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The Implications of Linking the Dynamic Performance and Turnover Literatures

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Abstract
This article examines how the literatures of dynamic performance and the performance–turnover relationship inform each other. The nonrandom performance–turnover relationship suggests that dynamic performance studies may be biased by their elimination of participants who do not remain for the entire study period. The authors demonstrated that the performance slopes of those who leave an organization differ from the performance slopes of those who remain. This finding suggests that studies of the performance–turnover relationship need to consider employee performance trends when predicting turnover. Replicating and extending the research of D. A. Harrison, M. Virick, and S. William (1996), the authors found that performance changes from the previous month and performance trends measured over a longer time period explained variance in voluntary turnover beyond current performance. Finally, the authors showed that performance trends interacted with current performance in the prediction of voluntary turnover.

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This article examines how the literatures of dynamic performance and the performance-turnover relationship inform each other. The nonrandom performance-turnover relationship suggests that dynamic performance studies may be biased by their elimination of participants who do not remain for the entire study period. The authors demonstrated that the performance slopes of those who leave an organization differ from the performance slopes of those who remain. This finding suggests that studies of the performance-turnover relationship need to consider employee performance trends when predicting turnover. Replicating and extending the research of D. A. Harrison, M. Virick, and S. William (1996), the authors found that performance changes from the previous month and performance trends measured over a longer time period explained variance in voluntary turnover beyond current performance. Finally, the authors showed that performance trends interacted with current performance in the prediction of voluntary turnover.

A substantial body of research examining performance over time suggests that performance is dynamic (Deadrick, Bennett, & Russell, 1997; Deadrick & Madigan, 1990; Ployhart & Hakel, 1998). Consequently, research in this domain has moved from demonstrations of performance's dynamism (exhibited through the presence of simplex patterns) to modeling either (a) mean changes in job performance or (b) the patterns of individual job performance changes (Hofmann, Jacobs, & Gerras, 1992). Empirical studies in these areas have provided a greater understanding of the trend of individual changes (e.g., Avolio, Waldman, & McDaniel, 1990; McDaniel, Schmidt, & Hunter, 1988; McEvoy & Cascio, 1989; Schmidt, Hunter, & Outerbridge, 1986), have demonstrated individual differences in performance trends (e.g., Deadrick et al, 1997; Hofmann, Jacobs, & Baratta, 1993; Hofmann et al., 1992; Ployhart & Hakel, 1998), and have lent insight into the causes of such changes (e.g., Kanfer & Ackerman, 1989; Murphy, 1989).

Although this research has provided valuable insights for those studying individual job performance levels at multiple time periods, dynamic performance research may have been limited by

failing to account for employee turnover. Almost all studies of individual performance trends have analyzed only employees who remained in the organization over the entire span of the study. Although this policy is methodologically convenient, we suggest that it may be problematic. There is substantial evidence that job performance and voluntary turnover are related (e.g., Bycio, Hackett, & Alvares, 1990; Harrison, Virick, & William, 1996; McEvoy & Cascio, 1987; Trevor, Gerhart, & Boudreau, 1997; Williams & Livingstone, 1994). Should a relationship with turnover exist when performance is considered in a dynamic framework, the policy of systematically selecting out those participants without complete data histories (i.e., leavers) may bias subsequent analyses and interpretations. That is, the policy of systematically selecting out leavers may result in bias by ignoring employees with different performance patterns than those being analyzed in dynamic performance research.

Although this potential for bias suggests that accounting for turnover should inform the dynamic performance literature, we recognize that the reverse is also true: Dynamic performance has much to contribute to mainstream turnover research. Harrison et al. (1996), in the only substantial analysis to date of the temporal nature of performance with regard to turnover, reported that voluntary turnover was predicted better by current (time-dependent) performance than by average (statically treated) performance. Moreover, turnover also depended on the change in performance from the previous month. In sum, Harrison et al. showed that paying attention to the dynamic performance phenomenon improved turnover prediction relative to models solely treating job performance as static.

The findings of Harrison et al. (1996) not only are important in their own right but also suggest a number of issues warranting further research. First, the identification of a relationship between performance changes and turnover in Harrison et al.'s study raises the question of the extent of the difference between the performance trends of leavers and those of stayers. Second, although considering changes in performance from a previous time period is a laudable first step in using dynamic performance literature to inform voluntary turnover research, Harrison et al.'s use of a 2-month window for measuring performance change is but one of many reasonable approaches to modeling performance change. Because some dynamic performance research suggests that performance trends over longer time periods are less susceptible to random "shocks" (e.g., Deadrick & Madigan, 1990; Hofmann et al., 1992, 1993; Ployhart & Hakel, 1998), exploration of such longer trends may further explain voluntary turnover patterns. Third, Harrison et al.'s research brought to light the notion of simultaneous unique effects of performance level and performance change. Combining their research with additional literature suggests the potential for the two factors to interact.

The purpose of this study was to build on the research opportunities presented by Harrison et al.'s (1996) results and to investigate (a) the role that turnover plays in affecting our understanding of performance dynamism and (b) the role of dynamic performance in predicting voluntary turnover. Initially, we sought to determine if leavers would exhibit significantly different performance trends from stayers. This investigation should present a more complete picture of the performance trends of all employees, not only the performance trends of those employees who remain in their organizations. We also examined how performance trends can predict voluntary turnover and tested how different performance trend time frames influence results. In addition, we considered how the effects of performance trends on voluntary turnover may depend on the current level of performance.

Performance Trends of Stayers Versus Leavers

Research on performance and turnover clearly indicates that the relationship is nonrandom. Three meta-analyses (Bycio et al., 1990; McEvoy & Cascio, 1987; Williams & Livingstone, 1994) showed there to be a significant negative relationship between performance and turnover, indicating that low performers are more likely to leave organizations. Recent research has characterized performance and turnover as having a curvilinear relationship (Trevor et al., 1997; Williams & Livingstone, 1994), because both low performers and high performers are more likely to leave an organization. Research also indicates that reward contingencies moderate the performance-turnover relationship (Harrison et al., 1996; Trevor et al., 1997), with a greater likelihood of retaining high performers when reward contingency is high. Because the present study, like that of Harrison et al., used a sample with highly contingent rewards, we did not pursue the curvilinear issue and operated from the presumption of a negative linear association between performance and turnover.

The systematic relationship between performance and turnover suggests that research predicting individual job performance over time that excludes leavers may suffer from nonrandom mortality, which threatens the internal validity of such studies (Cook & Campbell, 1979). Essentially, the issue of removing those who leave over the span of a longitudinal job performance study is one of missing data. Most studies examining dynamic performance require that all participants be present for the time periods of the study (e.g., Deadrick et al., 1997; Deadrick & Madigan, 1990; Ghiselli & Haire, 1960; Henry & Hulin, 1987; Hofmann et al., 1993; Rambo, Chomiak, & Price, 1983; Rambo, Chomiak & Rountree, 1987; Rothe, 1947). Those who left during the time frame of these studies were listwise deleted and thus removed from all of the analyses. Other studies have used alternative approaches to listwise deletion, such as aggregating monthly performance data to yield quarterly averages (Deadrick &

Madigan, 1990; Hofmann et al., 1993; Ployhart & Hakel, 1998), using an iterative data generation method to fill in missing data points (Inn, Hulin, & Tucker, 1972), and analyzing the average performance of employee groups at each time period (Rothe, 1970, 1978; Rothe & Nye, 1958, 1959, 1961). However, all of these approaches are appropriate only if data are missing at random (Little & Rubin, 1987; Roth, 1994, 1995).

It is interesting to note that the potential importance of ignoring leavers in dynamic performance studies is evident in an analogous issue from the turnover literature itself. Morita, Lee, and Mowday (1993) described the systematic exclusion of involuntary terminations from voluntary turnover research, citing it as potentially biasing the results. On the basis of Morita et al.'s (1993) identification of this issue, turnover researchers have begun to note the potential bias and include involuntary terminations in their analyses (e.g., Trevor et al., 1997). The important point for the present study is that, if there is a relationship between performance and turnover that is causing data to be missing, ignoring certain groups of employees may present a biased picture of the true temporal nature of performance.

Although research indicates that the performance-turnover relationship is nonrandom, this evidence is only suggestive of bias in dynamic performance research. That is, although research has shown a relationship between static performance and turnover, a relationship between dynamic performance and turnover is the critical determinant of bias in dynamic performance studies that exclude leavers. There have been no studies that explicitly examined the performance trends of leavers; however, limited research does suggest that the performance trends of leavers may differ from those of stayers.

This view was supported by McEvoy and Cascio's (1987) meta-analysis of the performance-turnover relationship, which found a negative correlation of greater magnitude when the time lapse between performance measurement and turnover was shorter. The authors interpreted this result as suggesting that there may be little or no performance-turnover relationship when performance is measured prior to the quit decision, but postdecision performance may decline substantially, thus strengthening the negative relationship. This interpretation also suggests that the slope of individual performance trends, if positive, will be of greater magnitude and, if negative, will be of lesser magnitude for those who remain in the organization than for those who do not.

Harrison et al.'s (1996) study is particularly relevant to the notion of differential performance trends for stayers and leavers (and subsequent bias in dynamic performance research). Harrison et al. found that both current performance and the change in performance from the previous month were

negatively related to turnover. Although Harrison et al.'s study did not explicitly demonstrate that stayers and leavers had different performance trends, the temporal performance component in the prediction of turnover suggests that this may well be the case. Moreover, the direction of the results (i.e., as performance change increased, turnover likelihood decreased), like McEvoy and Cascio's (1987) findings, suggests that the slopes of performance trends will be more positive for stayers (i.e., of greater magnitude if positive or of lesser magnitude if negative). Consequently, we predicted that those who remain in the organization will exhibit more positive performance trends than those who do not.

Thus, we considered performance trends of two different groups: those who stay with the organization for the entire length of the study (stayers) and those who leave during the span of the study (leavers). On the basis of the above review, we expected the groups to exhibit different slopes.

Hypothesis 1: The slopes of individual performance scores over time for stayers will be more positive than the slopes of individual performance scores over time for leavers.

Predicting Turnover on the Basis of Performance Trends

The preceding hypothesis addresses the importance of including leavers in dynamic performance research. If supported, it indicates that there is systematic exclusion of sample members and that bias is likely in dynamic performance research that fails to account for turnover. Examining this issue begs the following question: If those who separate exhibit notably different performance trends than those who stay, might we use performance trends to enhance our understanding of turnover and to increase our ability to predict turnover behavior?

Dynamic Performance Contribution to Voluntary Turnover Prediction

We suggest that, just as dynamic performance research would benefit from accounting for turnover, accounting for dynamic performance would likewise strengthen knowledge of performance's effect on voluntary turnover. Although voluntary turnover studies are typically longitudinal in the sense that time passes between the measurement of performance and turnover, such studies generally treat performance as a static construct. Most studies examining the effect of job performance on voluntary turnover have tended to examine only a single instance of performance. Other studies have looked at multiple performance measures but have also implicitly treated performance as static by examining the average performance of individuals over time (e.g., Hollenbeck & Williams, 1986; Stumpf & Dawley, 1981; Trevor et al., 1997).

The study by Harrison et al. (1996) is a notable exception. The authors found that current (time-dependent, in that performance was measured in each month) performance predicted voluntary

turnover better than did average (statically treated) performance. They also showed that the change in performance from the previous month (i.e., 2-month performance trend) explained additional turnover variance. It should be noted that Harrison et al. labeled the change in performance across 2 months as "performance velocity." In this article, as we expand on below, we argue that performance trends can be conceptualized over a number of possible time windows, with a 2-month trend being but one reasonable representation. Thus, for clarity here and throughout this article, we refer to this change in performance from 1 month to the next as "2-month performance trend." Longer term trends thus refer to conceptualizations longer than 2 months, with the relevant time frame present in the measure's name (e.g., 3-month trend, 6-month trend). Nonetheless, Harrison et al.'s results demonstrated that performance dynamism has implications for the study of the performance- turnover relationship. We built on Harrison et al.'s study by more fully incorporating implications of the dynamic performance literature and suggest that this should provide more explanatory power for predicting individual turnover.

The rationale for expecting performance trends to have a negative effect on turnover was well chronicled by Harrison et al. (1996). Essentially, the argument was based on the notion that satisfaction depends in part on the slope of change in outcomes over time. Hsee, Abelson, and Salovey's (1991) study was described as indicating that, in terms of participant satisfaction, salary change was uniquely important, beyond current pay level. In a similar manner, Weitz (1952), Rosse and Miller (1984), and Judge (1993) were cited as contending that changes in satisfaction are important for precipitating turnover. On the basis of the relative deprivation theory (Crosby, 1976), Harrison et al. maintained that current outcomes, relative to some standard, drive reactions to the outcomes. In turn, one such standard that has been shown to influence satisfaction with pay is the past pay outcomes that one has received (Sweeney, McFarlin, & Inderrieden, 1990). Hence, negative short-term performance trend (and the resultant decrement in pay from the highly contingent reward system) was expected to result in dissatisfaction and subsequent turnover.

There are also alternative explanations for a performance trend-turnover relationship. As noted by Harrison et al. (1996), it is also possible that withdrawal and turnover intentions are the immediate precursors to turnover, with performance as an indirect antecedent. Alternatively, job dissatisfaction may lead to lower performance and subsequent turnover. In this article, as in Harrison et al.'s article, we cannot speak to the causal ordering of the performance-turnover phenomenon. However, all three potential causal orderings suggest a similar relationship. Thus, in a partial replication of Harrison et al.'s study, we made the following prediction:

Hypothesis 2: When current performance is controlled for, short-term (i.e., 2-month) performance trend will be negatively related to voluntary turnover likelihood.

We next move beyond Harrison et al.'s (1996) research to delve more deeply into the dynamic performance literature. More specifically, this literature indicates that there are systematic changes in individual performance levels that span multiple time periods (Deadrick et al., 1997; Hofmann et al., 1992, 1993; Ployhart & Hakel, 1998). Each of these four studies described individuals' performance trends as exhibiting systematic patterns over time intervals well beyond a single month, with Ployhart and Hakel (1998) and Hofmann et al. (1993) demonstrating such trends over 2 years and 3 years, respectively. As such, to the extent that the appropriate time span for perceptions of the past as a comparison standard might exceed a single month, Harrison et al.'s 2-month window for measuring individuals' performance change may not fully capture performance trend's explanatory power. For example, Sweeney et al.'s (1990) study, which identified past pay outcomes as a standard influencing present pay satisfaction, found significant effects for past experiences when described in terms of pay 1 year prior. Moreover, Sweeney et al. found that future expectations of pay affected pay satisfaction. Trends based on longer time frames may be perceived as more reliable indicators of future performance and subsequent pay (i.e., based on more data and thus less likely to be affected by random influences).

Again, alternative causal explanations exist as to why an examination of performance over a longer time frame may explain turnover. As we discussed earlier, the decision to quit or job dissatisfaction may have effects on later performance. The important point, however, remains the same: A more long-term approach to performance trends should enhance voluntary turnover prediction.

Hypothesis 3: When current performance and 2-month performance trend are controlled for, individual performance trends measured over greater lengths of time will be negatively related to voluntary turnover likelihood.

Dynamic Performance by Static Performance Interaction

The preceding sections describe short-term and long-term performance trends as main effects in the prediction of turnover, which is the focus of our contention that dynamic performance can inform the turnover literature. However, we also explored the potential for dynamic and current performance to interact to produce turnover behavior. We characterized this inquiry as exploratory because research on the performance trend-turnover relationship is itself in its infancy and because addressing fundamental elements in that relationship (e.g., its very existence, performance trend length) is more central to this study than is a potential interaction. That being said, however, because there is some

foundation for suspecting that such an interaction may exist, we derived and tested the exploratory hypothesis.

As Harrison et al. (1996) argued, current job outcomes drive job affect (Cranny, Smith, & Stone, 1992; Greenberg, 1990) and precipitate job turnover through job affect (Hulin, Roznowski, & Hachiya, 1985; Rosse & Miller, 1984). Harrison et al.'s finding that current (time-dependent) performance was more predictive of turnover than average performance supported this argument; however, Harrison et al. also showed that changes in performance are related to voluntary turnover. As we discuss later, evidence suggests that these two phenomena may interact.

Research shows that, in a maximally contingent reward situation, high current performers are least likely to separate (Trevor et al., 1997). Given a high reward contingency, job affect should strongly tie high performers to the organization regardless of performance trend. That is, the bottom line for these employees should be that they are currently faring quite well financially as a result of their current performance.

However, for poor current performers, who are more likely to leave, we suggest that trend should make a greater difference. The dissatisfaction with rewards and the subsequent motivation to leave may increase if their performance trends have brought about pay decrements, the expectation of lower future pay, or both. This logic is consistent with that of Sweeney et al. (1990), who found that both pay relative to the past and future expectations had positive effects on satisfaction. Because both of these standards would be negative in the low trend condition, dissatisfaction for the poor performers may increase if their performance trends are negative. Moreover, because confirmatory information strengthens attributions (Kelley, 1987), both negative current performance and a negative performance trend would reinforce the inference that one is a poor performer with a poor future, further increasing dissatisfaction and turnover probability. In contrast, low performers with increasing performance may derive some satisfaction from pay increases and from projecting higher rewards in their future, and thus may be less inclined to leave.

In sum, the satisfaction resulting from the high rewards associated with high current performance will likely remain more salient than affective reactions associated with performance changes. However, when performance is not high, changes in performance are likely to play a more substantive role in determining individuals' satisfaction and turnover intentions. Therefore, we expected the following:

Hypothesis 4: The negative relationship between performance trends and voluntary turnover likelihood will be of greater magnitude at low levels of current performance than at high levels of current performance.

Method

Participants

The data reported in this study come from a financial services organization, headquartered in the southcentral United States, with employees located in 43 states. Employees were loan originators, whose jobs were to sell loans to customers (e.g., second mortgages). All loan originators participated in a 1-week training-orientation session after being hired, which was provided at the corporate headquarters. After the session, work was largely performed unsupervised. Pay for loan originators was highly contingent on performance, although a portion of their total compensation included a fixed base wage. On average, base pay was roughly $12,000 per year, and average total pay (base plus commissions) was approximately $40,000 annually.

The total sample consisted of 1,413 employees. Sixty-seven percent of the employees were male; their ages ranged from 21 to 69 years *(M* = 34.0 years, *SD* = 8.8 years), job tenure ranged from 0 to 7.6 years *(M* = 0.67 years, *SD* = 0.69 years), and organizational tenure ranged from 0 to 17.6 years *(M* = 1.1 years, *SD* = 1.3 years). Forty-two percent of the sample left during the 8 months of the study. This high turnover rate, however, is typical for this industry (Hubbard, 1998).

Measures

Current performance of the employees was measured monthly as the fees generated from the loans sold. Originators were paid on a commission basis, based on the fees generated. *Two-month performance trend,* the equivalent of Harrison et al.'s (1996) "velocity," was measured as the difference between performance in month *t +* 1 and month *t,* with a positive 2-month trend indicating that performance increased. *All-month performance trend,* our operationalization of longer performance trends, was calculated as the best-fit line (equivalent to the nonstandardized beta coefficient from a simple linear regression) covering the range of individual data up to the time period in question. Thus, when only 2 months of data were available, all-month trend and 2-month trend were equal. However, as additional time periods yielded additional individual data, the value of all-month trend was updated on the basis of the more complete data set. Following Harrison et al., in an employee's 1st month, when no prior month's data existed, we assigned an all-month trend and a 2-month trend of zero. This conservative approach yields a constant that allows no additional covariation with other variables (Harrison et al., 1996). Alternatively, one could argue that 2-month and all-month performance trends

should have been treated as missing data for the first person-month observation for each individual. We reran the analyses accordingly and found no substantive changes in the results.

We also note that average performance, defined as the sum of performance scores over time divided by the number of time periods, was excluded from our analyses for several reasons. First, in our data, as in the data used by Harrison et al. (1996), current performance had a stronger relationship with voluntary turnover than did average performance. Second, our emphasis here was on dynamic performance, and we thus focused on how performance trends can contribute relative to the best single measure of performance (i.e., current performance). Third, regressing average performance on the other three performance measures yielded a multiple correlation squared of .88, suggesting that this variable (as we expected) was virtually entirely captured by current performance, all-month trend, and 2-month trend.

To test Hypothesis 1 , which examined the performance trends of stayers and leavers, each individual had a dummy variable, labeled *turnover,* coded as 1 if they left the organization during the data collection time frame or coded as 0 otherwise. For this analysis, both voluntary and involuntary turnover were combined, because our intent was to demonstrate that the general policy of listwise deleting all leavers introduces bias to dynamic performance studies. For tests of the subsequent hypotheses, voluntary turnover was coded as 1 for voluntary leavers or as 0 for stayers and involuntary terminations (see the *Proportional hazards analysis* section for more on this coding). These codes were determined from the organization's human resources information system, which provided reasons for separation. To help control for demographic and human capital effects that may have provided alternative explanations for our results, we collected data on employee job tenure, organizational tenure, age, and sex. Because it is likely that differential sales opportunity might affect performance level and trend, as well as employee turnover likelihood, we also included dummy variables to control for effects of the firm's eight U.S. sales regions.

Procedure

To test our hypotheses, two sets of analyses were necessary. The first set used hierarchical linear modeling (HLM) to examine Hypothesis 1. The remaining hypotheses were tested using proportional hazards analysis.

The HLM procedure. We used HLM because it provides a means of examining the existence, nature, and predictors of within-person performance changes over time (Deadrick et al., 1997). Specifically, HLM is advantageous for this purpose because it recognizes that longitudinal data are

implicitly multilevel and nested (Bryk & Raudenbush, 1992). In this study, our data were longitudinal in that there were multiple observations of performance for each individual. This technique allowed us to model each individual's performance trend and then examine which variables predicted variance in these trends.

Like 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. At the most micro level of analysis, often referred to as Level 1 in HLM, the procedure required at least two instances of within-person performance but could have up to eight performance observations per individual. Thus, the analyses were based on a sample of 1,255 individuals and a total of 5,909 performance observations. The Level 1 model, which captures the intercept and slope of each individual's set of performance scores, is as follows:

$$\text{Performance} = \beta_{0j} + \beta_{ij} \times \text{Time} + e_j$$

The Level 1 parameters (β_0s and β_1s for each of the *j* individuals) are then treated as dependent variables in the Level 2 analysis, with each being predicted by sex, age, region, job tenure, and organizational tenure. The second level of analysis, which thus examines across-person differences, uses the following model:

$$\beta_{0j} = \delta_{00} + \delta_{01} \times \text{Sex} + \delta_{02} \times \text{Age} + \delta_{03} \times \text{Region} + \delta_{04} \times \text{Job Tenure} + \delta_{05} \times \text{Organizational Tenure} + r_0$$

$$\beta_{1j} = \delta_{10} + \delta_{11} \times \text{Sex} + \delta_{12} \times \text{Age} + \delta_{13} \times \text{Region} + \delta_{14} \times \text{Job Tenure} + \delta_{15} \times \text{Organizational Tenure} + r_1$$

To test the first hypothesis, we wished to demonstrate the relationship associated with turnover on individual performance trends (which were modeled as time's effect on performance, /3ᵢ) and the value of adding the turnover parameter to models of individual performance trends. Thus, after the analyses were performed with the above Level 2 equations, the turnover variable (coded as 1 if the individual left the company during the span of the study or 0 if the individual stayed) was added to the Level 2 equation.

The results of the Level 1 analyses provided an estimate of each individual's performance slope (and intercept) using all the possible observations of individual performance. By modeling each individual's performance slope, we could then test our first hypothesis by comparing the slopes of stayers versus leavers. Also, although turnover was added as a Level 2 variable, the model in no way implies causality (because indeed it is not conceptually sound to suggest that future turnover causes

prior performance level or trend). Rather, this method simply compares the performance slopes of two groups (i.e., stayers vs. leavers) and provides a statistical test of whether the former group has statistically different performance slopes from the latter (i.e., whether β_1, for stayers was significantly different from β_1 for leavers).

Proportional hazards analysis. In the second set of analyses, we assessed the effects of various approaches to conceptualizing performance over time on voluntary turnover. To estimate the influence of the independent variables on the turnover probabilities, we estimated a proportional hazards rate model (Cox, 1972), thus treating data on tenure with the organization as survival time (also known as failure time) data (Kalbfleisch & Prentice, 1980). The proportional hazards model has previously been applied in organizational research in studies of employee turnover (e.g., Dickter, Roznowski, & Harrison, 1996; Judge & Watanabe, 1995; Morita, Lee, & Mowday, 1989, 1993; Sheridan, 1992; Trevor et al., 1997) and employee absenteeism (e.g., Fichman, 1989; Harrison & Hulin, 1989).

One advantage of proportional hazards modeling is its use of information on survival time (i.e., tenure), rather than relying solely on a simple dichotomous turnover dependent variable. For example, whereas logistic regression differentiates between stayers and leavers, survival analysis does likewise but also differentiates between employees who resign 1 month into the study and those who resign 6 months into the study. In addition, the technique provides a vehicle for accounting for potentially valuable, and otherwise lost, data that result from the tenure of involuntary terminations. Because we were primarily interested in the prediction of voluntary turnover, we did not code involuntary terminations as leavers. Proportional hazards rate modeling, however, allowed us to account for the fact that those who were involuntarily terminated did not voluntarily separate during their tenure. Thus, these employees were coded as stayers and remained in the data set throughout their tenure.

Because we had monthly data on each individual, each observation (i.e., the unit of analysis) was a person-month. Hence, the number of observations per person ranged from 1 (for each employee who left after Month 1 in the data collection window) to 8 (for each employee who remained throughout the study's 8-month window). Each person-month observation carried values for all variables in the study. Variables that changed over time were modeled as time-dependent covariates. That is, each of these variables, within an individual (but across person-month observations), may have had a value in month / that differed from its value in month *t + 1.* Each person-month observation was coded as 1 for a voluntary turnover event or as 0 for all other possibilities (e.g., employment that continued into the following month, involuntary termination). The final data set contained 7,327 person-month observations for 1,413 individuals (note that the number of individuals used here differed

from the 1,255 used in the HLM analyses because the testing of Hypothesis 1 necessitated the existence of at least 2 performance observations per individual). An example of the data used for these analyses is provided in Table 1.

The general proportional hazards regression model used here was

$$h(t; x) = h(t)\exp[\beta_1(X_{Controls}) + \beta_2(X_{Performance})]$$

where $h(t; x)$ = the hazard function (i.e., conditional turnover probability) at time t, with predictors x; h(t) = the baseline hazard function; βs = the estimated regression weights; and Xs = the explanatory variables. Whereas this main effects model is conceptually correct, we note that $X_{Performarlce}$ represents various performance indicators in different models (i.e., current performance, 2-month performance trend, and all-month performance trend).

Table 1
Sample Data Table for Survival Analysis

				Stable covariate			Time-dependent covariate		
Observation (i.e., spell)	Individual	Month	Voluntary turnover	Sex	Age (years)	Region	Performance ($)	2-month trend	All-month trend
1	1	1	0	M	43	1	36,990	0	0
2	1	2	0	M	43	1	9,156	−27,834	−27,834
3	1	3	0	M	43	1	17,910	8,754	−9,540
4	1	4	1	M	43	1	26,557	8,647	−2,255
5	2	1	0	M	26	3	12,142	0	0
6	2	2	0	M	26	3	11,600	−542	−542
7	2	3	0	M	26	3	9,042	2,558	−1,550
8	3	1	0	F	32	6	7,420	0	0
9	3	2	0	F	32	6	23,655	16,245	16,245
10	3	3	0	F	32	6	10,620	−13,045	1,600
11	3	4	0	F	32	6	11,400	780	−111
12	3	5	0	F	32	6	4,750	−6,650	−1,761
13	3	6	0	F	32	6	38,800	34,130	2,884
14	3	7	0	F	32	6	8,900	−29,900	1,03
15	3	8	0	F	32	6	17,635	8,735	900

Note. Data presented in this table are representative of actual data in the study but are not actual observations. Person 1 represents someone who voluntarily left after Month 4, Person 2 represents someone who was terminated after Month 3, and Person 3 represents someone who remained over the entire span of the study. Note again that for involuntary turnover (Person 2), the individual was not coded as a voluntary leaver. For voluntary turnover, 1 = the person left the organization during the data collection time frame and 0 = otherwise. Also, for brevity, interactions were omitted. M = male; F = female.

We included two steps in our use of proportional hazards modeling to strengthen the validity of our statistical tests. First, because multiple observations per individual result in observations that are not independent of each other, we used the robust variance estimator advocated by Lin and Wei (1989). This approach accounts for the multiple observations through creating standard errors from residuals summed within individuals. Second, although proportional hazards models are partially parametric in that they do not impose any distributional assumptions on the data, the models do assume that hazard functions (i.e., the probability of turnover, conditional on tenure) at different levels of an independent variable are proportional to some unknown baseline hazard function. To test this key assumption,

Andersen (1982) proposed that the graphs of natural logarithms of the cumulative baseline hazard functions for levels of each independent variable should appear to be proportional (i.e., roughly parallel) to each other. Analyses for different levels of our predictors (a median split was used for the interval variables) yielded functions appearing to be approximately proportional to each other, indicating that the proportionality assumption was not violated for the hazards model. The proportionality of the graphs across hire month cohorts, however, was questionable. We therefore stratified our proportional hazards approach by hire month, thus allowing the model to calculate a different baseline hazard function for each hire month cohort. This stratification allowed the hazard function of employees in each of these cohorts to be in proportion to potentially different baseline hazard functions.

Results

Inter/correlations and descriptive statistics for the sample are reported in Tables 2 and 3. Table 2 presents variables associated with the individual level of analysis, which was used in the Level 2 HLM analysis of effects across individuals. Table 3 reports variables associated with the person-month observations, which were used in the Level 1 HLM analysis of within-individual effects and in the proportional hazards models.

Hypothesis 1

As we noted above, HLM allowed us to model the slopes of individual performance. That is, results of the Level 1 analyses provided an estimate of each individual's performance slope and intercept using all possible observations of individual performance. The HLM results, shown in Table 4, revealed that the performance slopes of leavers were significantly less than the performance slopes of stayers. The significant coefficient associated with the turnover dummy variable (8 = -1,496, $p < .001$) showed that, after we controlled for the effects of sex, age, job tenure, and organizational tenure, the predicted slopes estimated for leavers were, on average, significantly less than the estimated slopes for stayers. This finding can be further illustrated by examining the predicted slopes of both groups (provided in a residual file by the HLM software). Stayers, on average, clearly increased performance over time (for $\beta_{1,}$, M = 1,645, SD = 457), whereas the average performance slope of leavers was almost zero (for $\beta_{1,}$, M = 18, SD = 402).

With regard to variance explained, including the turnover variable in the equations yielded markedly different results in the modeling of performance intercepts and slopes. Adding turnover to the intercept model provided little additional explanatory power for predicting initial performance, because the turnover coefficient was not statistically significant and the percentage of initial performance

Table 2
Summary Statistics and Correlations of Individual-Level Data

Variable	*M*	*SD*	*N*	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Performance (Month 1)	7,299	9,657	1,413	—												
2. Performance (Month 2)	10,613	10,762	1,255	.48	—											
3. Performance (Month 3)	12,933	12,129	1,082	.50	.49	—										
4. Performance (Month 4)	14,526	12,983	929	.54	.50	.55	—									
5. Performance (Month 5)	13,928	12,214	801	.44	.48	.46	.50	—								
6. Performance (Month 6)	17,290	13,447	710	.38	.42	.48	.46	.44	—							
7. Performance (Month 7)	17,781	13,770	606	.43	.46	.42	.45	.47	.46	—						
8. Performance (Month 8)	20,357	15,057	526	.44	.42	.47	.49	.50	.51	.46	—					
9. Sex	0.33	0.47	1,413	−.03	−.08	−.04	−.05	−.05	−.06	−.11	−.05	—				
10. Age	33.96	8.80	1,413	.04	.01	.05	.01	.02	−.01	.03	.01	−.02	—			
11. Job tenure	0.67	0.69	1,413	.42	.34	.28	.31	.26	.17	.15	.20	.00	.10	—		
12. Organizational tenure	1.10	1.30	1,413	.35	.25	.21	.24	.18	.13	.13	.15	.09	.11	.60	—	
13. Turnover	0.42	0.49	1,413	−.07	−.15	−.20	−.25	−.29	−.30	−.27	−.26	.03	.07	−.08	−.07	—

Note. Decimals were omitted for the means and standard deviations for Variables 1–8. Correlations are based on pairwise deletion, with the sample size for each comparison equaling the smaller of the two *N*s. For turnover, leaver = 1, stayer = 0. For sex, female = 1, male = 0. Age, job tenure, and organizational tenure were measured in years.

variance explained remained at 35%. This finding suggests that, after we controlled for the other variables in the analysis, those who ultimately left our sample did not have different initial performance than those who stayed. However, adding turnover to the model of individual slopes not only resulted in a significant negative turnover coefficient but also increased the individual performance trend variance explained from 12% to 34%. In sum, the leavers and the stayers exhibited significantly different performance trends, and including leavers in models of dynamic performance vastly increased the precision of such models.

Note that we also reran these analyses using only those participants for whom we had all eight possible performance evaluations. This analysis illustrates the effect of considering stayers versus leavers in a sample in which we might have listwise deleted those for whom we did not have all eight performance observations. Yet, even in this case, the analyses revealed that the performance slopes of stayers and leavers were significantly different (δ for turnover = —1,170, $p < .001$). Furthermore, accounting for the potentially different performance slopes of leavers increased the amount of variance explained in β_1, from 18% to 30%.

Hypothesis 2

The proportional hazards analyses associated with the remaining hypothesis tests are presented in Table 5. As we expected, given the performance-turnover literature, current performance was negatively related to voluntary turnover likelihood (see Model 1 in Table 5). A change in an independent variable in the proportional hazards equation produces a multiplier of the hazard rate (i.e., of the turnover likelihood conditional on tenure) equal to the exponentiated product of the coefficient and the size of the change in the variable in question (see Morita et al., 1993). Hence, having standardized the three performance variables, we

found that the turnover likelihood associated with an increase of one standard deviation in current performance changed by a factor of (exp[—1.304 X 1]), or 0.27. Thus, an increase of one standard deviation in current performance reduced turnover likelihood by 73%. The noteworthy size of this effect was likely due to the highly contingent reward structure in our sample. Indeed, our result was similar to the 64% reduction in turnover likelihood evident in the current performance coefficient from Harrison et al.'s (1996) study, which used a sample characterized by maximally contingent rewards.

We also used this approach to evaluate Hypothesis 2, in which we predicted that, after we controlled for current performance, 2-month trend would have a negative relationship with turnover likelihood. Model 2 in Table 5 reveals that adding 2-month trend to the equation significantly improved model fit *(p* < .001). The significant -0.425 coefficient for 2-month trend supports Hypothesis 2 and indicates that a one standard deviation increase in 2-month trend was associated with a 35% decrement in turnover likelihood. In addition, the current performance effect remained strong, because even with 2-month trend's presence, a one standard deviation increase in current performance translated to a 70% turnover likelihood reduction. Consequently, like Harrison et al. (1996) and in support of Hypothesis 2, we found that current performance's association was pervasive but that accounting for performance trend by adding 2-month trend into the model improved our prediction and understanding of voluntary turnover.

Table 3
Summary Statistics and Correlations of Person–Month Data

Variable	*M*	*SD*	1	2	3	4	5	6	7
1. Voluntary turnover	0.07	0.26	—						
2. Performance	13,070	12,711	−.18	—					
3. 2-month trend	918	11,292	−.09	.48	—				
4. All-month trend	1,398	5,318	−.11	.42	.52	—			
5. Organizational tenure	1.51	1.46	−.07	.23	−.01	−.06	—		
6. Age	34.00	8.78	.02	.02	−.01	−.02	.13	—	
7. Sex	0.33	0.47	.01	−.05	.00	−.02	.11	−.01	—

Note. Correlations are based on 7,327 observations from 1,413 individuals. For turnover, leaver = 1, stayer = 0. For sex, female = 1, male = 0. Organizational tenure and age were measured in years.

Hypothesis 3

Having found the expected results for current performance and 2-month trend, we next examined whether all-month performance trend (i.e., performance trend calculated on the basis of all performance observations up to that point in time) provided additional information in the prediction of voluntary turnover. Model 3 in Table 5 indicates that replacing 2-month trend with all-month trend in the turnover model provided similar results to the 2-month trend approach taken in Model 2, because the all-month trend coefficient was negative and significant, current performance retained its effect, and model fit was improved over Model 1 *(p* < .001). This result is not surprising, given that the

conceptual argument for all-month trend was largely an extension of the argument for 2-month trend, that all-month and 2-month trends were equal in Months 1 and 2 of an employee's tenure, and that the two were highly correlated *(r* = .52, *p* < .001). To better address whether all-month performance trend would tell us anything new, we included both 2-month trend and all-month trend in Models 4 and 5 of Table 5, with Model 5 also including current performance. In both cases, all-month trend's addition improved model fit and provided a unique negative effect on turnover, thus supporting Hypothesis 3. Because Model 5 includes all three approaches to performance, we used its estimates for interpretation. One standard deviation increases in current performance, 2-month trend, and all-month trend (in three separate applications, with the effects of each of the other two performance indicators held constant) resulted in turnover likelihood decrements of 69%, 31%, and 14%, respectively. Hence, although all-month trend was less predictive of turnover than were current performance and 2-month trend, it added meaningful information and was a useful variable in conjunction with 2-month trend.

Table 4
Hierarchical Linear Model Output for Performance Level and Trend

Independent variable	Step 1	Step 2
For intercept, β_0		
Intercept	5,177***	5,816***
Sex	−1,112*	−971
Age	7	14
Job tenure	3,325***	3,758***
Organizational tenure	1,374***	1,219***
Turnover		−987
Initial performance explained	35%	35%
For slope, β_1		
Intercept	1,840***	2,079***
Sex	−87	−86
Age	−9	−8
Job tenure	−342***	−348***
Organizational tenure	−70	−103*
Turnover		−1,496***
Performance trend explained	12%	34%

Note. Analyses are based on 1,255 individuals, with a total of 5,909 performance observations. All models also include seven dummy variables representing the company's eight sales regions. The second model better fits the data on the basis of a likelihood ratio test, $\Delta\chi^2(1, N = 5{,}909) = 203.60$, $p < .001$.
* $p < .05$. *** $p < .001$.

Hypothesis 4

Although support for Hypotheses 2 and 3 suggests a rationale for accounting for performance trends of various time frames, Hypothesis 4 proposed a more refined use of performance trends. That is, we had suggested that the association between performance trends and voluntary turnover might depend on the level of current performance. We tested this hypothesis by using both 2-month trend

and all-month trend as operationalizations of performance trend. Models 6 and 7 in Table 5 provide the results for the interactions of current performance with 2-month trend and all-month trend, respectively. In both cases, the interaction term was positive and significant. Furthermore, simultaneously entering both interaction terms in Model 8 provided additional support for the independence of the 2-month trend and all-month trend moderation effects, because both interaction terms retained significance.

To provide an intuitively meaningful interpretation of the interaction between current performance and performance trend, we graphed turnover probabilities that were computed for a fixed time frame from our hazard estimates. Hence, Figure 1 illustrates the interactive effects of current performance and 2-month trend on turnover probability within 18 months of hire, which was the approximate mean organizational tenure in our sample (we note that the graph of the current performance by all-month trend interaction was similar). The graphical interpretation clearly supports Hypothesis 4 in that the negative relationship between performance trend and voluntary turnover probability was very strong when current performance was low but was negligible when current performance was high.

Table 5
Proportional Hazards Regressions of Voluntary Turnover on Various Approaches to Employees' Job Performance

	Model							
Independent variable	1	2	3	4	5	6	7	8
Age	0.001	0.002	0.001	0.002	0.002	0.003	0.001	0.003
	(0.006)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
Sex	−0.272**	−0.225**	−0.257**	−0.94	−0.224**	−0.215*	−0.256**	−0.216*
	(0.100)	(0.097)	(0.098)	(0.093)	(0.096)	(0.097)	(0.098)	(0.097)
Current performance	−1.304***	−1.207***	−1.229***		−1.181***	−1.216***	−1.220***	−1.186***
	(0.100)	(0.096)	(0.096)		(0.094)	(0.092)	(0.094)	(0.091)
2-month trend		−0.425***		−0.498***	−0.372***	−0.251***		−0.237***
		(0.075)		(0.066)	(0.082)	(0.066)		(0.078)
All-month trend			−0.294***	−0.266***	−0.146*		−0.128**	−0.047
			(0.076)	(0.060)	(0.078)		(0.057)	(0.067)
2-Month Trend × Current Performance						0.369***		0.295***
						(0.026)		(0.041)
All-Month Trend × Current Performance							0.281***	0.132***
							(0.030)	(0.041)
Model χ^2	229.90***	257.36***	248.60***	256.68***	267.44***	400.73***	343.69***	424.32***
df	10	11	11	11	12	12	12	13
$\Delta\chi^{2a}$	111.93***	27.46***	18.70***	18.27***	10.08**	143.37***	95.09***	12.82***

Note. $N = 7{,}327$ in all models. Current performance, 2-month trend, and all-month trend are standardized in all models. All models also include seven dummy variables representing the company's eight sales regions. Values in parentheses represent standard errors.
[a] $\Delta\chi^2$ (with 1 degree of freedom) from the nested model, which includes all but the final term.
* $p < .05$. ** $p < .01$. *** $p < .001$.

Supplemental Investigation of Performance Trend and Time

Implicit thus far in our analyses is the assumption that shorter and longer term performance trends are adequately represented by 2-month trend and all-month trend. We used 2-month trend to

be consistent with Harrison et al.'s (1996) initial foray into the notion of performance trend as a predictor of voluntary turnover. All-month trend was the logical longer term application in that it both made maximal use of all performance data available for each person-month observation and could be calculated for each person-month observation. We recognize, however, that there are alternative approaches to operationalizing trend length. Thus, to more thoroughly investigate the issue of performance trends in the trend-turnover relationship, we created alternative operationalizations of longer term trend performance. Using the same approach described for all-month trend, we calculated performance trends for 3-, 4-, 5-, 6-, 7-, and 8-month intervals. We then conducted several proportional hazards regressions to test the robustness of our conclusion regarding longer term trend effects. Table 6 provides trend coefficients from separate analyses for each of the six new operationalizations (under various combinations of controls), accompanied by 2-month and all-month trend coefficients for comparison's sake.

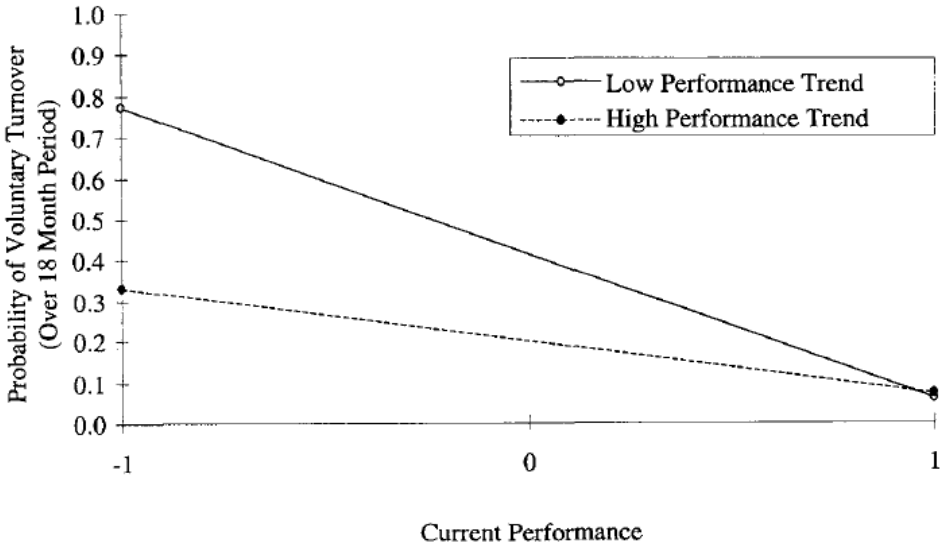

Figure 1. Current performance by performance trend interaction in the prediction of voluntary turnover.

In Table 6, each column provides trend coefficients for a specified trend length from regressions under various sets of controls, which are listed along the left-hand side of the table. Thus, for example, the 6-month trend column provides the 6-month trend coefficients under five different regression scenarios (i.e., first, controlling for no other performance indicators; second, controlling for current performance; third, controlling for 2-month trend; fourth, controlling for current performance and 3-month trend; and fifth, controlling for current performance and 4-month trend). There are several patterns of interest in the Table 6 data. Because each fixed length trend (i.e., except for all-month trend)

was available only for the person-month records that had the requisite number of performance observations, the number of employees and person-month observations decreased as fixed trend length increased. Thus, sample attrition made comparing coefficient sizes across trend lengths somewhat problematic. Comparisons within trend length, however, were revealing. When defining trend as 3 months or longer, each of the fixed trend length columns suggests that controlling for current performance was critical to investigating a unique trend effect, because trend effect size became substantially smaller when that control was added. Short-term trend as a control, however, when operationalized as a 2-, 3-, or 4-month trend, did not appear to share much predictive variance with longer term trends. Longer term trend coefficients remained relatively unaffected by the short-term trend's addition both to models with no other performance controls and to models with current performance already controlled.

Table 6
Performance Trend Coefficients From Proportional Hazards Models Featuring Various Trend Lengths and Sets of Control Variables

	Time interval associated with the performance trend coefficient							
Additional control variables in model	2 months	3 months	4 months	5 months	6 months	7 months	8 months	All months
None	−.59***	−.51***	−.58***	−.76***	−.78***	−.95***	−.83***	−.49***
Current performance	−.43***	−.15*	−.13†	−.38***	−.31**	−.45***	−.24	−.29***
2-month trend		−.42***	−.52***	−.70***	−.71***	−.92***	−.81***	−.27***
Current performance and 2-month trend		−.17*	−.13†	−.38***	−.30**	−.36**	−.09	−.15*
Current performance and 3-month trend			−.11	−.39***	−.34**	−.45***	−.23	−.24*
Current performance and 4-month trend				−.59***	−.43***	−.54***	−.23	−.61***
N	1,413	1,083	930	802	711	608	527	1,413[a]
Spells	7,327	4,661	3,578	2,648	1,846	1,135	527	7,327[a]

Note. Each table cell (except for those featuring sample and spell size) is from a unique model based on controls included and the performance trend length. All models also controlled for age, sex, and region.
[a] *N* and spell sizes equal those of 4-month and 5-month trend models, respectively, when 3-month trend and 4-month trend are controlled (e.g., controlling for 3-month trend as short-term trend necessitates calculating all-month trend over at least 4 months).
† $p < .10$. * $p < .05$. ** $p < .01$. *** $p < .001$.

Note that the intent of the analyses reported in Table 6 was to investigate the robustness of the relationships between short- and long-term performance trends and employee turnover. It was beyond the scope of these analyses and this study, though, to recommend an optimal time frame for conceptualizing performance over time. As we discuss below, such an investigation would be a fruitful direction for future research. Rather, under the various operationalizations of shorter term trend (i.e., 2-month, 3-month, and 4-month trend), these results reinforce the conclusion that longer term trend matters. Negative effects prevailed even when current performance and any of our three potential approaches to short-term trend were controlled for.

Discussion

Combining the dynamic performance and performance-turnover literatures can provide valuable insights for research in each domain. This study took advantage of the logical connection between the two literatures and used recent methodological advances in each domain to develop and test its hypotheses. The results indicate that individuals who left their organization had notably different performance slopes than those who stayed (Hypothesis 1). We also found that performance trends, both short-term (Hypothesis 2) and longer term (Hypothesis 3), had statistically and practically significant effects for predicting turnover. Furthermore, we found that the association between individual performance trends and voluntary turnover depended on the level of the individual's current performance (Hypothesis 4). The immediate takeaway from these findings is that turnover is related to dynamic performance, and thus models of either phenomena would be better specified by accounting for the other. The broader implication of these results is that the dynamic performance and turnover domains can inform each other with productive consequences.

For dynamic performance research, our findings indicate that the common practice of ignoring leavers may hamper our understanding of individuals' performance trends. Because dynamic performance is related to turnover, previously used methods for handling the missing cases may fail to reveal potentially important phenomena. It may be of theoretical and practical interest to focus on predicting the performance trends of all employees within a cohort, including those who eventually separate. Studies of individual performance trends that limit their sample by including only those who remain throughout the study may not generalize to the more general population of all employees (i.e., stayers and leavers). Managers may want to know how individuals will change over time, which includes knowing about both potential turnover and future performance levels.

For studies examining the performance-turnover relationship, this study demonstrates the specification error associated with a static treatment of individual job performance. Although a "snapshot" of one's performance does have a sizable impact on the probability of turnover, the likelihood of turnover is also based on where one has been (and likely where one thinks one is going). Although we replicated the finding that an employee's most recent change in performance has a sizable impact on voluntary turnover (Harrison et al., 1996), we expanded on previous research by showing that longer term performance trends are also relevant. This finding suggests that when one is using performance trends to predict turnover, it is important to consider both immediate changes and longer term trends. Thus, the practice of aggregating performance data over multiple periods to make performance trends less susceptible to "shocks" may be ignoring important (even if random)

performance changes that are associated with turnover behavior. Our results suggest that such "shocks" play sizable roles in individuals' turnover behavior, in addition to the effects associated with longer performance trends.

For practice, these results suggest that organizations should take advantage of individual performance trend data, which can help to predict future turnover. For example, in conjunction with performance- level data, performance trend information can help managers make decisions as to who would most benefit from training and development. The evidence that low performers with flat or decreasing performance slopes are likely to leave is not of much practical value, because indeed organizations would likely want such individuals to leave. However, consider the case of average performers, who are profitable for the company, who have demonstrated that they can perform at a higher level but who have decreasing performance slopes and thus are more likely to leave. Our results could be used by managers to help target employees such as these who are desirable to retain but whose performance trends (short-term or longer term) indicate a greater risk of turnover. Consequently, from a cost-benefit perspective, performance trend data could be a valuable tool in decisions of where best to invest in training that might subsequently manifest in retention, by means of improved performance. Similar logic suggests that trend data may be of use in targeting employees for transfer and promotion, when turnover may be even more costly.

Limitations

Despite this study's contributions, a number of limitations potentially weaken the generalizability of our results. Like Harrison et al.'s (1996) study, our data were limited to sales jobs with contingent rewards in one organization and one industry. However, Harrison et al.'s sample was paid under a maximally contingent pay system, whereas employees in our sample had a portion of fixed base pay. The subset of our analyses that replicates Harrison et al.'s findings suggests some generalizability for both studies. As Harrison et al. pointed out, a number of organizations have sales positions working under various commission-based systems (Heide, 1994). Nonetheless, the nature of the job and compensation system, although not unique, may not generalize to contexts in which pay has a limited or no link with individual performance. Reward contingency has been shown to moderate the performance-turnover relationship when performance is treated as a static construct (Trevor et al., 1997; Williams & Livingstone, 1994). It is thus likely that the dynamic performance-turnover relationship would also be affected by performance contingencies.

One might speculate, for instance, that, for those with positive trends, lower contingent pay might be associated with relatively more turnover, because performance increases without concurrent pay increases may yield dissatisfaction. For those with negative trends, lower contingent pay might be associated with relatively less turnover, because little pay change relative to performance decrements likely would yield less dissatisfaction than in the high reward contingency situation, in which negative trends translate to more substantive income loss. Although this speculation suggests a somewhat weaker negative relationship between performance trend and turnover when reward contingencies are lowered, it also seems reasonable that the relationship might be further moderated both by current performance, which is strongly related to both performance trend and voluntary turnover, and by organizational pressures on low and declining performers to leave.

The sample's performance was also measured monthly, which is ultimately how pay was determined. Although this procedure is common in sales jobs, it is unclear whether or how the temporal relationship between performance and turnover might change if performance were measured over a different time frame. In addition, our 8-month time frame was shorter than the 2- and 3-year windows in other studies of dynamic performance (e.g., Deadrick et al., 1997; Harrison et al., 1996; Ployhart & Hakel, 1998). However, the fact that we found significantly different performance trends for stayers and leavers over a relatively short time frame speaks to the strength of our findings.

Our study is also limited by our lack of measures of individual abilities and affective data. Turnover research has often shown that turnover intentions, job satisfaction, and organizational commitment are related to actual turnover (e.g., Horn, Caranikas-Walker, Prussia, & Griffeth, 1992; Tett & Meyer, 1993). Dynamic performance literature has shown that cognitive ability and psychomotor ability measures help predict performance trends (e.g., Deadrick et al., 1997; Deadrick & Madigan, 1990). As Harrison et al. (1996) noted, it would be desirable to track such constructs over time and examine how these constructs also change. Such data could provide a more direct means to determine the causes of performance changes over time, how job performance outcomes affect organizational attachments, and how changes in job performance alter such feelings and influence the cognitive processes leading to turnover decisions. Although our results provide evidence that performance trends, measured both as the most recent change in performance and over a longer time frame, are related to turnover, we could not truly test the causal mechanisms of this relationship. Delving into this question would prove a valuable area for future research.

Finally, as in most research purporting to measure and explain voluntary turnover, the construct of "voluntariness" is a problem (Campion, 1991; Jackofsky, 1984). Although our sample employees

provided specific reasons for leaving the firm, inferring voluntariness remains particularly problematic for poor performers who may have been forced out or who may have left because of that threat. Rerunning our voluntary turnover analyses with all turnover instances as the dependent variable yielded no notable differences in our results. To remain consistent with the field, however, we presented the analyses that were based on the voluntary designation.

Future Research

Our findings present a number of immediate implications for future research on dynamic performance and the performance-turnover relationship. Future examinations of individual performance trends should include all available performance observations and should control for the performance trends associated with employees who leave during the span of the study. As dynamic performance research is beginning to move away from simple demonstrations of the phenomenon of dynamic performance to understanding the nature and causes of such changes, it is important that analyses not be biased by excluding an often sizable, and conceptually important, portion of the workforce. By excluding those who leave an organization, constructs that relate to both turnover and dynamic performance may have their ranges restricted, and thus subsequent analyses may be more susceptible to Type II errors.

Furthermore, research is needed on reliability with regard to performance trends. In this study, we could not differentiate between random performance change and systematic changes over time. Although it is likely that short-term (i.e., 2-month) trends may have been more subject to random noise than were performance trends based on longer time frames, we could not specifically partial out this systematic variance from the random variance. Past research has highlighted the importance of understanding the reliability of job performance ratings but has focused on reliability at a point in time (i.e., intrarater reliability and interrater reliability; see Viswesvaran, Ones, & Schmidt, 1996). Future research on the nature of dynamic performance and the causal mechanisms through which changes in performance (both long-term and short-term) relate to voluntary turnover decisions would benefit from a better understanding of the extent to which performance instability over time is attributable to systematic versus random performance variation.

Future research on the performance-turnover relationship should also heed the findings of this study as well as that of Harrison et al. (1996). That is, although one's most recent performance level has a notable relationship with voluntary turnover, job performance must be examined over time to more accurately represent how the constructs relate. Although cross-sectional research examining

performance and turnover may still prove useful for examining the relationship in varied contexts (e.g., under different compensation systems), the relationship between performance and turnover is one that spans multiple time periods. The complexity of performance is further highlighted by our finding of a current performance by performance trend interaction. One potentially beneficial research endeavor would be to illustrate how the trend main effect and the interaction might change under different reward contingencies.

Furthermore, it would be valuable to explore how performance changes affect turnover intentions and subsequent behaviors. Our study does not speak to the intermediate causal links between performance changes and turnover. Although we examined behaviors, and not the cognitive processes leading to such behaviors, the fact that both 2-month trend and all-month trend were related to turnover behaviors suggests that individuals modified their turnover intentions when confronted with performance feedback. These intentions seem to be based on both the most recent piece of performance feedback and one's overall performance record. Research investigating how performance trends of different lengths of time affect turnover intentions may shed some light on the half-life of effects attributable to past performance experiences. It is also plausible that the causal chain associated with various performance trends is more complex. For example, one's overall performance trend (all-month trend) may yield turnover intentions, but these intentions may in turn produce the most recent performance change (2-month trend). Clearly, it would be fruitful for future research to delve into how changes in performance relate to the cognitive processes leading to turnover behavior. It would also be valuable to explore this phenomenon in multiple contexts, such as in nonmaximally contingent reward systems and in the presence of other human resource interventions.

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