated (Avolio, Waldman, & McDaniel, 1990; McDaniel et al., 1988). Therefore, we hypothesize:

> H1: There is a non-linear relationship between job experience and job performance.

Organizational Tenure

Organizational experience suggests an accumulation of work-related information that is conceptually distinct from job experience (Quiñones et al., 1995; Tesluk & Jacobs, 1998). Accurate specification of the context through which experience is accumulated (i.e., job vs. group vs. organizational level) furthers our understanding of relationships with critical variables (Tesluk & Jacobs, 1998). The accumulation of organizational experience, or organizational tenure, may have effects on individual development beyond those of job experience. The literature on organizational socialization (e.g., Chatman, 1991; Feldman, 1976; Louis, 1990; Van Maanen & Schein, 1979) most directly addresses the effects of accumulating organizational experience.

Organizational socialization is the process by which an individual comes to understand the social knowledge, values, and expected behaviors necessary to assume an organizational role (Chatman, 1991; Van Maanen & Schein, 1979). Through socialization, employees learn how to function within an organization's culture by gaining familiarity with the organization's systems, becoming trusted by coworkers, and establishing friendships (Feldman, 1976).

Some have argued that when experience is measured at the organizational level of specification, it is more appropriately linked to such phenomena as organizational commitment rather than job performance (Quiñones et al., 1995; Tesluk & Jacobs, 1998). While organizational experience may appear less directly related to job performance, the accumulation of knowledge of expected behaviors and acceptance by coworkers should affect one's proficiency within an organization. Similarly, changes in the organizational environment may lead to changes in job performance. Thus, measuring familiarity with the environment or how to

function within the organization captures a level of understanding beyond that explained by changes in job experience over time. Take for example two research scientists, both with 10 years experience. All else equal, we would expect one with those ten years of experience within the same organization to be more knowledgeable about how to get a project done (e.g., knowing who to contact for help, building upon established relationships with colleagues, locating resources, and obtaining necessary information or supplies) than another scientist who is just beginning to work for the organization. As with job experience, though, the benefit of accumulated organizational experience on job performance is likely to change over time. We would expect that socialization is most pronounced for new employees as compared with veteran employees. Thus, any effect of organizational tenure on performance should be non-linear: with a larger positive effect at low levels of organizational tenure and with a diminishing effect as organizational tenure increases. Therefore, we predict

> H2: There is a non-linear relationship between organizational tenure and job performance.

Age

Simultaneous to the accumulation of job experience and organizational tenure, the individual necessarily is getting older. Thus, aging may also play a role in describing how an individual changes over time, and subsequently may affect how performance changes over time (Waldman & Avolio, 1993).

There has long been a view of a negative age-performance relationship (Rhodes, 1983), although the belief has endured without conclusive empirical support (McEvoy & Cascio, 1989). One theoretical rationale for the hypothesized negative relationship is the decremental theory of aging (Giniger, et al., 1983), which suggests that increased age causes a deterioration in abilities, such as speed, dexterity, motor coordination, and strength (Giniger et al., 1983; Rhodes, 1983; Salthouse, 1979). Similarly, Kliegl and Mayr (1992) have advanced a model that suggests there is an underlying single negative affect of age-related influences on a wide range

of cognitive variables. Although the simplest single factor model (i.e., one underlying factor, affected solely by age, accounts for all declines in cognitive functions) has been shown to be too simplistic, a large number of studies do present evidence of the negative effects of aging, and a form (albeit somewhat more complex than the simplest model) of the single factor model is strongly supported (Verhaeghen & Salthouse, 1997). Notably, age has also been shown to be associated with decreases in performance on tests of learning, memory, reasoning, spatial abilities, and psychomotor speed (Lindenberger & Baltes, 1994; Salthouse, 1991; Schaie & Willis, 1993; Verhaeghen & Salthouse, 1997).

Aging may also affect performance through motivation. Wright and Hamilton (1978) suggest that older employees go through a "grinding down" stage where they accept what is available to them and lessen their expectations. Supporting this proposition, empirical work demonstrates a negative relationship between age and ambition, aspirations, and overall motivation (Giblin, 1986; Judge & Hulin, 1993; Judge & Locke, 1993; Kuhlen, 1977; Rhodes, 1983; Slocum, Cron, Hansen, & Rawlings, 1985).

Aging may also affect how others perceive, and therefore treat, an individual. Research suggests that older workers are evaluated more harshly than younger workers (Cleveland, & Landy, 1983, 1987; Siegel & Ghiselli, 1971), are given raises less readily (Siegel & Ghiselli, 1971), and are offered fewer training and networking opportunities (Kuhlen, 1977; Lawrence, 1988). Thus, even if an individual does not change in terms of performance-causing characteristics, other employees may fulfill their own expectations of performance changes by reducing opportunities for performance or development, or by giving lower evaluations.

Despite the theory suggesting that aging will affect performance, and empirical evidence showing aging's effects on performance-related constructs, research on the age/performance relationship has shown mixed results. Rhodes (1983) reported approximately equal numbers of studies with positive, negative, and no relationships. Meta-analyses have shown that age alone accounts for little variance in job performance (McEvoy & Cascio, 1989; Waldman & Avolio,

1986). It should be noted that not all examinations of aging suggest negative effects. In particular, crystallized intelligence (e.g., Cattell, 1963)—which entails the cognitive processes and abilities that are embedded in learned cultural meaning, acquired through prior experience (Warr, 1994)—has been found to be higher among older people (Dixon, Kramer, & Baltes, 1985; Labouvie-Vief, 1985). Others have made similar arguments, that while physical and mechanical abilities may decline over time, pragmatic abilities may increase (Salthouse, 1995). Thus, performance may remain constant at higher age levels because job experience may compensate for any detrimental affect of aging (Tesluk & Jacobs, 1998). Accounting for experience, though, should reveal the relationship with age (Avolio et al., 1990).

The theoretical position positing a relationship between age and performance does not imply that the effect of age on performance is linear. Again, we expect a non-linear relationship, with the negative effects of age becoming stronger as employees age. Thus, the total relationship between employee age and job performance should be non-linear (Avolio et al., 1990). Evidence supporting this position is mixed. McEvoy and Cascio (1989) found some support for a curvilinear hypothesis. Specifically, they examined studies with young employees versus those of all ages and found that the young samples had a higher age/performance correlation than the other studies. While this result is informative, as no other meta-analysis had yet examined such a moderator, it is limited in that it had only a few studies in the younger group (K= 4 in one analysis; K = 9 in another). More importantly, it did not treat age as a continuous variable and thus did not examine the potential non-linear relationship between age and performance over the plausible range of age values. Others have found support for non-linear effects of age, but lacked a sufficient range (particularly of older workers) in the sample to fully test the nature of the age/performance relationship at all values potentially facing modern employers (Avolio et al., 1990). For these reasons, stronger support of a non-linear relationship may not have been detected by this previous research, and further work is necessary to substantiate this proposed non-linear relationship. Furthermore, no study has looked for a non-

linear relationship between age and performance after controlling for the effects (and in particularly, non-linear effects) of job experience *and* organizational tenure. Based on available theory, and in line with previous predictions (e.g., Giniger et al., 1983; McEvoy & Cascio, 1989) this paper posits

H3: There is a non-linear relationship between age and job performance.

Considering Temporal Variables Simultaneously: The Inverted U-Shaped Hypothesis

In sum, the literature relevant to understanding how temporal variables relate to job performance describe two key phenomena. First, job experience and organizational tenure are expected to have positive relationships with performance, but the strength of this effect is expected to diminish over time. Second, employee age should be negatively related to performance, with the effect increasing in magnitude as age increases. These effects should operate simultaneously. Furthermore, it is important to note that the strength of the effects varies over time. Thus, the positive effects of job experience and organizational tenure should be initially strong, but grow weaker over time; simultaneously, the expected negative effects of age should be at first small, but become increasingly stronger while the positive effects of experience and seniority are diminishing. Note that because the expected magnitude of the forces changes over time, their effects should not simply cancel each other out. Rather, the combination of these forces should yield an inverted U-shaped relationship between time and performance (Avolio et al., 1990).

The hypothesis of an inverted U-shaped relationship between time and performance is a proposal that individual job performance follows a given, generalizable pattern over individuals' careers. This is in contrast to an implicit null hypothesis that performance is unrelated to time. This null hypothesis suggests that, for performance prediction, individual job performance regresses to an overall grand mean (zero in standardized units), which further suggests that when considering performance over time, changes in performance would in part be captured by the tendency to regress to this mean. The inverted U-shaped hypothesis proposes that

individual job performance does not regress to a single overall grand mean with the passage of time; rather, performance follows a generalizable pattern with time, and thus some of performance dynamism may be attributable to the changes captured by this inverted U-shaped curve. Thus, for the development of performance theory related to dynamic performance, and for the purpose of informing empirical research exploring the nature of performance over time, it is important to search for generalizable patterns of performance over employees' careers. Note that this proposition of an inverted U-shaped relationship is not new (e.g., Avolio et al., 1990; McEvoy & Cascio, 1989; Rhodes, 1983); however, previous research has failed to provide conclusive empirical evidence either for or against this relationship (McEvoy & Cascio, 1989; Rhodes, 1983). The search for this inverted U-shaped hypothesis remains important for research and practice to confirm or falsify the notion that there exists generalizable changes in individual job performance levels over the span of individuals' careers.

The lack of support in the literature for an inverted U-shaped relationship may be attributable to the lack of older workers in examined samples. This would make the observation of the inverted U-shaped relationship difficult. For example, the McDaniel et al. (1988) study clearly demonstrated a non-linear relationship between experience and performance; however, it only investigated the experience/performance relationship for a population with an average experience of less than 6 years, and their last reference group in their analysis was "12 years and up." Thus, although the study did not provide support for the existence of an inverted U-shaped relationship, due to its lack of range, their study did not provide evidence to the contrary. Avolio et al. (1990) investigated the age/performance and experience/ performance relationships. They too found non-linear relationships, but failed to support (or reject) the notion of an inverted U-shaped curve for the majority of their sample. Avolio et al. (1990) did find, however, that the non-linear terms in all of their equations were significant and negative. The negative non-linear terms means that the positive relationship of age and experience with performance diminishes at higher levels, and may even become negative and form an inverted U-shape. Had the Avolio et

al. (1990) sample included more older employees, they might have supported the inverted U-shaped hypothesis; however, only 6% of Avolio et al.'s (1990) sample were aged 55 or more.

The trend toward increased workforce participation by older individuals (Ahlburg & Kimmel, 1986; Warr, 1994) combined with more frequent employee movements between jobs, organizations, and careers (Hall & Associates, 1996; Hall & Mirvis, 1995), suggests that organizations will increasingly encounter diverse ranges of job experience, organizational tenure, and age levels. This trend highlights the need for research to explore the temporal variable/ performance relationships over a wider range of the time-related variables. This paper posits that there are theoretical reasons to expect an inverted U-shaped relationship between time and performance which, although potentially difficult to observe, should help predict individual performance levels over employees' careers. Thus, the joint review of job experience/ performance, organizational tenure/performance, and age/performance relationships suggests the following hypothesis:

> H4: There exists an inverted U-shaped relationship between temporal variables (i.e., job experience, organizational tenure, and employee age) and job performance.

METHODS

Fully testing this study's hypotheses presents a major methodological challenge because it requires substantial ranges of the independent variables (i.e., job experience, organizational tenure, and employee age). Given the modern trends toward frequent employee movements between jobs, organizations, and careers (Hall & Associates, 1996; Hall & Mirvis, 1995), data sets with high levels and diverse ranges of job experience and organizational tenure are increasingly rare. Furthermore, if such data sets are obtainable, they may lack generalizability to more typical samples. Yet the very trends that make finding samples with high levels of job experience and organizational tenure less likely also increase the diversity of these values across workplaces, underscoring the need to investigate how these variables simultaneously

relate to performance. To provide a balance between finding data sets allowing comprehensive tests and producing results generalizing to other settings, this study employs multiple methods and data sources to yield a more complete picture of the variables' relationships.

First, this paper employs meta-analyses to determine if data used in previously published studies conform to the study's hypotheses. Although a large number of studies have examined relationships between the temporal variables of interest in this paper and performance, few have examined potential non-linearities. Consideration of the hypothesized non-linear relationships between temporal variables and performance may help explain the variance of prior findings and the inability of prior meta-analyses to explain a substantial portion of such variance. This study employs a meta-analytic method that includes testing continuous covariates, and thus allows the investigation of non-linear relationships. The advantage of this method is that previous studies' results should provide confirmatory evidence of the temporal variables' non-linear relationships with performance, and of the inverted U-shaped relationship. An advantage of the meta-analysis methodology is that it can show generalizable findings across the published literature (even though this literature did not initially examine or test for these non-linearities); however, it only presents a summary of results of a single temporal variable/performance relationship at a time, at a group level of analysis, and without controlling for the effects of the other temporal variables. Demonstration of the findings would also be desirable at the individual level of analysis.

Second, this paper examines cross-sectional data from a single large company to help demonstrate the inverted U-shaped phenomenon and illustrate the simultaneous effects of time on individual job performance. This organization's human resource practices encourage a highly stable employee population: it employs a policy of internal promotion for all but entry level positions; its employees tend to stay with the company for their entire careers; and job movements within the organization build upon the experiences of previous job assignments. Thus, this data sets affords us the opportunity to test the inverted U-shaped hypothesis on a

sample of employees where job experience, organizational tenure, and age are operating simultaneously (albeit nearly collinearly) and over a wide range of time values.

Third, this paper uses longitudinal design to demonstrate the temporal variables' non-linear relationships while simultaneously controlling for the linear and non-linear effects of the other temporal variables. This sample is advantageous because it allows the examination of all three temporal variables simultaneously. Furthermore, because it is longitudinal, it is possible to examine how these temporal variables relate to both the level of performance and how performance changes over time. However, because job experience, organizational tenure, and age vary widely (i.e., because, like many workplaces, employees are hired with various experience levels, at various ages, and may move within the company and thus have various organizational tenure levels), this sample does not afford a good opportunity to examine the inverted U-shaped hypothesis.

Although every methodological approach has its weaknesses, using a broad range of data sources and analytical methods helps present a comprehensive test of the study's hypotheses. The specific methods and results for each part are described below.

Study One

Meta-analytic approach. The first set of analyses investigate the study's hypotheses by quantitatively reviewing literature on job experience and performance, organizational tenure and performance, and age and performance. The expected non-linear relationships suggest that observed correlations in studies are not random samplings of a single true correlation coefficient; rather, the observed correlation for a given study depends on the level of the temporal variable of the subjects being studied. For example, the observed correlation between job experience and performance for a sample depends on the subjects' job experience levels. So, a sample with a mean experience of 2 years or fewer should have a different (greater) correlation than a sample with a mean experience of 15 years. Because correlations summarize data at the group level, we would therefore expect the hypothesized non-linear

relationships to appear through study's correlations being a function of the mean level of the temporal variable for the sample.

Although a number of methods of meta-analysis exist which could be used to test this study's hypotheses (e.g., Bryk & Raudenbush, 1992; Erez et al., 1996; Hedges & Olkin, 1985; Hunter & Schmidt, 1990), it is important that the assumptions of the meta-analysis are appropriate for the analyses in question (Hunter & Schmidt, in press; Overton, 1998). Most notably, if a random-effects model is appropriate and a fixed-effects model is used, sampling error variances are seriously underestimated, thus resulting in far more false positives than expected due to chance (Hunter & Schmidt, in press; Overton, 1998). The study's hypotheses all suggest that the "true" correlation for a sample depends on the mean level of the temporal variable for the sample; thus, random effects models appropriately describes the nature of the relationships under investigation.

We employ a hierarchical approach to the meta-analysis (e.g., Bryk & Raudenbush, 1992; Erez et al., 1996). Specifically, we are modeling the following:

$$r_i = \tilde{n}_i + e_i \qquad e \qquad N(0,\acute{o}^2)$$

$$\tilde{n}_i = ß_0 + ß_1 * x_i + \ddot{a}_i \qquad \ddot{a} \qquad N(0,\hat{o}^2)$$

Where r_i, = Observed correlation coefficient of study i

$\tilde{n}_i$ = true or population correlation coefficient of study i

e_i, = within-study error

$\acute{o}^2$ = variance of within-study error

$\ddot{a}_i$ = across study error

$\hat{o}^2$ = variance of across study error

x_i = Study covariates for study i, such as the level of the temporal variable

ß = Estimated parameters describing the relationships

The specific methods of calculation are described in detail elsewhere (c.f., Bryk & Raudenbush, 1992; Erez et al., 1996), but essentially entail, (a) transforming the observed correlations using Fisher's Z-transformation (Fisher, 1932) and Hotelling's (1953) transformation,

and (b) using a maximum likelihood estimation method to approximate ß and ô ^{2}. The method also provides a regression-like framework to examine the effect of covariates.

Before any meta-analyses were conducted, the correlations were corrected for unreliability of the performance measure (Hunter & Schmidt, 1990, pg. 119). If a measure of performance reliability was not reported in the original study, the reliability of performance scores from a random effects meta-analysis of the entire set of studies (S [number of studies] = 54; K [number of samples] = 91; N [combined sample size] = 81,287; rho = 0.90) was used. As the temporal variables were all measured in years, no measure or correction for unreliability was available or appropriate. Note that we did not correct the estimates for range restriction. Such corrections assume that the relationship between the two variables is constant over the true range of estimates (Hunter & Schmidt, 1990; Sackett & Yang, 2000), a direct contradiction to the reviewed literature and the study's hypotheses. However, as the range of values may have an effect on the magnitude of the observed relationship, the standard deviation of the temporal variable will be included later as a control variable in the tests with covariates.

Summary of Literature Searches. There are many potential studies to include in a meta-analysis of job experience, organizational tenure, employee age, and performance. Many studies report these variables even when not specifically examining relationships among them. The search for such studies involved two major steps: one, using the references from previous meta-analyses on these relationships; and two, performing a manual search of top management and human resource journals. We used references from age/performance meta-analyses (McEvoy & Cascio, 1989; Rhodes, 1983; Waldman & Avolio, 1986), and the experience/performance and tenure/performance meta-analyses by Quiñones et al. (1995). The manual search examined seven management journals—Academy of Management Journal, Administrative Science Quarterly, Industrial and Labor Relations Review, Journal of Management, Journal of Applied Psychology, Organizational Behavior and Human Decision

Processes, and Personnel Psychology—from 1980-2000. The cites for each of the meta-analyses discussed below are available from the author upon request.

Results of the meta-analyses' literature reviews yielded greater sample sizes than other meta-analyses in these areas (e.g., Hunter & Hunter, 1984; McEvoy & Cascio, 1989; Quiñones et al., 1995; Waldman & Avolio, 1986). For the meta-analysis of job experience and performance, 53 studies (K = 89; N = 59,511) were obtained. Of those studies also reporting the mean job experience of the sample (S = 47; K = 80; N = 56,495), the weighted mean job experience was 5.78 (SD = 4.08), and ranged from 0.77 to 22. For most of these studies, job experience was approximated as job tenure; however, this was not always the case, and in two studies the mean experience of the sample was greater than the mean organizational tenure of the sample. As the intent of this study was to examine the relationships between temporal variables and performance, all covariates were expressed in units of time and the level of specificity was the job. However, because other meta-analyses of temporal variables and performance have examined differences for performance measures and broad categorizations of job types (e.g., McEvoy & Cascio, 1989; Quiñones et al., 1995; Waldman & Avolio, 1986), this information was also collected for examination purposes. In the entire sample of studies with a job experience/performance correlation, 76 studies measured performance through "soft" measures (e.g., supervisory performance rating, peer ratings, etc.), of which 69 were supervisory ratings, and 13 included objective ratings (e.g., sales, production, etc.) of performance. Fifty-one of the samples were of white collar employees, 20 of blue collar employees, and 11 of medical employees (e.g., nurses, medical aids, etc.). Six of the studies included a variety of jobs, and one was on military trainees.

The literature review for studies examining the organizational tenure/performance yielded 63 studies, containing 75 separate samples and a total sample size of 45,850. Sixty-four of the samples used "soft" performance measures, 59 of which were supervisory ratings; 11 samples employed objective performance measures. Fifty-three of the samples were of white collar

employees, 12 were of blue collar employees, eight samples were of mixed groups of employees, and two were of police officers. Fifty-four of these studies (K = 65; N = 43,070) reported the average organizational tenure of the sample. Mean organizational tenure levels ranged from 0.22 to 19.2, with a mean of 7.82 (SD = 4.93).

The age/performance meta-analysis was based on 107 studies (K = 157, N = 82,851). Thirty-seven of the samples used "hard" measures of performance; 120 samples used "soft" measures, 115 of which were supervisory ratings. Ninety-seven of the correlations were from samples of white-collar workers, 44 from blue collar, 11 from diverse samples, three from studies of police officers, and two from studies of military trainees. In the subset of studies reporting the mean ages of the samples (S = 98, K = 145, N = 80,275), the weighted mean age was 35.6 (SD = 7.53), with a minimum of 17.4 and a maximum of 64.

In sum, the literature search yielded a greater total sample size than any previous meta-analyses of published studies in these areas. Furthermore, although it is difficult for any single study to observe diverse ranges of job experience, organizational tenure, and age, the body of literature reporting correlations of these variables with performance does cover a broad range of employee characteristics.

Results. Table 1 presents results of the meta-analyses of the three principle relationships of interest for this study with subgroup analyses similar to those in other published meta-analyses. Like other meta-analyses (e.g., McEvoy & Cascio, 1989; Waldman & Avolio, 1986), the analyses of separate subgroups show differences in correlation magnitudes for some of the relationships. Specifically, there were notable effects for the type of ratings when examining the experience/performance and age/performance relationships, and for the type of worker for the job experience/performance relationship. Recall, however, that subgroup analyses are not the focus of this paper. Rather, it is expected that the relationships with performance are non-linear, and thus should be affected by the level of the temporal variable in the sample. Supporting the continued search for this relationship, each meta-analysis shown in

Table 1 also included a test of homogeneity (i.e., Hunter & Schmidt, 1990; Hedges & Olkin, 1985), all of which were rejected at $p < .0001$. Thus, even within the subgroups shown in Table 1, there remains significant heterogeneity suggesting the presence of further moderators.

Table 2 presents the results of the meta-analyses with covariates. Two sets of analyses were used to provide a more complete test of the hypotheses. The first set simply included only the temporal variable as the covariate (i.e., coded as the average job experience, organizational tenure, or age of the sample, as appropriate). This approach maximized the number of studies being analyzed; however, it ignores study characteristics that other meta-analyses on similar relationships have suggested should also be investigated. Therefore, a second set of analyses was conducted that sacrificed sample size for greater model specificity. This second model included dummy variables representing the subgroups from Table 1 and the standard deviation of the temporal variables. Note that the analyses are not steps in a hierarchical regression, but are alternative hypothesis tests under different decision rules that meta-analysts might apply. However, for the purpose of comparing the percent of variance explained by each set of variables, such computations were performed using only the studies employed in the second set of analyses.

TABLE 1

Meta-analytic results of temporal relationships without temporal variables as covariates

Sample	Studies	K	N	range of rs	Mean r	ñ	T
Relationship: Job experience and Performance							
All	53	89	59,511	-0.26 to 0.48	0.12	0.16	
Productivity	9	13	1,982	-0.23 to 0.48	0.24	0.26	2.80**
Supervisory Ratings	42	69	51,803	-0.26 to 0.43	0.10	0.11	
White	37	51	21,520	-0.26 to 0.48	0.08	0.07	3.54**
Blue	10	20	19,802	-0.18 to 0.47	0.22	0.25	
Relationship: Organizational tenure and Performance							
All	63	75	45,850	-0.34 to 0.46	0.06	0.07	
Productivity	11	11	19,282	-0.14 to 0.39	0.12	0.13	1.10
Supervisory Ratings	48	59	23,567	-0.34 to 0.46	0.06	0.06	
White	45	53	40,362	-0.34 to 0.39	0.05	0.06	1.41
Blue	10	12	2,912	-0.11 to 0.46	0.12	0.14	
Relationship: Age and Performance							
All	107	157	82,851	-0.36 to 0.39	0.03	0.03	
Productivity	27	37	21,935	-0.30 to 0.38	0.08	0.09	2.17*
Supervisory Rating	78	115	58,281	-0.36 to 0.39	0.01	0.01	
White	75	97	50,727	-0.36 to 0.38	0.02	0.02	0.72
Blue	20	44	26,254	-0.36 to 0.39	0.05	0.05	

Notes: Mean r is the unweighted, uncorrected correlation; ñ is the estimated true correlation. T is the T-statistic for the test of differences between the subgroups.

The results of the meta-analyses support the study's hypotheses, including the proposition of an inverted U-shaped relationship between temporal variables and performance.

In the first set of analyses, all three relationships under consideration - experience/performance, tenure/performance, and age/ performance—are moderated by the temporal variable. For the experience/performance relationship, the correlation between these constructs decreased by 0.01 for each year of greater experience in the sample ($p < .05$). For the tenure/performance relationship, an increase in a sample's tenure by one year was associated with a decrease in the relationship with performance by 0.013 ($p < .01$). For age, an increase of one year of a sample's age was associated with a decrease in the age/performance relationship by 0.003 ($p < .10$). These relationships were confirmed with the second set of analyses. These results all suggest that the relationship of temporal variables with performance is smaller in samples where the covariate is larger.

These results also provide support for the presence of an inverted U-shaped relationship between time and performance. For example, the results of the experience/performance meta-analysis indicates that the relationship begins positive (i.e., $r = 0.16$ for a sample with a mean experience of 1 year), declines to zero for a sample with a mean experience level of 17 years, and is thus negative for samples with mean experience levels beyond 17 years. The same pattern of results is found for the organizational tenure/performance and age/performance relationships, with both relationships beginning positive for samples with low levels of the temporal variable (e.g., 0.16 for a sample with mean tenure of one year; and 0.063 for a sample with a mean age of 20 years), and becomes negative for samples with mean temporal variable levels of 14 years of organizational tenure and 41 years of age.

Discussion and Limitations. The meta-analytic results support the hypotheses. The finding that all three relationships are moderated by the average level of the temporal variable in the sample is indicative of a non-linear relationship between the temporal variable and performance. Furthermore, all three relationships begin positive, decrease with higher covariate levels, and ultimately become negative. These results suggest that the validity of

TABLE 2

Meta-analysis of temporal variables and performance with covariates

	Temporal Variable		
Covariate	**(1) Job Experience (ß)[a]**	**(2) Organizational Tenure (ß)[b]**	**(3) Age (ß)[c]**
Set 1 (Simple analysis)			
Intercept	0.171**	0.177**	0.123*
Temporal variable	-0.010*	-0.013**	-0.003†
% Variance Explained	10%	17%	4%
Set 2 (Analysis with additional covariates)			
Intercept	0.1319*	0.1881**	0.1055
Temporal variable	-0.0133*	-0.0096†	-0.0062*
Ratings (1 = Productivity)	0.1326*	0.1148*	0.1121**
White Collar	-0.0214	-0.0447	-0.0632
Blue Collar	0.1815**	-0.0030	-0.0716
SD(Temporal variable)	0.0009	-0.0054	0.0167**
% Variance Explained	49%	26%	25%

Notes: † $p < .10$; * $p < .05$; ** $p < .01$; S is the number of studies; K is the number of samples; N is the total sample size. The temporal variable is the reported mean job experience level of the sample in column 1, the mean organizational tenure of each sample in column 2, and the mean sample ages in column 3. To convert predicted values back to correlations, the art tangent of the predicted value must be taken. For purposes of comparing the percent of variance explained, statistics are all computed using the group of studies employed in set two.

a.) In Set 1, S= 47; K = 80; N = 56,495. In Set 2, S = 41; K = 59; N = 39,312.
b.) In Set 1, S= 54; K = 65; N = 43,070. In Set 2, S = 45; K = 55; N = 41,521.
c.) In Set 1, S= 98; K =145; N = 80,275. In Set 2, S = 71; K = 107; N = 71,522.

using temporal measures in performance prediction depends on the characteristics of the subjects. The results also provide three separate instances of support for the existence of an inverted U-shaped relationship between temporal variables and performance. Moreover, these methods reveal that past research has implicitly been capturing performance's non-linear relationships with each of the temporal variables.

The value of these finds, though, is tempered somewhat by the necessary limitations of meta-analytic research (e.g., Hunter & Schmidt, 1990). Most notably, this paper is interested in examining an individual-level non-linear relationship, but investigates this by quantitatively reviewing published studies which assume a linear relationship summarized at the group level (i.e., correlation coefficient). Additionally, there was insufficient studies reporting all the necessary means and relationships to perform meta-analyses with all the desired covariates simultaneously, and thus it was impossible to determine the specific effects of each temporal variable because the effects of the other temporal variables could not be partialled out. The fact that significant results were found in three separate meta-analyses supports the hypotheses. Nonetheless, it would be desirable to demonstrate this non-linearity on a sample of employees at the individual level of analysis. Study two provides a more direct test of the inverted U-shaped hypothesis; Study three examines the temporal variables simultaneously and longitudinally.

Study Two

For the purpose of testing the inverted U-shaped hypothesis at the individual-level of analysis, data were collected from employees in an organization where (a) employees begin and remain with a single organization over their careers, (b) job experience, organizational tenure, and age are perfectly or nearly perfectly correlated, and (c) job experience accumulates over one's entire career. In this relatively controlled circumstance, time can be conceived as any of the above variables; this piece uses organizational tenure. Although this circumstance may be atypical of those facing many organizations, it provides a valuable opportunity to test the inverted U-shaped hypothesis at an individual level of analysis. By examining a situation where the

temporal variables of this study are collinear, this study can specifically examine if performance follows the hypothesized function with the more general construct of time. Although, as discussed below, most practical applications would want to differentiate between job experience, organizational tenure, and age, this organization's circumstance provides a valuable opportunity for theory testing.

Sample. Data were collected in 1994 from a large, diversified, multinational firm. This company pursues a human resource strategy of internal selection, and hires from outside the firm only for entry level positions, directly from high school or technical colleges for blue collar jobs, or from colleges for white collar, sales, and research and development positions. Employees have historically remained at the firm for their entire careers.

The criterion used for the analysis was most recent supervisory performance appraisal ratings. Employees with less than one year at the company were excluded because their performance had not yet been evaluated. Performance was rated on a four-point scale (mean = 2.40; SD = 0.67), with one indicating the poorest rating. The same rating scale is used throughout the organization so that ratings are comparable across job types and organizational units. No data were available on the reliability of these ratings. The average age at the company is 37 years, and most employees are male (88%). The majority of employees (68%) are white collar workers, of whom 36% are in research and development and 13% are in sales.

In all, data on a total of 65,743 employees were available for analysis, with tenure ranging from 1 to 55 years (mean = 18.09 years; SD = 11.07), and being correlated -0.12 with job performance. Roughly 48% of the employees in the sample have been at the company over 20 years. Thus, this sample includes data on employees with higher levels of organizational tenure than typically found in this sort of research. No data were available on individuals' experience levels within their current jobs.

Analyses. As this study examines a sample of employees over the span of their careers, and because the nature of this sample made organizational tenure and age nearly

collinear, organizational tenure was used as the dimension of time. OLS Regression was used to examine the relationship between organizational tenure and performance. The first step of the regression included dummy variables representing the different types of employees (i.e., production, support, research and development, and sales; note that in the analyses, production employees are the base case). These dummy variables were employed to determine if the relationships uncovered by the analyses exist across broad job categories. The second step examined the linear effects of organization tenure by including the dummy variables, organizational tenure, and organizational tenure interacted with the dummy variables. The third step added tenure-squared to capture predicted non-linearities. Thus, the third step included all the variables from the second step, tenure-squared, and the interaction of tenure-squared with the dummy variables. The dependent variable for all three steps was the most recent supervisory performance ratings.

Results. The regression analyses are reported in Table 3. The relationship between tenure and predicted job performance (i.e., the predicted value of individual job performance from the full regression model) is depicted in Figure 1. The results support the inverted U-shaped hypothesis. All three regressions were significant. The first step of the regression had an R^2 of .03. Adding the linear term was also statistically significant ($p < .0001$), but did not add much explanatory power (ÄR^2 = 0.02); however, including the squared organizational tenure terms makes a significant difference, both statistically ($p < .0001$), and practically (ÄR^2 = .05). For each subgroup, the magnitude and signs of the coefficients indicates the presence of an inverted U-shaped relationship between the temporal variable (i.e., organizational tenure) and performance. Rerunning the regression without the dummy variables replicates the above results: organizational tenure and its squared term explains 6% of the variance in job performance ($ß_0$ = 0.88; $ß_1$ = -1.01), whereas organizational tenure by itself explains only 1%.

TABLE 3
Predicting Employee Performance

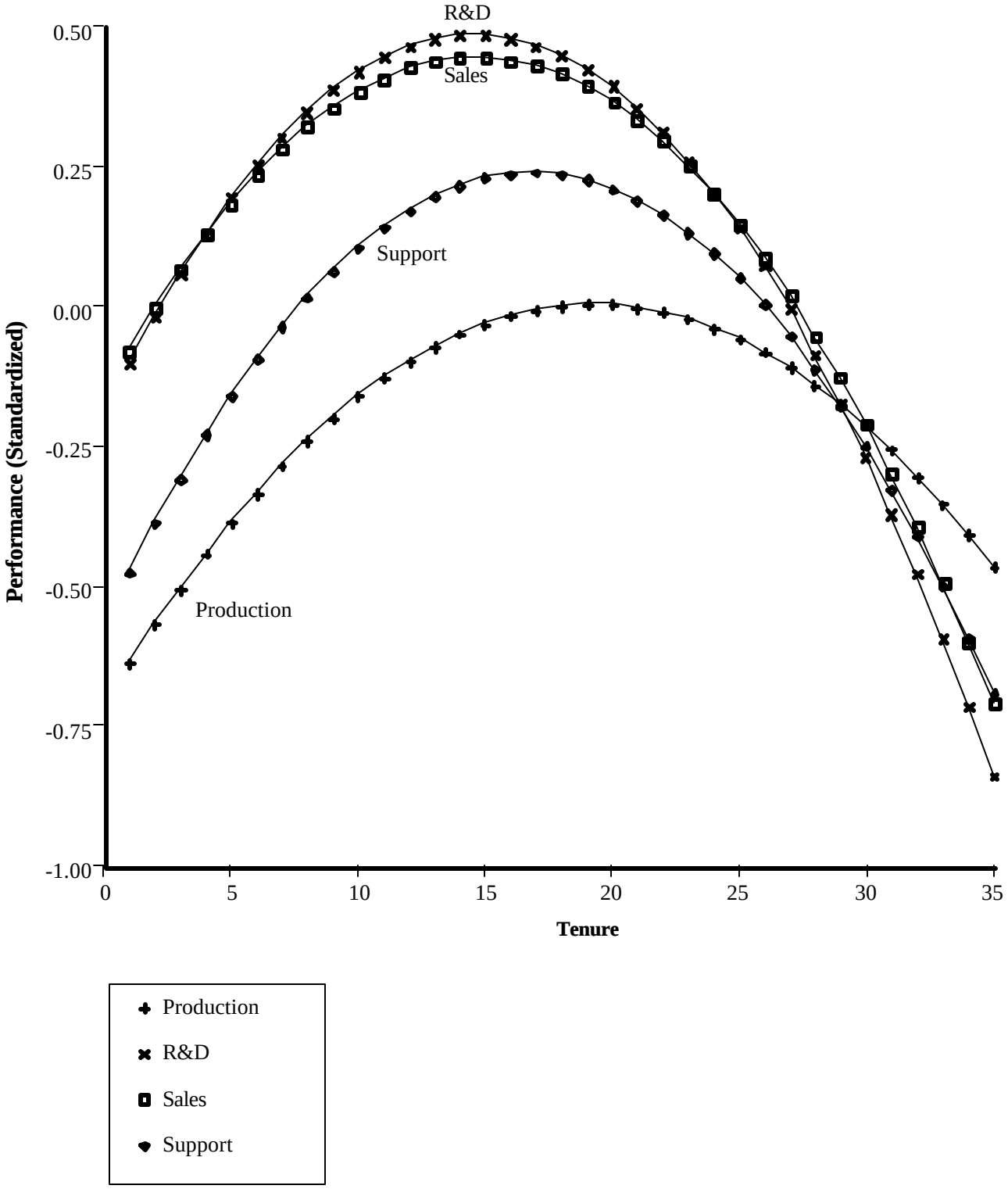
Variable	Step 1 ß	Step 2 ß	Step 3 ß
Support	0.04	0.13	0.07
R&D	0.19	0.34	0.26
Sales	0.12	0.23	0.18
Tenure		0.02	0.71
Support * Tenure		-0.10	0.10
R&D * Tenure		-0.19	0.14
Sales * Tenure		-0.13	0.09
Tenure^2			-0.68
Support * Tenure^2			-0.16
R&D * Tenure^2			-0.30
Sales * Tenure^2			-0.20
R^2	0.03	0.05	0.10

Notes: N = 65,743. Coefficients are standardized beta. All coefficients are significant at $p < .0001$ with the exception of Sales * Tenure, which is not significant. All R^2 and increases in R^2 are significant at $p < .0001$.

Discussion and Limitations. The results from this study provide support for the hypothesis of an inverted U-shaped relationship between temporal variables and performance, and thus provides confirmatory evidence supporting hypothesis 4. This curvilinear relationship was shown for production, support, sales, and R&D workers.

There are a number of limitations from this study, though, that should be noted. In particular, the analyses use cross-sectional data to examine an implicitly longitudinal question. The method assumes that employees are drawn from the same population. Changing selection methods over time, differing standards of promotion, and the effects of non-random turnover all potentially limit the validity of the study's conclusions based on these data. Furthermore, the analyses grouped employees over a wide range of jobs and hierarchical levels. The data are

FIGURE 1
Predicted Employee Performance Versus Organizational Tenure



also atypical of the diverse job experience, organizational tenure, and age levels facing most modern organizations. It is important to note, however, that these limitations would only have weakened the results found here, and that controlling for job level, job complexity, or job experience should have improved the predictability of performance (Avolio et al., 1990; McDaniel et al., 1988). Moreover, the very nature of the circumstances leading to many of these limitations is what provided the opportunity to test and illustrate the presence of the inverted U-shaped relationship.

It is likely that other samples will be less likely to replicate these results because of fewer instances of high job experience and organizational tenure. Furthermore, most organizations will not possess the internal labor market that made this sample possible, thus diminishing the practical implications of this finding for other settings. It would be valuable to build on this study's findings by considering the separate impact of age, job experience, and organizational tenure on job performance over time and within the context of a single job. Nonetheless, although the inverted U-shaped relationship between temporal variables and performance may be obscured in other samples and settings, this study provides strong support for the curve.

Study Three

Sample. The data reported in this study come from a financial services organization, headquartered in the south-central United States, with subjects employed in 43 states. Employees were loan originators, whose jobs were to provide (i.e., "sell") loans to customers. Performance of these employees was measured as each of the monthly sales of loans during an eight-month period in 1998. The total sample consisted of 527 employees who remained with the organization over these 8 months. Originators were paid on commission based on the amount of these sales. Data were available on each individual's age, organizational experience, and job experience. Note that job experience was equal to the number of years of job tenure plus the number of years of related sales experience, which was determined (and recorded in

each employee's file) at the time of hiring. Table 4 reports the summary statistics of these variables.

TABLE 4

Summary Statistics of Study Three Variables

Variable	Mean	SD	Range	1	2	3	4
1. Performance (Time 1)	11,737	11,651	$0-$96,065	1.00			
2. Performance (Time 8)	20,351	15,043	$0-$94,917	0.45	1.00		
2. Job experience	0.57	0.69	0-7.3	0.30	0.16	1.00	
3. Organizational tenure	1.02	1.3	0-17.3	0.21	0.12	0.53	1.00
4. Age	34.0	8.8	21-69	0.09	0.01	0.11	0.11

Note: N = 527; all correlations > 0.08 are significant at p < .05.

Analyses. Like other studies involving longitudinal observations of job performance, I employed Hierarchical Linear Modeling (HLM) because it provides a means of examining the predictors of within-person performance changes over time (Deadrick et al., 1997). HLM is advantageous for this purpose because it recognizes that longitudinal data are implicitly multilevel and nested (Bryk & Raudenbush, 1992). This technique models each individual's performance level and trend, and then examines if temporal variables are related to either.

As implemented by other hierarchical models of individual performance trends (e.g., Deadrick et al., 1997), we modeled individual performance as a function of an intercept and slope related to time. For each individual, the eight observations of monthly performance was modeled as follows:

$$\text{Performance} = ß_{0j} + ß_{1j} * \text{time} + e_j$$

The parameters ($ß_0$'s and $ß_1$'s for each of the j individuals) are then treated as dependent variables in the next level of analysis, with each being predicted by age, job tenure, and

organizational tenure. Because the hypotheses suggest non-linear relationships, the initial level of each individual's performance ($ß_{0j}$) should be a non-linear function of the temporal variables. Thus, we include both linear and squared terms for the model predicting $ß_{0j}$, with support for the hypotheses being demonstrated by significant negative coefficients associated with the squared terms. For the prediction of slope, $ß_{1j}$, the hypotheses of non-linear relationships suggests that the slopes should decrease as a function of the temporal variables. Thus, demonstration of decreasing performance trends with time should be indicated by significant negative coefficients associated with the temporal variables. The second level model equations are as follows:

$$ß_{0j} = \delta_{00} + \delta_{01} * \text{age} + \delta_{02} * \text{age}^2 + \delta_{03} * \text{job tenure} + \delta_{04} * \text{job tenure}^2 + \delta_{05} * \text{organizational tenure} + \delta_{06} * \text{organizational tenure}^2 + r_0$$

$$ß_{1j} = \delta_{10} + \delta_{11} * \text{age} + \delta_{12} * \text{job tenure} + \delta_{13} * \text{organizational tenure} + r_1$$

Results. The HLM analyses are reported in Table 5. As mentioned above, support for the hypotheses should be shown by significant negative coefficients associated with the non-linear terms in the model of the performance intercept, and significant negative coefficients associated with the three linear terms in the model of performance slope. Each hypothesis was supported in this way either in the model of performance slope or in the model of performance trend; however, the results are mixed in that no temporal variable was significant in both cases.

Job experience was significantly positively related to initial performance, and the non-linear term was negative as hypothesized, but the coefficient was not significant. In the model of performance slope, as predicted, job experience was significantly negative ($p < .01$). Organizational tenure had the expected relationships with initial performance. The linear term was positive, and the squared term was negative (both at $p < .001$), thus showing a curvilinear relationship between organizational tenure and performance. However, organizational tenure had no relationship with performance slope. Age was not shown to have a relationship with the

performance intercept; however, age was negatively related to performance trend (at $p < .10$), indicating that older employees have flatter (or more negative) slopes than younger employees.

TABLE 5

Hierarchical Linear Model Output for Performance Level and Trend

	Coefficient	Standard Error	T-Value
For Intercept, B_0			
Intercept	-1214.14	7780.86	0.16
Job Experience	3504.85	951.93	3.68***
Job Experience^2	-253.10	217.40	1.16
Organizational Tenure	2973.24	758.55	3.92***
Organizational Tenure^2	-258.53	63.72	4.06***
Age	296.33	452.92	0.65
Age^2	-2.69	6.24	0.43
% Initial Performance Explained	25%		
For slope, B_1			
Intercept	1742.70	291.52	5.98***
Job Experience	-267.16	88.37	3.32**
Organizational Tenure	0.30	37.18	0.01
Age	-12.07	8.54	1.41†
% Performance Trend Explained	9%		

Notes: † $p < .10$; * $p < .05$; ** $p < .01$; ***$p < .001$. Analyses are based on 527 individuals, with a total of 4216 performance observations.

Discussion and Limitations. Overall, the results generally provided support for the first three hypotheses, although not all of the expected relationships were statistically significant. Nonetheless, there was evidence for non-linear relationship between all three temporal variables and performance, even when simultaneously controlling for the effects of the other temporal

variables. However, the advantage of this sample which permits the demonstration of each of the effects independently provides a limitation in that it becomes difficult to determine if such results necessarily suggest the existence of an inverted U-shaped relationship between time and performance. Granted, the presence of significantly negative squared terms and decreasing slopes suggests an inverted U-shaped relationship, but it is conceptually unsound to make generalizations about the relationship between, say, age and performance while holding the level of job experience constant. Rather, all three variables covary simultaneously, and thus the results cannot be used in this form to support or contradict the fourth hypothesis.

CONCLUSION

Every methodology and data set carry with it limitations that temper the conclusions and generalizability of results drawn from it. Indeed, this is true with each of the approaches employed in this paper; however, the three studies complement each other, and subsequently as a whole yield strong support for the study's hypotheses. By employing three approaches with very different data sets, the results of this study show that there exists non-linear relationships between temporal variables and performance, which culminate in the presence of an inverted U-shaped relationship between time and performance.

For theory, the set of results have several implications. Most notably, it provides support for the hypothesis of an inverted U-shaped relationship between temporal variables and performance. Although others have hypothesized this relationship (e.g., Avolio et al., 1990; McEvoy & Cascio, 1989; Rhodes, 1983), evidence supporting or contradicting its existence has not been conclusive. These results suggest that the relationship has always existed (although prior methodologies have not revealed the relationship), as evidenced by the meta-analyses, and its observable when sample characteristics contain a sizable range of a temporal variable. Thus, this paper suggests that there exists a generalizable trend in the nature of individual performance levels over time. Therefore, some of performance dynamism appears attributable to changes in individual job experience, organizational experience, and age over time. Although

clearly there is much remaining unexplained variance which future performance research needs to explore, this study shows that when considering the nature of individual performance over time, the generalizable pattern is that of an inverted U-shape.

The non-linear relationships also suggest that consideration of performance over time needs to delve into the consequences of the passage of time. Simply including one temporal variable as a linear "control" in models of job performance is overly simplistic. At a minimum, efforts should be made to consider non-linear effects and the simultaneous effects associated with the three variables job experience, organizational tenure, and age. Theoretical models of performance are needed that explicitly detail how performance changes over time.

It would also be valuable for future theoretical and empirical research to consider the constructs approximated by temporal variables to help understand the forces causing individual performance changes over time. Future theoretical work should examine whether the effects of temporal variables on performance are a function of individual changes over time, or the result of others perceptions of the effects of time. This study does not lend insight to whether temporal variables approximate actual changes in individual characteristics and/or if others fulfill their own expectations of temporal effects. Although temporal variables are easily measured and have significant practical value for research and practice, the prediction of job performance would benefit from a more detailed understanding of the causes of performance and how those characteristics and their effects change over time.

The practical implications of these results are also noteworthy. These results suggest that the use of job experience as a selection device is most useful in samples with low experience levels. The meta-analysis suggests it would be most effective in blue collar work when productivity ratings reflect the importance of individual job performance. In such circumstances (say, for example, where the average experience level of applicants is 3 years), job experience can serve as a highly effective selection device ($r = 0.43$; computed given the above assumptions and the results reported in Table 2). These results also support the use of

seniority as a valid internal selection device. For example, for the organization in the second study, organizational tenure predicted performance with a validity (the square root of the R-squared value from the regression) of 0.25 (for the subgroups of production workers, support personnel, R&D employees, and sales people, r's equaled 0.20, 0.29, 0.28, and 0.28 respectively). Thus, understanding this relationship yields information comparable to many other selection devices (see Gatewood & Feild, 2001), and of moderate usefulness in selection (Heneman, Heneman, & Judge, 1997). This is particularly noteworthy given that bona fide seniority systems provide valid exceptions to key employment legislation, such as the civil rights acts of 1964 and 1991, the Age Discrimination in Employment Act, and the Equal Pay Act (Heneman et al., 1997; Kahn, Brown, Zepke, & Lanzarone, 1994).

These findings may also help inform human resource planning by providing information on expected average employee performance changes in the future. Although personnel decisions cannot be made based on age, the results do provide a benchmark against which companies can compare the performance of their workers. As the temporal variables are only proxies for other performance-causing phenomena, these results do not suggest individual performance trends cannot be altered. Companies can use these results to help evaluate the effectiveness of their development programs, particularly for those workers for whom these results imply the beginning of a negative performance trend.

It should again be noted, though, that job experience, organizational tenure, and age are not causal factors in and of themselves. Ideally, when investigating individual performance over time, researchers would collect the specific constructs of interest, such as physical and mental ability, job knowledge, motivation, opportunity to perform, etc. Unfortunately, this is not always feasible, and proxies are often used. The ease of collecting the temporal variables, compared to the variety of constructs which they may approximate, likely indicates that such proxies will continue to be used in the future. Furthermore, the fact that this study shows significant relationships between temporal variables and performance demonstrates the importance of

collecting such information when predicting performance. The need to include such proxies is only increasing as modern organizations are facing more diverse sets of employees.

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