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Effects of Selection and Training on Unit-Level Performance Over Time: A Latent Growth Modeling Approach

Chad H. Van Iddekinge, Gerald R. Ferris, and Pamela L. Perrewé
Florida State University

Alexa A. Perryman
Texas Christian University

Fred R. Blass
Florida State University

Thomas D. Heetderks
YUM! Brands

Surprisingly few data exist concerning whether and how utilization of job-related selection and training procedures affects different aspects of unit or organizational performance over time. The authors used longitudinal data from a large fast-food organization ($N = 861$ units) to examine how change in use of selection and training relates to change in unit performance. Latent growth modeling analyses revealed significant variation in both the use and the change in use of selection and training across units. Change in selection and training was related to change in 2 proximal unit outcomes: customer service performance and retention. Change in service performance, in turn, was related to change in the more distal outcome of unit financial performance (i.e., profits). Selection and training also affected financial performance, both directly and indirectly (e.g., through service performance). Finally, results of a cross-lagged panel analysis suggested the existence of a reciprocal causal relationship between the utilization of the human resources practices and unit performance. However, there was some evidence to suggest that selection and training may be associated with different causal sequences, such that use of the training procedure appeared to lead to unit performance, whereas unit performance appeared to lead to use of the selection procedure.

Keywords: employee selection, employee training, human resources practices, latent growth modeling, service employees

Employee selection and training are two fundamental means by which organizations can acquire and develop human capital, which represents the aggregate knowledge, skills, abilities, and other characteristics (KSAOs) of an organization's workforce (Ployhart, Weekley, & Baughman, 2006). It is not surprising, then, that scholars have devoted considerable attention to these two human resources (HR) practices. The traditional approach has been to collect selection or training data from individuals and then to relate those data to some individual-level outcome, such as job performance or turnover. Most of this "micro-level" work has focused on relations between applicant or employee scores on selection instruments (e.g., cognitive tests, employment interviews) and subsequent performance on the job (e.g., Schmidt & Hunter, 1998). Other research has examined how employee training affects outcomes, such as transfer of training and job performance (e.g., Colquitt, LePine, & Noe, 2000).

More recently, scholars have begun to investigate the influence of selection and training on organizational performance. The typical design has been to identify various systems or "bundles" of high-performance work practices—which sometimes include selection and/or training—to ask company representatives to indicate the extent to which their organizations use these practices, and then to relate their judgments to one or more organizational-level criteria, such as sales or profits. This "macro-level" research has shown that firms that use progressive HR practices tend to demonstrate higher levels of financial performance than firms that do not (B. E. Becker & Huselid, 2006; Combs, Liu, Hall, & Ketchen, 2006).

Although these two lines of research have contributed greatly to our understanding of how selection and training can enhance the performance and well-being of individuals and the organizations for which they work, these approaches have limitations. For one, micro studies often have been carried out in research settings, rather than in operational settings (this is particularly true for selection research), and thus the results of such studies actually speak more to the potential impact of selection and training than to their actual impact.

Furthermore, micro research does not tell us whether or how individual performance with respect to selection and training translates into team, unit, or organizational performance. For example,

Chad H. Van Iddekinge, Gerald R. Ferris, and Pamela L. Perrewé, Department of Management, Florida State University; Alexa A. Perryman, Department of Management, Texas Christian University; Fred R. Blass, Department of Management, Florida State University; Thomas D. Heetderks, YUM! Brands, Louisville, Kentucky.

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Correspondence concerning this article should be addressed to Chad H. Van Iddekinge, College of Business, Florida State University, 821 Academic Way, P.O. Box 3061110, Tallahassee, FL 32306-1110. E-mail: cvanidde@fsu.edu

if scores on a selection test correlate with supervisor ratings of job performance, this does not necessarily mean that the same degree of correlation exists between aggregate test scores from a team of employees and team-level performance. As Ployhart and Schneider (2005) noted, "We hire better employees with the *expectation* [italics added] that doing so contributes to group and organizational behavior and effectiveness. This leaves the entire selection profession in the undesirable position of having to assume these relationships exist (p. 513)." In addition, managers and HR professionals typically are held accountable for unit-level outcomes rather than for the selection or training of individual employees. Therefore, micro research may not always provide practitioners with the evidence they need to justify their programs to decision makers.

Existing macro research on selection and training also is limited in several respects. First, most macro studies have measured the existence of one or more HR practices within the organization, or the *perceived* use or effectiveness of the practices, rather than the actual utilization of those practices. The current measurement paradigm involves administering surveys to organizational representatives (e.g., HR managers), who are asked to provide a relatively small number of ratings concerning their perceptions of the firm's HR practices and, sometimes, of the firm's performance as well.

Unfortunately, there are several potential limitations to this approach. For one, asking representatives to assess the HR practices for the organization as a whole presumes homogeneity in practice use/effectiveness across units, and this assumption has not been widely tested (Wright & Boswell, 2002). In addition, asking respondents for an accurate evaluation of all the HR practices across their organization requires substantial information-processing demands. As a result, respondents may rely on various decision-making heuristics, such as their "implicit theories" about the organization and its performance (Wright, Gardner, Moynihan, & Allen, 2005). Finally, the typical method of obtaining HR practice information from one representative per organization precludes an assessment of interrater reliability. Even in rare circumstances in which data from multiple respondents have been collected, single-rater reliability estimates have tended to be very low (e.g., Wright et al., 2005). Therefore, relatively large numbers of raters may be needed to obtain reliable aggregate measures of HR practice use/effectiveness.

Macro research also has tended to combine multiple HR practices into a single bundle to form an overall measure of the use or perceived effectiveness of high-performance work practices. When finer distinctions are made, they typically involve creation of a limited number of relatively heterogeneous practice categories. For instance, selection and training have been combined into a single category of practices related to enhancing employees' skills (e.g., Huselid, 1995). The relatively few studies that have examined selection and training separately have tended to use fairly simple measures of these practices. Measures of selection practices have included "yes/no" judgments concerning whether an organization uses certain types of tests for selection and the typical number of applicants considered for job openings (e.g., Delaney & Huselid, 1996). Training has been measured with questions about whether the organization provides any type of formal job training or the number of training hours that employees typically receive (e.g., Batt, 2002).

A final concern within the macro HR literature has been the reliance on cross-sectional designs (this concern also applies to much of the micro HR literature). In fact, most studies that have examined relations between HR and organization performance have used "post-predictive" designs, whereby information on the firm's current HR practices (typically collected from single-source informants) is related to prior firm financial performance (Wright et al., 2005). Thus, data are limited concerning the nature and magnitude of relations between HR and firm performance over time and what, if any, causal relationship may exist between the two variables (Gerhart, 2005).

Present Study

Our purpose in this study was to examine relations between the selection and training of entry-level employees and the performance of units from a large fast-food organization using a design and an analytic approach that attempt to overcome some of the limitations of previous micro and macro research. For example, we investigated the unique and combined effects of actual utilization of selection and training systems on unit performance, rather than the potential or perceived effectiveness of these two important HR practices. In doing so, we responded to calls for research that focuses on actual HR practices rather than on stated policies (e.g., Gerhart, Wright, McMahan, & Snell, 2000; Huselid & Becker, 2000; Wright et al., 2005). Use of unit-level data also enabled us to examine the extent and potential influence of between-unit variance in selection and training use/effectiveness.

The few truly longitudinal macro HR studies that have been conducted have tended to examine perceived practice use/effectiveness at one point in time and organizational performance (e.g., profits) at one later point in time. In contrast, we investigated the effects of selection and training on unit performance using a longitudinal design with many measurement periods. We analyzed these data using multiple-indicator latent growth modeling (Chan, 1998), as this enabled us to examine not only whether selection and training are related to unit performance across time but, more important, whether change in selection/training is related to change in unit performance. Furthermore, we used a cross-lagged panel analysis to assess alternative causal sequences of relations between selection/training and unit outcomes.

Finally, few data exist concerning the intermediate processes by which selection and training, as individual HR system components, may affect unit or organizational performance. We attempted to illuminate this issue by assessing whether selection and training affect unit performance directly or whether they do so indirectly via more proximal unit outcomes (i.e., customer service performance [CSP] and retention). Taken as a whole, we believe, the results of this study may provide a clearer picture concerning the nature and magnitude of influence that selection and training can have on unit performance.[1]

[1] We examined the extent to which units utilized job-related employee selection and training systems. However, to conserve space, we often use the phrase "selection and training" rather than "units' utilization of the selection and training procedures." Similarly, although *unit* and *organization* represent different units of analysis, we use these terms interchangeably throughout the article.

Research Model and Theoretical Foundation

Figure 1 displays the model that serves as the basis for our research.[2] We proposed that utilization of job-related selection and training would reflect the quality of units' human capital and that it would demonstrate independent and direct effects on unit CSP performance and retention and indirect effects on unit financial performance. Our model also suggests that selection, training, and unit outcomes are not static but rather change over time. Further, we proposed that changes in selection and training would be related to changes in unit outcomes over time.

The primary theoretical foundation for this model comes from human capital theory (G. S. Becker, 1964). According to this theory, organizations that invest more into human capital may pay more initially but will recover these costs through increased productivity as employees acquire greater amounts of job- and/or organization-specific knowledge and skills. The theory specifies two types of human capital: generic and firm specific. Generic human capital (e.g., general cognitive ability, motivation) is not unique to any particular organization or industry, and it typically represents stable individual differences inherent in employees or general skills developed through prior education and experience. In contrast, firm-specific human capital (e.g., skills for producing a particular product or service) is unique to a given job or organization, and it must be trained and developed by the organization.

Micro HR researchers have long recognized the importance of individuals' "human capital" as a key determinant of job performance (e.g., Hull, 1928; Thorndike, 1949; Viteles, 1932). In recent years, macro HR researchers have placed increased emphasis on the importance of human capital for unit and organizational performance (e.g., Hitt, Bierman, Shimizu, & Kochhar, 2001; Pfeffer, 1994; Wright, Dunford, & Snell, 2001). For example, human capital has become a focal construct within the literature on the resource-based view of the firm (RBV; Barney, 1991). RBV predicts that firms are heterogeneous with regard to resources and that firms that possess the right "mix" of resources will outperform firms that do not. Human capital (particularly firm-specific human capital) represents a key source of sustained competitive advantage, because it is valuable, rare, inimitable, and nonsubstitutable.

Selection and training are the two primary mechanisms by which organizations accumulate human capital (Hatch & Dyer, 2004; Koch & McGrath, 1996; Snell & Dean, 1992). Selection represents the primary means through which organizations acquire human capital in an attempt to hire people whose KSAOs match those required to perform the duties of a given job. The KSAOs assessed during selection tend to reflect more generic human capital variables that are relatively stable (and thus difficult to develop through training) and/or more general knowledge and skills that applicants have attained through their education and experience. In addition, many of today's jobs are fluid, and the specific duties of a given job change frequently (Ilgen & Pulakos, 1999). Thus, organizations often attempt to select people who possess the general abilities (e.g., adaptability, problem solving) that predispose them to succeed in a variety of roles (Lepak & Snell, 1999).

However, the human capital embodied in new employees often is not job/organization specific. Therefore, organizations must use training to develop firm-specific knowledge and skills. As training builds firm-specific human capital, it enhances the rate at which employees learn their duties and improve their productivity (Hatch & Dyer, 2004). Also, training can serve a socialization function by fostering the values and norms of the organization. According to the RBV, job/organization-specific knowledge and skills, as developed through training and experience, represent the types of human capital that are most likely to create a competitive advantage, because they are valuable, unique, and difficult to imitate.

Expected Relations Among the Model Variables

We now discuss our expectations concerning the specific relationships within our model (see Figure 1). To begin, we proposed that selection and training, as indicators of units' quality of human capital, would demonstrate independent and direct effects on unit CSP and retention. Within the services industry, it is widely accepted that quality service contributes to greater customer satisfaction, repeat business, and positive word of mouth, which, in turn, lead to higher financial outcomes, such as sales (e.g., Keiningham, Perkins-Munn, & Evans, 2003; Liao & Chuang, 2004; Salvaggio et al., 2007). High-quality service is a particularly important source of competitive advantage in fast-food organizations because of the large number of companies that offer very similar products at comparable prices.

The selection procedure (described in detail within the Method section) was designed to measure several KSAOs thought to predispose people to demonstrate high levels of customer service (e.g., customer orientation, work ethic, teamwork). Thus, we expected that consistent use of this procedure should positively affect unit CSP by helping to ensure that units were staffed with employees who had the KSAOs they needed to perform effectively within a service environment.

We also expected that use of job-related training would positively affect unit CSP. Selection systems are designed to identify applicants who possess the KSAOs that predispose them to succeed on the job. However, applicants often do not possess the knowledge and skills they need to perform the specific tasks a job may require, and this is why employee training is so important. Customer service was a primary focus of the training procedures we examined (see the Method section for a detailed description). Therefore, we expected that units that used job-related training would be more likely to demonstrate higher CSP than would units that did not use such training.

Human capital quality was expected to be related to unit retention. In fast-food organizations, where turnover rates often exceed 100% annually, increased retention could be an important factor in achieving a competitive advantage. Use of job-related selection procedures can impact retention in various ways. For one, selection of applicants who have the required KSAOs should result in employees who are more likely to demonstrate the type of effective performance that increases retention and decreases involuntary turnover. The KSAOs measured in the selection procedures also can influence retention. For example, research has shown that pre-hire dispositions, attitudes, and behavioral intentions measured

[2] We express our sincere thanks to Steve Kozlowski and two anonymous reviewers for the extraordinary amount of guidance they provided with respect to this model, from its theoretical foundation to the analytical approach we used to test the model.

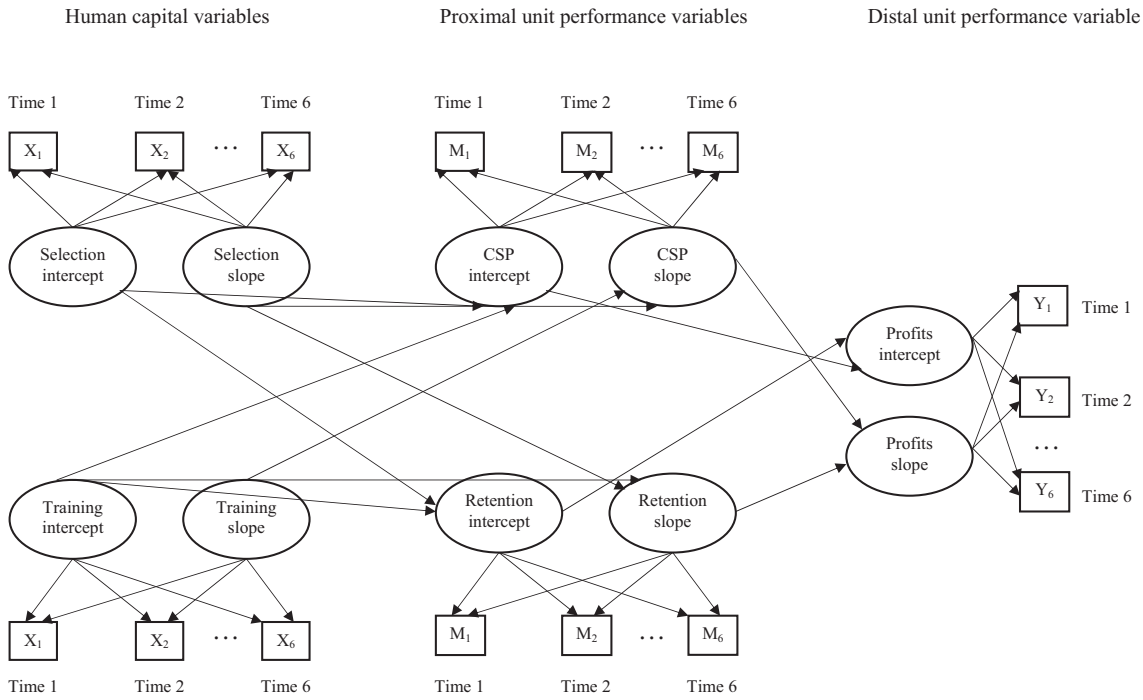

Figure 1. Proposed relations among time-varying, job-related selection and training (as indicators of unit-level human capital quality) and customer service performance (CSP), retention, and profits (as proximal and distal indicators of unit performance). For clarity, we excluded covariances between the intercept and slope of the same latent variable, the latent variances, and the item disturbances and residual covariances. X = independent variable; M = mediating variable; Y = dependent variable.

by personality and biodata instruments can predict subsequent retention (e.g., Barrick & Zimmerman, 2005).

Furthermore, job-related selection procedures can influence retention indirectly through their impact on employee attitudes. For instance, retention can be increased by use of best selection practices, because employees are more likely to succeed on the job and to feel a sense of personal validation for being selected (Cho, Woods, Jang, & Erdem, 2006). Additionally, employees who perceive the selection process to be job related will be more likely to view the organization as fair and just. This perception creates a sense of attachment and a desire to remain with the organization (Hausknecht, Day, & Thomas, 2004).

Use of training that emphasizes job-related knowledge has been found to increase retention (e.g., Arthur, 1994). Training should positively impact unit retention by providing employees what they need to be successful and thus should prevent their termination or voluntary withdrawal due to lack of knowledge and skills. Further, human capital theory suggests that job/organization-specific knowledge and skills often are not transferable to other organizations; thus, investment in internal training and development will be less likely to result in capital loss (G. S. Becker, 1964; Lepak & Snell, 1999). As a socialization mechanism, training may foster employee commitment to the units' norms, values, and goals, and such commitment in turn may increase feelings of attachment and, ultimately, retention.

Finally, little, if any, research has examined the mechanisms by which selection and training may impact unit financial performance. Our model suggests that these two indicators of human capital quality will affect financial performance indirectly through the more proximal outcomes of unit CSP and retention. As noted, within the fast-food industry, customer service is thought to be a direct precursor of customer satisfaction, which, in turn, is a direct precursor of unit financial performance.

Unit retention should be associated with increased profits, because the unit retains the general and job/organization-specific human capital that it acquired and developed through employee selection and training. Employees who remain with the unit are more likely to possess job-relevant, tacit knowledge obtained from their own experience in the unit, as well as from their work with other experienced employees (Dess & Shaw, 2001). When units experience turnover, the attainment and transfer of knowledge is less likely, and this in turn will negatively affect sales and profits (e.g., by decreasing efficiency; Kacmar, Andrews, Van Rooy, Steilberg, & Cerrone, 2006). In addition, retention can influence unit financial performance by reducing the administrative costs associated with recruiting, selecting, and training new employees.

Relations Between Selection and Training and Unit Performance Over Time

Little is known about the nature or magnitude of relations between the utilization of HR practices and unit performance over time. In the few truly longitudinal macro HR studies that have been conducted, there is a tendency to examine perceived practice use/effectiveness at one point in time and organizational performance (e.g., profits) at one later point in time. This is unfortunate

because change in these variables may be rapid and/or subtle, and thus valuable information can be lost through use of static (i.e., time invariant) measures of HR practices and organizational performance.

In contrast, our model predicts that selection, training, and unit outcomes will change over time. Furthermore, we expected that changes in selection and training (represented by the slope variables in Figure 1) would affect changes in the outcome variables. For example, units that increased (decreased) their use of job-related selection and training procedures also would increase (decrease) the quality of their human capital. This relation, in turn, should affect change in the unit's CSP and retention. We also anticipated a dynamic relationship between the proximal and distal indicators of unit performance, such that increases (decreases) in CSP and retention would be related to increases (decreases) in profits.

Causal Direction of Relations Between Selection and Training and Unit Performance

Finally, our model implies that selection and training will lead to or cause unit performance. As we discuss above, there are reasons to believe that use of job-related HR systems, such as selection and training, will lead to organizational performance, and this assumption has been predominant in the macro HR literature (Wright et al., 2005). However, there are reasons why the causal direction may be reversed. For example, high-performing organizations may possess more "slack" resources to devote to HR, such as the ability to develop and implement more extensive selection and training procedures.

Similarly, organizations with high employee retention may have the ability to be more selective of those they hire and may have the time to train new employees extensively, whereas organizations with retention problems may have to lower their hiring standards and expedite the training process in order to maintain production. Last, both of these arguments may be valid, such that the relationship between HR and firm performance may be one of reciprocal causation. For instance, firms that use job-related selection and training procedures may perform better, and this high performance may allow them to devote further resources to selection and training.

Few published studies have examined the causal direction of relations between HR practices and organizational performance (for a review, see Wright et al., 2005). For instance, Guest, Michie, Conway, and Sheehan (2003) surveyed managers about their HR practices (including selection and training) and obtained independent measures of present and future firm financial performance (e.g., sales and profits). Correlations between a composite measure of the HR practices and firm performance were rather modest (rs = .05–.21), and they did not reveal strong evidence for any particular causal direction.

In a similar study, Wright et al. (2005) examined correlations between a composite of high-performance HR practices (including selection and training) and time-varying measures of organizational performance. Average correlations between the HR practices composite and six measures of firm performance (e.g., shrinkage, profitability) measured in the past, present, and at two points in the future were .23, .29, .29, and .25, respectively. However, controlling for past performance reduced these mean correlations to .10, .11, .04, and .04, respectively.[3]

Although the results of Guest et al. (2003) and Wright et al. (2005) are informative, they are limited in their focus on aggregate HR practices, which were measured on the basis of respondent perceptions and were captured at a single point in time. In addition, neither study provided a direct test of causal direction; instead, both studies relied on general comparisons of zero-order correlations. We attempted to shed further light on these issues by conducting a cross-lagged panel analysis, which allowed us to test the relative fit of models that specify alternative causal directions. Given the arguments noted above for why HR practices may lead to organizational performance and vice versa, as well as the pattern of correlational evidence reported in prior research, we anticipated that a reciprocal causality model would best describe relations between selection/training and unit performance.

Method

Sample

The sample for this study comprised 861 units from a large fast-food organization based in the southeastern United States. All variables were measured at the unit level, on a monthly basis over the course of a calendar year, and they pertained to the selection, training, CSP, and retention of entry-level service employees. Our focus on "frontline" employees is important because these employees represent the "face" of the organization, and thus their attitudes and behavior can demonstrate a large impact on customer satisfaction and overall unit effectiveness (Liao & Chuang, 2004). In addition, retention is a persistent concern in entry-level service positions; in the fast-food industry, annual turnover rates regularly exceed 100% and often reach 200% or more (Newman, 2007). This high level of turnover necessitates the extensive use of selection and training and allows for potentially wide variation in human capital quality (both within and between units) over relatively short periods.

This particular organization provided a useful context in which to conduct this research. Macro HR practice studies typically include organizations of varying sizes and industries, and this practice can render tenuous at best the comparability of HR practices, performance criteria, and so forth (B. E. Becker & Gerhart, 1996; Hitt et al., 2001). In contrast, the units within the present organization were of similar size. They produced the same products, used the same selection and training systems, and gathered data on the same outcomes. Thus, use of unit-level data controls for various potential extraneous variables that are difficult or impossible to control for in organizational-level research. At the same time, although the units followed a central HR strategy, they could exercise some discretion in how they implemented the strategy. This discretion enabled us to investigate the extent to which the differential use of selection and training across units affected unit performance.

[3] We calculated both sets of mean correlations using the individual correlations reported in Table 4 of Wright et al. (2005, p. 429).

Measures

Selection and Training Variables

Selection. The primary component of the entry-level selection process is a validated paper-and-pencil test. The test measures the five most critical KSAOs identified from a comprehensive job analysis as being important for service employees. The organization labeled these KSAOs customer focus, work ethic, commitment, teamwork, and fundamental skills (e.g., comprehension of written information).

The selection test contains five sections. In the first section, applicants respond to biodata-like items that asked them to indicate how frequently they had demonstrated various behaviors relevant to the KSAOs (e.g., "How often have other people come to you with their problems?"). The second section includes items typical of personality-oriented selection measures, whereby applicants have to indicate the extent to which each item is true for them (e.g., "I am good at seeing things from other people's point of view"). Section 3 comprises several situational judgment items. For each item, applicants read a brief description of a job-related situation (e.g., an upset customer) and then select which of five actions they would take to handle the situation. In the final section, applicants are presented with several figures that contain job-relevant information, such as an ingredients chart and an equipment maintenance schedule. For each figure, applicants answer several questions (e.g., "How many pieces of *X* are needed to make one large *X*") that require them to identify the correct response from a list of five options.

When the test is completed, the responses for each applicant are computer coded and a total score is generated. This overall score is compared to a cutoff score identified from a predictive validation study that examined the relationship between test scores and supervisor ratings of job performance. The cutoff score was deemed to reflect the minimum amount of the general KSAOs applicants needed to succeed on the job.

The organization tracks the percentage of new employees in each unit who score at or above a minimum cutoff score on the selection test. Although use of the test to facilitate selection decisions is a standard operating procedure, there is variation in the extent to which individual units consistently used the established cutoff score for selection. For instance, there was anecdotal evidence that units sometimes hired applicants who had scored below the cutoff but who did very well in the interview or whose references were "impeccable." At the end of each month, we compared the number of new employees who scored at or above the cutoff with the total number of new employees to determine the extent to which each unit had used the established cutoff for selection.

Training. A foundational training program is the primary way in which new hires in the organization develop job-specific human capital. The program lasts 2 full weeks and covers both general orientation topics (e.g., corporate policies and values) and core job responsibilities. Trainers lead new employees through a comprehensive manual that details relevant job procedures. In addition, trainees perform simulated job tasks (e.g., greeting customers, taking orders, giving change) and receive coaching and feedback.

At the end of training, new employees are required to complete a computer-based test that covers all the key elements of the training program. The test comprises around 50 objectively scored questions, which are presented primarily in true/false and multiple-choice formats. Trainees must correctly answer 80% of the questions to pass the test. At the end of each month, we compared the number of new employees who had passed the training test with the total percentage of employees who had been selected during the month and whose hire date would have enabled them to have completed the 2-week training prior to the end of the month.

Although new-employee training was a standard operating procedure, as with the selection system, anecdotal evidence suggested that individual units might vary in the extent to which they used the system to train new employees and/or required trainees to pass the post-training test before assuming their position. For example, new hires might receive training on only the most essential job duties and then be put on the job without having completed the entire course. In other cases, new hires might be put directly on the job and would receive on-the-job training only.

Unit Performance Variables

We collected data on three measures of unit performance. The first two variables—CSP and unit retention—are criteria that our model suggests are relatively proximal to human capital (as acquired and developed through selection and training). Unit retention was calculated by dividing the number of employees who remained with the unit by the average hourly employee head count during the given month.

As is common in service organizations, CSP was measured with ratings from "mystery shoppers." Each month, two customers enter each unit and place an order. These customers are contract employees of the organization, and they receive extensive training prior to performing this role. After finishing their meals, the customers evaluate the unit on several dimensions using a standardized rating form. The dimensions include food quality, customer service (e.g., friendliness, wait time), and unit cleanliness. The individual ratings of each customer are summed to create an overall measure of performance, which the organization converts into a 100-point scale (100 equates to a perfect score).

The final, and most distal, outcome variable was a measure of unit financial performance that reflected controllable profits relative to the expected profits for each unit. A measure of controllable profit is calculated that represents sales minus variable costs that units can control (e.g., labor and product costs). This value is compared with expected profits, which are established by a group of internal financial analysts on the basis of factors such as prior year performance, unit size and location, expected road construction/closings, and new competitors. Within this organization, "profits against target" is one of the primary criteria on which units are evaluated. The value of this measure is that it reflects outcomes the unit can control (i.e., sales and variable costs) and at the same time controls for potential confounding variables (e.g., unit size, local competition).

Data Analysis

The data were analyzed with multiple-indicator latent growth modeling (MLGM; Chan, 1998; McArdle & Epstein, 1987; Meredith & Tisak, 1990; Willett & Sayer, 1994). MLGM is an emerging technique that overcomes limitations of more traditional approaches for analyzing change, such as repeated-measures analysis of variance and difference scores (Chan, 1998; Lance, Meade, & Williamson, 1999). MLGM represents an extension of latent

growth modeling in which the variable or variables of interest are modeled as a latent variable represented by multiple indicators.

To use this approach, one must measure each variable on at least three occasions (Chan, 1998). Each of these (first-order) measurements then serves as a separate indicator of two (second-order) latent factors associated with each variable. The first latent variable represents the initial status of that variable (i.e., the latent intercept) and provides information concerning the mean and variance of the individual intercepts for each unit's growth curve (Chan, 1998). The second latent variable represents the rate of change in each variable (i.e., the latent slope) and provides information concerning the mean and variance of the individual slopes for each unit's growth curve.

MLGM is particularly useful for determining whether change in one set of variables is related to change in another set of variables. A structural equation modeling framework is used, and the latent intercept and slope factors for the predictors are related to the latent slopes and intercepts for the criteria. A significant path between two latent intercepts indicates that the initial status of one variable is related to the initial status of the other variable, whereas a significant path between two latent slopes indicates that change in one variable is related to change in the other variable. Mediation can be assessed within this approach by examining whether the initial status and/or change in the predictors influences the initial status/change in the criteria through the initial status/change in one or more proposed mediators (Pitariu & Ployhart, 2006). As with models that comprise static (i.e., non-time-varying) variables, dynamic mediation can be assessed by comparing the relative fit of alternative structural models.

In implementing this analytic approach, we relied heavily on the work of Chan (1998, 2002), who provided a comprehensive description of the MLGM procedure for examining cross-domain relations. We also consulted recent applications of this approach in areas such as organizational entry (Chan & Schmitt, 2000) and job attitudes (Bentein, Vandenberg, Vandenberghe, & Stinglhamber, 2005). Readers interested in further details concerning MLGM are encouraged to consult these articles, as well as those by Meredith and Tisak (1990) and Willett and Sayer (1994).

To increase the stability of the scores that served as input for the MLGM analyses, as well as to reduce model complexity (and, in turn, enhance both statistical power and interpretability), we averaged the monthly data to create bimonthly indicators for each variable. Thus, every latent variable in the model was represented by six indicators. All factor loadings for the latent intercepts were fixed to 1.0. Also, consistent with prior research (e.g., Bentein et al., 2005), residual covariances were included between consecutive measures of the same variable (e.g., selection at Time 1 and Time 2, retention at Time 4 and Time 5). The one exception is that we did not include covariances between consecutive measures of selection, as doing so resulted in a poor-fitting (univariate) selection model. Finally, we allowed the latent intercept and slope for each variable to covary.

Before fitting the multivariate MLGM models, we fitted separate univariate models to determine the functional form of each latent slope.[4] We began by specifying a linear form for each slope by fixing the factor loadings of the six bimonthly indicators to equal 0, 1, 2, 3, 4, and 5. We also assessed an optimally estimated functional form by fixing the loadings for the first two periods (to 0 and 1) and allowing the remaining loadings to be free (Bentein et al., 2005; Chan, 1998). A linear model provided a good fit to the data for all the variables, whereas the optimal model either did not improve model fit or failed to converge (note that the linear and optimal models are nested). The one exception was that the linear model did not provide an acceptable fit for the CSP variable, but the optimal model did. Thus, within the multivariate growth model, change was represented by a linear form for four of the research variables and by an optimal form for one of the variables.

All analyses were conducted with structured equation modeling procedures within LISREL 8.71 (Jöreskog & Sörbom, 2004), with the means and covariances of each indicator used as input. We used five indices to assess model fit: the chi-square goodness of fit test, the comparative fit index (CFI; Bentler, 1990), the nonnormed fit index (NNFI; Bentler & Bonnett, 1980), the root-mean-square error of approximation (RMSEA; Steiger, 1990), and the standardized root-mean-square residual (SRMR; Bentler, 1995).

Results

Change in Selection, Training, and Unit Performance Over Time

Table 1 presents descriptive statistics and correlations for all of the observed (first-order) variables. One interesting pattern of results concerns the correlations involving selection and training. First, the relative ordering of units on selection was less stable over time (rs = .19–.33, mean r = .25) than was the relative ordering of units on training over time (rs = .42–.73, mean r = .56). This result suggests that, within a given unit, use of the training system was much more systematic than was use of the selection system.

Second, there was greater consistency in units' use of a particular HR practice (i.e., selection or training) over time (as indicated by the ranges of correlations listed above) than there was in units' use of selection and training within a given period (rs = .13–.23, mean r = .18). The relatively small correlations between selection

[4] We also considered various potential control variables to include in the MLGM analyses. First, unit size (i.e., square footage), age (i.e., year opened), and relative wages (compared to the average wage for businesses within the zip code of each unit) failed to demonstrated notable relations with any of the substantive variables in our model (all rs $< .10$), and they did not affect relations among the variables. We also obtained monthly unemployment rates for the zip code of each unit and correlated those rates with the model variables. Unemployment was positively related to both selection and training (all rs $\leq .15$), as well as to retention (all rs $\leq .20$). Correlations between unemployment and CSP and profits generally were positive, but they were no larger than .07.

Therefore, we initially included unemployment rate in the MLGM analyses (i.e., represented by bimonthly variables that corresponded to our bimonthly substantive variables). However, local unemployment did not change significantly over time, as indicated by a nonsignificant mean for its latent slope. We therefore created a non-time-varying, annual unemployment variable for each unit. Nonetheless, this variable related only to the initial status of the selection and training variables (but not to change in these variables), and it did not relate to the initial status of, or change in, any of the outcome variables. In fact, inclusion of annual unemployment had a negative impact on model fit. Given these results, as well as our interest in keeping the research model as parsimonious as possible (which was a concern, given the large number of time-varying indicators and associated latent factors), we chose not to include unemployment rate in the final analyses.

Table 1
Descriptive Statistics and Correlations for the Observed Variables

Variable	*M*	*SD*	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1. Selection 1	51.95	34.30	—																													
2. Selection 2	53.42	31.75	.25	—																												
3. Selection 3	54.21	32.47	.19	.26	—																											
4. Selection 4	53.79	31.30	.23	.26	.28	—																										
5. Selection 5	52.67	29.00	.24	.22	.31	.29	—																									
6. Selection 6	52.38	31.30	.19	.23	.25	.22	.33	—																								
7. Training 1	76.03	17.55	.19	.16	.19	.16	.19	.15	—																							
8. Training 2	74.78	15.63	.14	.16	.16	.17	.19	.16	.69	—																						
9. Training 3	75.94	16.67	.13	.15	.19	.17	.20	.17	.60	.73	—																					
10. Training 4	75.89	16.25	.14	.15	.19	.21	.21	.19	.47	.56	.73	—																				
11. Training 5	73.18	16.22	.18	.16	.22	.22	.23	.23	.43	.48	.53	.67	—																			
12. Training 6	75.19	16.69	.13	.14	.18	.18	.17	.20	.42	.44	.47	.54	.67	—																		
13. CSP 1	94.32	4.29	.12	.15	.12	.04	.16	.11	.22	.21	.21	.18	.19	.20	—																	
14. CSP 2	90.25	7.19	.07	.17	.10	.12	.15	.12	.19	.19	.21	.20	.16	.15	.26	—																
15. CSP 3	87.08	6.71	.11	.10	.15	.18	.16	.12	.19	.23	.27	.25	.22	.16	.29	.30	—															
16. CSP 4	86.81	7.26	.08	.10	.07	.19	.16	.12	.17	.19	.19	.21	.22	.20	.25	.26	.37	—														
17. CSP 5	85.86	7.12	.09	.08	.12	.12	.18	.16	.09	.10	.09	.13	.19	.21	.25	.20	.31	.40	—													
18. CSP 6	86.32	7.33	.06	.12	.08	.09	.15	.16	.12	.12	.11	.10	.16	.20	.24	.22	.23	.28	.31	—												
19. Retention 1	87.09	10.32	.13	.12	.09	.13	.08	.09	.25	.20	.17	.19	.20	.19	.12	.12	.05	.11	.01	.09	—											
20. Retention 2	87.61	7.26	.18	.19	.17	.17	.17	.18	.43	.34	.32	.29	.29	.26	.19	.13	.13	.21	.09	.13	.65	—										
21. Retention 3	87.66	6.84	.20	.23	.21	.19	.18	.19	.41	.40	.34	.33	.30	.27	.20	.16	.19	.20	.11	.13	.52	.81	—									
22. Retention 4	86.40	6.98	.20	.23	.24	.20	.19	.20	.40	.39	.37	.31	.31	.28	.21	.15	.19	.23	.12	.13	.49	.75	.86	—								
23. Retention 5	84.76	7.42	.19	.22	.23	.23	.19	.20	.34	.34	.35	.35	.31	.32	.22	.15	.24	.27	.15	.14	.41	.66	.73	.83	—-							
24. Retention 6	85.93	6.65	.20	.22	.24	.21	.24	.23	.34	.33	.34	.38	.37	.29	.20	.14	.23	.25	.16	.15	.43	.65	.71	.78	.86	—						
25. Profits 1	100.75	8.46	.06	.10	.12	.13	.12	.12	.11	.12	.15	.18	.16	.15	.14	.11	.12	.16	.13	.05	.10	.20	.23	.18	.17	.19	—					
26. Profits 2	99.13	8.08	.03	.05	.10	.07	.08	.11	.12	.15	.11	.13	.12	.13	.12	.12	.11	.07	.08	.11	.06	.08	.14	.13	.09	.09	.44	—				
27. Profits 3	101.31	7.59	.06	.07	.10	.15	.11	.10	.17	.21	.16	.10	.14	.16	.09	.10	.17	.17	.09	.09	.10	.16	.17	.18	.18	.20	.38	.47	—			
28. Profits 4	98.43	7.68	.01	.05	.09	.12	.09	.08	.13	.15	.17	.21	.18	.14	.13	.08	.16	.14	.12	.12	.09	.14	.14	.12	.13	.17	.32	.39	.45	—		
29. Profits 5	100.85	9.66	.04	.06	.06	.09	.08	.09	.04	.12	.07	.11	.19	.14	.07	.09	.15	.15	.17	.15	.11	.10	.11	.07	.02	.07	.31	.41	.41	.51	—	
30. Profits 6	100.76	7.70	.08	.12	.12	.16	.13	.15	.17	.22	.15	.15	.24	.24	.12	.14	.17	.20	.16	.12	.13	.20	.19	.16	.15	.18	.37	.46	.71	.47	.54	—

Note. $N = 861$ units. Each variable was measured on a bimonthly basis (i.e., the mean across 2 months) over a calendar year (e.g., Selection 1 reflects the selection data for January and February). The selection and training variables are percentages that reflect the proportion of new employees who were selected and trained with the specified procedures. Retention was calculated by dividing the number of employees who remained with the unit by the average hourly employee head count during the given month. CSP = customer service performance ratings, which are based on a 100-point scale. Profits is a percentage that reflects the extent to which units met expectations for each month. For example, a value of 100 indicates an exact match between actual and expected controllable profits. Correlations of an absolute value of .08 and larger are statistically significant ($p < .05$).

and training indicate that units' use of one practice was not heavily dependent upon units' use of the other.

Table 2 presents descriptive statistics and correlations for the latent (second-order) variables. Note the means and variances of the latent intercept/slope variables. The means for the latent slopes indicate the amount and direction of change in a given variable over time. All the slope means were statistically significant ($p < .05$), and this result indicates that change did occur. The negative slopes for selection, training, CSP, and retention indicate a decreasing trend for these variables, whereas the positive slope for profits indicates an increasing trend.

The variance of the latent factors indicates the degree of between-unit differences in each variable. All variances were statistically significant, and this result suggests the existence of differences among the units, both in the initial status of each variable (as indicated by the intercept variance) and in the change in the variable over time (as indicated by the slope variance). The significant between-unit differences in selection and training are particularly noteworthy, given the frequent assumption that HR practices are homogeneous within a given organization.

Longitudinal Relations Between Selection and Training and Unit Performance

We began by fitting the model in Figure 1 to the data with MLGM. Results suggest that this model fit the data quite well, $\chi^2(400, N = 861) = 1{,}388.75$, CFI = .96, NNFI = .95, RMSEA = .053, SRMR = .043. Table 3 displays the variance accounted for (i.e., R^2) in each outcome variable within the model (i.e., CSP, retention, and profits). The latent intercepts and slopes for selection and training explained between 9% and 49% of the variance in latent intercepts/slopes of CSP and retention. The intermediate outcomes, in turn, explained 18% and 22% of the variance in the latent intercept and slope, respectively, of unit profits. Thus, this model provided a good fit to the data and demonstrated notable explanatory power.

Table 3 also displays the path coefficients for the individual predictor–outcome relations. Again, a significant path between two latent intercepts indicates that the initial status of the predictor is related to the initial status of the criterion, and a significant path between two latent slopes indicates that change in the predictor is related to change in the criterion.

Table 3
Standardized Path Coefficients and R^2 Values From the Hypothesized Latent Growth Model

	Criterion					
Predictor	CSP-I	CSP-S	Retention-I	Retention-S	Profits-I	Profits-S
Selection-I	.38*		.13			
Selection-S		.50*		.01		
Training-I	.44*		.49*			
Training-S		.41*		.30*		
CSP–I					.35*	
CSP–S						.47*
Retention-I					.15*	
Retention-S						.15
R^2 for criterion	.43	.49	.29	.09	.18	.22

Note. CSP = customer service performance; I = intercept (i.e., initial status); S = slope (i.e., change over time).
* $p < .05$.

To begin with relations between the latent intercepts, most of the intercept-to-intercept paths were statistically significant and moderate to large in magnitude. Selection was positively related to CSP (.38) but not to retention. The significant path to CSP indicates that units that used the cutoff score on the validated test for selection to a greater extent tended to demonstrate higher CSP ratings. Training was significantly related to both CSP and retention (.44 and .49, respectively), such that units that used the new-hire training to a greater extent tended to exhibit higher CSP and retention. Finally, the initial status of both CSP and retention was significantly related to the initial status of unit profits (.35 and .15, respectively).

The preceding results suggest a relationship between unit human capital quality (i.e., as indicated by selection and training use) and unit performance. However, these results do not indicate whether change in human capital quality is associated with change in performance, and this question is the focus of the latent slope analyses. As Table 3 shows, several of the slope-to-slope path

Table 2
Descriptive Statistics and Intercorrelations for the Latent Variables From the MLGM Analyses

Variable	*M*	Var	1	2	3	4	5	6	7	8	9	10
1. Selection-I	82.74	163.00	—									
2. Selection-S	−0.62	4.71	−.26	—								
3. Training-I	75.57	194.27	.28	−.02	—							
4. Training-S	−0.21	5.73	−.04	.17	−.50	—						
5. CSP-I	80.41	5.69	.50	−.11	.55	−.24	—					
6. CSP-S	−2.11	0.44	−.15	.57	−.21	.49	.04	—				
7. Retention-I	67.43	45.95	.27	−.04	.53	−.25	.33	−.12	—			
8. Retention-S	−0.38	0.92	−.02	.07	−.15	.30	−.07	.16	−.48	—		
9. Profit-I	100.07	24.70	.21	−.04	.27	−.13	.40	.00	.26	−.10	—	
10. Profit-S	0.63	0.23	−.07	.26	−.12	.19	.03	.45	.01	−.07	.04	—

Note. All means and variances for the latent intercepts and slopes are statistically significant ($p < .05$). MLGM = multiple-indicator latent growth modeling; Var = variance; I = intercept (i.e., initial status); S = slope (i.e., change over time); CSP = customer service performance.

coefficients were statistically significant and moderate to large in magnitude. First, change in selection was positively related to change in CSP (.50), such that as units' use of the validated test for selection increased, so also did units' CSP ratings. On the other hand, change in selection was not a significant predictor of change in retention. Change in training was a significant predictor of change in both CSP and retention (.41 and .30, respectively). In particular, as units' use of the new-hire training program increased, so did units' CSP ratings and retention.

Finally, we expected that change in the proximal measures of unit performance would be related to change in the distal performance measure of unit profits. Change in CSP was positively related to change in profits (.47). This result indicates that as units' CSP ratings increased, so also did units' profits. Conversely, change in unit retention was not significantly related to change in profits.

Structural Model of Relations Between Selection and Training and Unit Performance

Next, we explored the relative fit of several models that might explain the nature of relations between selection and training and the proximal and distal measures of unit performance. We used our a priori model (see Figure 1) as the starting point. This figure represents a fully mediated model, such that the effects of selection and training on unit performance are specified to be entirely indirect through CSP and retention. We then fitted two alternative models. The first represents a partial mediation model, in which we freed the paths between the selection and training and unit profits to account for any direct relations that selection and training might have on profits beyond their indirect effects through CSP and retention. For the second alternative model, we eliminated the paths between selection and training and CSP and retention (but retained the paths between selection and training and profits). This direct effects only model specifies the effects of all the variables on profits to be direct (i.e., no mediation).

The fit statistics for the models are presented in Table 4. All three models provided a good fit to the data. Because the a priori (full mediation) model and the partial mediation model are nested, we could directly test their relative fit to the data using the changes in chi-square relative to the change in degrees of freedom (the direct effects only model is not nested with these two models). Although the partial mediation model provided a significantly better fit to the data according to this test, $\Delta\chi^2(4) = 16.59, p < .05$, the other fit indices were nearly identical. This fact suggests that the two models demonstrated similar good fit to the data.

Table 4
Fit Statistics for Alternative Latent Growth Models of Relations Between Selection and Training and Unit Performance

Model	χ^2	*df*	CFI	NNFI	RMSEA	SRMR
1. Full mediation	1,388.75	400	.96	.95	.053	.043
2. Partial mediation	1,372.16	396	.96	.95	.053	.038
3. Direct effects only	1,350.67	384	.96	.95	.054	.035

Note. *df* = degrees of freedom; CFI = comparative fit index; NNFI = nonnormed fit index; RMSEA = root-mean-square error of approximation; SRMR = standardized root-mean-square residual. All chi-square values are significant ($p < .05$).

We also assessed the direct and indirect effects of selection and training on unit profits (i.e., we used the path coefficients from the partial mediation model), and these results are shown in Table 5. To focus on the change relationships, both selection and training were significant predictors of profits, but their influence was manifested in different ways. In particular, change in selection affected change in profits more indirectly than it did directly (i.e., mediated through CSP), whereas the effect of change in training on change in profits was almost completely direct. Thus, selection and training affected not only CSP and retention (which our model suggests are relatively proximal indicators of unit performance) but also the "bottom-line" outcome of unit profits.

Causal Direction of Relations Between Selection and Training and Unit Performance

Our final interest was in the causal direction of relations between selection/training and unit performance, which we examined using a cross-lagged panel design analysis within LISREL (Finkel, 1995; Kessler & Greenberg, 1981). We fitted three structural models for each pair of predictor–criterion variables. The first model (i.e., the causality model) included paths from earlier measures of the selection or training variable (e.g., selection at Time 1) to later measures of the unit performance variable (e.g., retention at Time 2). The second model (i.e., the reverse causality model) included paths from earlier measures of the unit performance variable (e.g., retention at Time 1) to later measures of selection or training (e.g., selection at Time 2). The third model (i.e., the reciprocal causality model) included both sets of paths and thus tested whether the relationship of interest was nonrecursive. This last model is shown in Figure 2.

Each model included autoregressive paths between consecutive measures of the selection or training variable and between consecutive measures of the unit performance variable. Inclusion of these paths controls for the effects of prior selection/training and unit performance when one estimates each cross-lagged relationship. Further, we allowed the Time 1 selection/training and unit performance measures to covary, and we included residual covariances between subsequent, same-period measures of the two variables (Finkel, 1995). Because the three models described above are nested, we could compare their relative fit to the data using the change in chi-square test.

Results revealed that differences in fit among the three models (i.e., causality, reverse causality, and reciprocal causality) generally were rather modest (see Table 6). Nonetheless, as we anticipated, the reciprocal model tended to fit the data better (i.e., according to the change in chi-square test and, to some extent, the other fit indices) than did the causality and reverse causality models.[5] However, there were two exceptions. In particular, the causality model provided the best fit for the training–profits rela-

[5] The somewhat poor fit for some of these models was due primarily to the fact that paths between nonconsecutive measures of the same variable (e.g., selection at Time 1 and Time 3, profits at Time 2 and Time 5) were constrained to be zero. Recall that only paths between consecutive measures were estimated.

Table 5
Standardized Total, Direct, and Indirect Effects of Selection and Training on Unit Profits

Variable	Total	Direct	Indirect	Indirect: Through CSP	Indirect: Through retention
Selection-I	.30*	.23*	.07	.06	.01
Selection-S	.23*	.08	.15*	.15	.00
Training-I	.24*	.13*	.11*	.07	.04
Training-S	.32*	.27*	.05	.05	.00
CSP-I	.17*	.17*			
CSP-S	.34*	.34*			
Retention-I	.08	.08			
Retention-S	.24*	.24*			

Note. CSP = customer service performance; I = intercept (i.e., initial status); S = slope (i.e., change over time).
* $p < .05$.

tionship, and the reciprocal and the reverse causality models for the selection–profits relationship were not significantly different. Thus, the reverse causality model, which is more parsimonious, is to be preferred.

In addition, an interesting trend emerged as we compared the fit of the causality and reverse causality models. For training, the causality model fitted significantly better than did the reverse causality model for all three training–unit performance relationships. Conversely, the reverse causality model fitted better for selection in relation to both CSP and profits (the causality and reverse causality models demonstrated a similar fit for selection–retention relation). Thus, to the extent that selection and training were causally related to unit performance, the results suggest that training tended to lead to unit performance, whereas unit performance tended to lead to selection.

Discussion

Key Findings and Implications

Our primary aim in this study was to examine relations between the actual utilization of job-related selection and training systems and the performance of units from a large fast-food organization, using a design and analytic approach that overcame some of the limitations of previous research in this important area. Results revealed considerable variation in the use and the change in use of entry-level selection and training systems across units of the same organization. This variation in selection and training, in turn, was related to unit performance; more important, change in selection and training use was related to change in unit performance over time. Change in selection was related to change in unit CSP, whereas change in training was related to change in service performance, as well as to change in unit retention. In addition, change in both selection and training was positively related to change in unit financial performance. Training primarily affected profits directly, and selection affected profits both directly and indirectly via its influence on change in service performance.

Furthermore, the present results, which are based on a longitudinal design and an analytic approach that support causal inferences, generally suggest the existence of a reciprocal relationship between selection/training and unit performance. In cases where there was some evidence of a unidirectional relationship, the data appear to suggest that use of the training procedure leads to unit performance, whereas unit performance leads to use of the selection procedure (i.e., reverse causality). A reviewer suggested that one possible explanation for this latter finding is that units have less control over the selection system than the training system. In particular, external factors, such as the local economy and the quality of the applicant pool, may have a relatively greater influence on selection than on training (although preliminary analyses suggested that these factors did not have a strong influence on selection or training; see Footnote 3). This argument, along with the relatively higher stability of training versus selection utilization across units and over time (see Table 1), suggests that use of employee selection practices, at least in the way they were operationalized in the present study, may be more endogenous than exogenous. However, because the fit of the alternative causal models we tested did not differ much, we must be careful not to overinterpret this finding.

The above results have at least four implications for HR research and practice. First, our finding of significant across-unit variation in the use and the change in use of selection and training has implications for interpretation of the results of prior research. That is, previous research that has measured HR practices by asking single representatives to indicate the existence or perceived use/effectiveness of various HR practices within their organization as a whole could be problematic. If units vary in the extent and/or manner in which they use those practices, the analysis and interpretation of organization-level data will be incomplete and potentially inaccurate. Moreover, we found that selection and training use, as well as all three measures of unit performance, exhibited significant change over time, even during the course of a single year. This finding suggests that studies that use static (i.e., nontime-varying) measures of HR practices and/or organizational per-

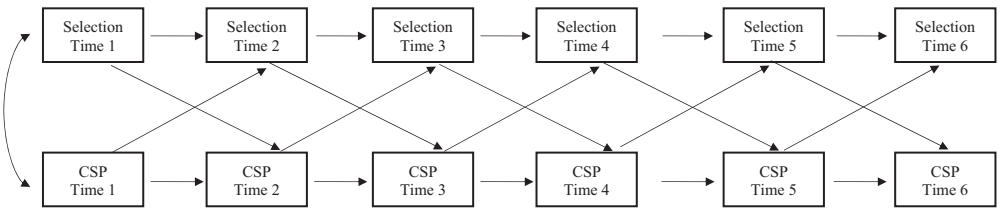

Figure 2. Cross-lagged panel model (i.e., the reciprocal causality model) we used to assess the causal direction of relations between selection/training and unit performance. For clarity, residual covariances between same-period measures of selection and customer service performance (CSP) variables have been excluded.

Table 6
Fit Statistics for Models From the Cross-Lagged Panel Design Analyses

Variables/model	χ^2	*df*	Sign.	CFI	NNFI	RMSEA	SRMR
1. Selection and CSP							
a. S → CSP	452.88	45		.70	.68	.103	.117
b. CSP → S	411.92	45	a	.73	.71	.097	.110
c. S ↔ CSP	397.46	40	a,b	.73	.72	.102	.106
2. Training and CSP							
a. T → CSP	350.46	45	b	.92	.91	.089	.098
b. CSP → T	376.51	45		.92	.90	.093	.116
c. T ↔ CSP	308.58	40	a,b	.93	.92	.088	.087
3. Selection and retention							
a. S → R	359.46	45		.94	.94	.090	.113
b. R → S	355.79	45		.94	.94	.090	.089
c. S ↔ R	284.63	40	a,b	.96	.95	.084	.070
4. Training and retention							
a. T → R	291.11	45	b	.97	.96	.080	.095
b. R → T	478.85	45		.95	.94	.106	.138
c. T ↔ R	220.71	40	a,b	.98	.97	.072	.047
5. Selection and profits							
a. S → P	442.45	45		.83	.82	.103	.113
b. P → S	421.54	45	a	.84	.83	.100	.105
c. S ↔ P	411.18	40		.84	.83	.105	.102
6. Training and profits							
a. T → P	370.14	45	b,c	.93	.93	.093	.096
b. P → T	423.41	45		.92	.92	.100	.115
c. T ↔ P	363.82	40		.93	.93	.098	.092

Note. Sign. = model fitted data significantly better ($p < .05$) than the alternative model(s) listed according to change in chi-square statistics. The causality model (a) includes paths from early selection/training to later unit performance. The reverse causality model (b) includes paths from early unit performance to later selection/training. The reciprocal model (c) includes paths from Models a and b. CFI = comparative fit index; NNFI = nonnormed fit index; RMSEA = root-mean-square error of approximation; SRMR = standardized root-mean-square residual; CSP = customer service performance; S = selection; T = training; R = retention; P = profits.

formance may conceal potentially important change processes that exist within the data.

Second, the present results demonstrate that utilization of job-related selection and training systems can positively affect various aspects of unit performance and effectiveness. The magnitude of these relationships (which often exceeded .40) is particularly revealing, given our focus on selection and training for entry-level service positions. Indeed, these relations suggest that human capital investments, even for low-skill jobs, can yield a high return in terms of higher CSP, retention, and profits.

To help illustrate the practical implications of these relations, we estimated the predicted mean of each outcome (in its original metric) using values of −2 and 2 standard deviations from the mean of the predictors. With selection and training as the predictors, the resulting predicted means for CSP were 92.52 and 84.33, respectively. This indicates that units 2 standard deviations above the mean on the two HR variables are likely to have 8% higher service performance ratings than are units 2 standard deviations below the mean on the HR variables. The predicted mean values for retention were 94.15 and 79.00, which is a difference of 15%. Finally, when service performance and retention were added to the HR variables to forecast unit profits, the predicted means were 105.65 and 94.72, respectively. This means that units 2 standard deviations above the mean on the predictors would, on average, demonstrate 11% higher profits (relative to expectations) than would units 2 standard deviations below the mean on the predictors. Of course, the positive impact of selection, training, and the intermediate outcomes would be even larger if one were to compare units that further deviate from the average unit (e.g., the top and bottom 10% of units).

A third implication of our findings is that failure to consider more proximal performance measures can lead one to underestimate the potential value of HR systems. Although both selection and training exhibited bottom-line impact, they also influenced more proximal outcomes (e.g., CSP) that in turn influenced unit profits. Therefore, even if HR systems, such as selection and training, appear to demonstrate a minimal influence on distal outcomes, such as profits, they may exhibit a relatively stronger influence on more immediate but valued outcomes (e.g., service performance) that may be more affected than are financial outcomes by employee KSAOs, behavior, and attitudes.

Fourth, strategic HR researchers generally believe that an organization's overall HR system, rather than its individual practices, provides the strongest basis for understanding the effects of HR on firm performance (B. E. Becker & Gerhart, 1996). However, at least two of our findings raise questions about the practice of combining measures of selection, training, and/or other HR systems (e.g., rewards, benefits) into a single high-performance work practices composite. For one, correlations between units' use of selection and training within any given period were relatively small. As discussed, one possible explanation for this finding is that use of training is more systematic than is use of selection, which, in turn, contributes to weak relations between the two practices. Second, selection and training appeared to affect differ-

ent measures of unit performance in different ways. For instance, there was some evidence that training affected unit profits primarily directly, whereas selection affected profits (and/or vice versa) both directly and indirectly.

Taking these findings together, we believe that failure to consider the unique effects of individual HR practices on various measures of unit or organizational performance may inhibit advances to both theory and practice. At a minimum, we encourage scholars to use research designs and analytic methods that allow them to evaluate both the individual and combined effects of HR practices on the outcomes of interest.

Limitations and Directions for Future Research

We conclude by noting some potential limitations of the present study and some suggestions for how they might be addressed in future research. First, the 1-year time frame of our study was appropriate, given that entry-level service environments are subject to constant change (e.g., high turnover) and, thus, that HR systems may demonstrate more immediate impacts relative to other types of work environments.

At the same time, this time frame limited our ability to assess longer term effects of selection and training. It also may have limited our ability to assess more clearly the causal direction of relations between selection/training and unit performance. For example, changes in unit profits over time, although statistically significant, were relatively modest, and this made it difficult for us to determine whether selection and training lead to financial performance or vice versa. Also, our results do not provide strong support for any particular causal sequence of relations between change in selection/training and change in unit performance. We hope that future studies will provide further insights in this regard. For instance, the possibility that different HR practices may exhibit different causal linkages with unit outcomes is intriguing and deserves further research attention.

Furthermore, although we were able to examine relations between the actual utilization of job-related selection and training (e.g., versus the mere existence or perceived use these systems) and unit performance, our measures were somewhat broad indicators of selection and training and, in turn, human capital quality (e.g., the extent to which units selected employees who achieved a specific cutoff score on a single selection test). The demonstrated effectiveness of these systems may have been even stronger had we used more fine-grained measures, such as unit-level averages of actual scores on the selection test. However, these are promising results for practitioners, in that the use of a single selection test and a basic training program can affect a diverse set of unit outcomes.

A related issue is that the selection and training variables we used were proxies of the underlying psychological mechanisms. That is, we did not measure the actual emergent manifestations of human capital quality, such as individual or team KSAOs and behavior, that presumably account for the observed relations (Kozlowski & Klein, 2000; Ostroff & Bowen, 2000). Because of this, we are somewhat limited in what we can infer regarding the relationship between human capital quality and unit performance on the basis of the present results. A key challenge for those conducting future macro-level research will be to use measures that allow for more valid inferences concerning the effects of human capital variables on organizational performance (e.g., Ployhart et al., 2006).

A persistent challenge for organizational scholars, and for macro HR researchers in particular, is to test comprehensive models (e.g., avoid the omitted variables problem) and at the same time ensure that the models are parsimonious enough to produce interpretable results and meaningful conclusions. Although we investigated both proximal and distal indicators of unit performance, our model did not include other potentially relevant proximal outcomes, such as unit-level attitudes like job satisfaction and organization commitment. In addition, the overall pattern of results provides some evidence that selection/training and unit performance are causally related. Nonetheless, it is possible that these relations are spurious and that the link between the HR practices and performance is due to some third variable that we did not measure, such as the relative effectiveness of unit managers. We hope that future research can investigate the effects of selection and training within models that include these and other potentially relevant variables.

Macro research has not dealt with implementation of HR practices as a separate construct but rather has held that implementation follows automatically from organizations' strategic HR policies (B. E. Becker & Huselid, 2006). The same can be said of micro HR research. For example, most selection studies have been focused on demonstrating the validity of a particular selection procedure (e.g., in a single sample of job incumbents), but rarely have researchers examined whether or how the selection system actually is implemented across the organization or the effects of this implementation on outcomes such as unit performance.

Although our data reflected units' utilization (i.e., implementation) of entry-level selection and training, we were unable to model factors that may contribute to this variation. For example, the extent to which units selected employees who scored at or above the cutoff on the selection test may have been influenced by the quality of their respective applicant pools, but we did not have the data with which to examine this possibility fully. Investigating the range of factors that could influence the implementation of these and other HR systems would seem to be an important direction for future research. One critical need is the development of a model of implementation decisions to guide researchers' work. For example, such a model might focus on factors that affect managers' willingness and ability to implement HR systems. Such factors might include rewards or negative consequences for implementing (or not implementing) the systems, managers' perceptions concerning the effectiveness of the systems, and the KSAOs (e.g., dependability, time management) and training managers may need to implement the systems.

References

Arthur, J. B. (1994). Effects of human resource systems on manufacturing performance and turnover. *Academy of Management Journal, 37,* 670–687.

Barney, J. B. (1991). Firm resources and sustained competitive advantage. *Journal of Management, 17,* 99–120.

Barrick, M. R., & Zimmerman, R. D. (2005). Reducing voluntary, avoidable turnover through selection. *Journal of Applied Psychology, 90,* 159–166.

Batt, R. (2002). Managing customer services: Human resources practices, quit rates, and sales growth. *Academy of Management Journal, 45,* 587–597.

Becker, B. E., & Gerhart, B. (1996). The impact of human resources management on organizational performance: Progress and prospects. *Academy of Management Journal, 39,* 779–801.

Becker, B. E., & Huselid, M. A. (2006). Strategic human resources management: Where do we go from here? *Journal of Management, 32,* 898–925.

Becker, G. S. (1964). *Human capital.* New York: Columbia University Press.

Bentein, K., Vandenberg, R., Vandenberghe, C., & Stinglhamber, F. (2005). The role of change in the relationship between commitment and turnover: A latent growth modeling approach. *Journal of Applied Psychology, 90,* 468–482.

Bentler, P. M. (1990). Comparative fit indexes in structural models. *Psychological Bulletin, 107,* 238–246.

Bentler, P. M. (1995). *EQS structural equations program manual.* Encino, CA: Multivariate Software.

Bentler, P. M., & Bonnett, D. G. (1980). Significance tests and goodness of fit in the analysis of covariance structures. *Psychological Bulletin, 88,* 588–606.

Chan, D. (1998). The conceptualization and analysis of change over time: An integrative approach incorporating longitudinal mean and covariance structures analysis (LMACS) and multiple indicator latent growth modeling (MLGM). *Organizational Research Methods, 1,* 421–483.

Chan, D. (2002). Latent growth modeling. In F. Drasgow & N. Schmitt (Eds.), *Measuring and analyzing behavior in organizations: Advances in measurement and data analysis* (pp. 302–349). San Francisco: Jossey-Bass.

Chan, D., & Schmitt, N. (2000). Interindividual differences in intraindividual changes in proactivity during organizational entry: A latent growth modeling approach to understanding newcomer adaptation. *Journal of Applied Psychology, 85,* 190–210.

Cho, S., Woods, R. H., Jang, S., & Erdem, M. (2006). Measuring the impact of human resource management practices on hospitality firms' performances. *Hospitality Management, 25,* 262–277.

Colquitt, J. A., LePine, J. A., & Noe, R. A. (2000). Toward an integrative theory of training motivation: A meta-analytic path analysis of 20 years of research. *Journal of Applied Psychology, 85,* 678–807.

Combs, J., Liu, Y., Hall, A. T., & Ketchen, D. (2006). How much do high performance work practices matter? A meta-analysis of their effects on organizational performance. *Personnel Psychology, 59,* 501–528.

Delaney, J. T., & Huselid, M. A. (1996). The impact of human resource management practices on perceptions of organizational performance. *Academy of Management Journal, 39,* 949–969.

Dess, G. G., & Shaw, J. D. (2001). Voluntary turnover, social capital, and organizational performance. *Academy of Management Review, 26,* 446–456.

Finkel, S. E. (1995). *Causal analysis with panel data.* Thousand Oaks, CA: Sage.

Gerhart, B. (2005). Human resources and business performance: Findings, unanswered questions, and an alternative approach. *Management Revue, 16,* 174–185.

Gerhart, B., Wright, P. M., McMahan, G. C., & Snell, S. A. (2000). Measurement error in research on human resources and firm performance: How much error is there and how does it influence effect size estimates? *Personnel Psychology, 53,* 803–834.

Guest, D. E., Michie, J., Conway, N., & Sheehan, M. (2003). Human resource management and corporate performance in the UK. *British Journal of Industrial Relations, 41,* 291–314.

Hatch, N. W., & Dyer, J. H. (2004). Human capital and learning as a source of sustainable competitive advantage. *Strategic Management Journal, 25,* 1155–1178.

Hausknecht, J. P., Day, D. V., & Thomas, S. C. (2004). Applicant reactions to selection procedures: An updated model and meta-analysis. *Personnel Psychology, 57,* 639–683.

Hitt, M. A., Bierman, L., Shimizu, K., & Kochhar, R. (2001). Direct and moderating effects of human capital on strategy and performance in professional service firms: A resource-based perspective. *Academy of Management Journal, 44,* 13–28.

Hull, C. L. (1928). *Aptitude testing.* Tarrytown, NY: World.

Huselid, M. A. (1995). The impact of human resource management practices on turnover, productivity, and corporate financial performance. *Academy of Management Journal, 38,* 635–672.

Huselid, M. A., & Becker, B. E. (2000). Comment on "Measurement error in research on human resources and firm performance: How much error is there and how does it influence effect size estimates?" by Gerhart, Wright, McMahan, and Snell. *Personnel Psychology, 53,* 835–854.

Ilgen, D. R., & Pulakos, E. D. (1999). Employee performance in today's organizations. In D. R. Ilgen & E. D. Pulakos (Eds.), *The changing nature of work performance: Implications for staffing, motivation, and development* (pp. 1–20). San Francisco: Jossey-Bass.

Jöreskog, K., & Sörbom, D. (2004). *LISREL 8.71: Structural equation modeling.* Chicago: SSI.

Kacmar, K. M., Andrews, M. C., Van Rooy, D. L., Steilberg, R. C., & Cerrone, S. (2006). Sure everyone can be replaced. . .But at what cost? Turnover as a predictor of unit-level performance. *Academy of Management Journal, 49,* 133–144.

Keiningham, T. L., Perkins-Munn, T., & Evans, H. (2003). The impact of customer satisfaction on share-of-wallet in a business-to-business environment. *Journal of Service Research, 6,* 37–50.

Kessler, R. C., & Greenberg, D. F. (1981). *Linear panel analysis: Models of quantitative change.* New York: Academic Press.

Koch, M. J., & McGrath, R. G. (1996). Improving labor productivity: Human resource management policies do matter. *Strategic Management Journal, 17,* 335–354.

Kozlowski, S. W. J., & Klein, K. J. (2000). A multilevel approach to theory and research in organizations: Contextual, temporal, and emergent processes. In K. J. Klein & S. W. J. Kozlowski (Eds.), *Multilevel theory, research, and methods in organizations* (pp. 3–90). San Francisco: Jossey-Bass.

Lance, C. E., Meade, A. W., & Williamson, G. M. (1999). We should measure change–And here's how. In G. M. Williamson & D. R. Shaffer (Eds.), *Physical illness and depression in older adults: Theory, research, and practice* (pp. 201–235). New York: Plenum Press.

Lepak, D. P., & Snell, S. A. (1999). The human resource architecture: Toward a theory of human capital allocation and development. *Academy of Management Review, 24,* 31–48.

Liao, H., & Chuang, A. (2004). A multilevel investigation of factors influencing employee service performance and customer outcomes. *Academy of Management Journal, 47,* 41–58.

McArdle, J. J., & Epstein, D. (1987). Latent growth curves within developmental structural equation models. *Child Development, 58,* 110–133.

Meredith, W., & Tisak, J. (1990). Latent curve analysis. *Psychometrika, 55,* 107–122.

Newman, J. (2007). *My secret life on the Mcjob: Lessons from behind the counter guaranteed to supersize any management style.* New York: McGraw-Hill.

Ostroff, C., & Bowen, D. E. (2000). Moving HR to a higher level: Human resource practices and organizational effectiveness. In K. J. Klein & S. W. J. Kozlowski (Eds.), *Multilevel theory, research, and methods in organizations* (pp. 211–266). San Francisco: Jossey-Bass.

Pfeffer, J. (1994). *Competitive advantage through people.* Boston: Harvard Business School Press.

Pitariu, A. H., & Ployhart, R. E. (2006, August). *Mediation in longitudinal and multilevel contexts: The longitudinal multilevel mediation (LMM)*

model. Paper presented at the 60st Annual Meeting of the Academy of Management, Atlanta.

Ployhart, R. E., & Schneider, B. (2005). Multilevel selection and prediction: Theories, methods, and models. In A. Evers, O. Smit-Voskuyl, & N. Anderson (Eds.), *Handbook of personnel selection* (pp. 495–516). London: Wiley.

Ployhart, R. E., Weekley, J. A., & Baughman, K. (2006). The structure and function of human capital emergence: A multilevel examination of the attraction–selection–attrition model. *Academy of Management Journal, 49,* 661–677.

Salvaggio, A. N., Schneider, B., Nishii, L. H., Mayer, D. M., Ramesh, A., & Lyon, J. S. (2007). Manager personality, manager service quality orientation, and service climate: Test of a model. *Journal of Applied Psychology, 92,* 1741–1750.

Schmidt, F. L., & Hunter, J. E. (1998). The validity and utility of selection methods in personnel selection: Practical and theoretical implications of 85 years of research findings. *Psychological Bulletin, 124,* 262–274.

Snell, S. A., & Dean, J. W. (1992). Integrated manufacturing and human resource management: A human capital perspective. *Academy of Management Journal, 35,* 467–504.

Steiger, J. H. (1990). Structural model evaluation and modification: An interval estimation approach. *Multivariate Behavioral Research, 25,* 173–180.

Thorndike, R. L. (1949). *Personnel selection.* New York: Wiley.

Viteles, M. S. (1932). *Industrial psychology.* New York: Norton.

Willett, J. B., & Sayer, A. G. (1994). Using covariance structure analysis to detect correlates and predictors of individual change over time. *Psychological Bulletin, 116,* 363–381.

Wright, P. M., & Boswell, W. R. (2002). Desegregating HRM: A review and synthesis of micro and macro human resources management research. *Journal of Management, 28,* 247–276.

Wright, P. M., Dunford, B. B., & Snell, S. A. (2001). Human resources and the resource-based view of the firm. *Journal of Management, 27,* 701–721.

Wright, P. M., Gardner, T. M., Moynihan, L. M., & Allen, M. R. (2005). The relationship between HR practices and firm performance: Examining causal order. *Personnel Psychology, 58,* 409–446.

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