An Empirical Examination of the Mechanisms Mediating Between High-Performance Work Systems and the Performance of Japanese Organizations

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The resource-based view of the firm and social exchange perspectives are invoked to hypothesize linkages among high-performance work systems, collective human capital, the degree of social exchange in an establishment, and establishment performance. The authors argue that high-performance work systems generate a high level of collective human capital and encourage a high degree of social exchange within an organization, and that these are positively related to the organization's overall performance. On the basis of a sample of Japanese establishments, the results provide support for the existence of these mediating mechanisms through which high-performance work systems affect overall establishment performance.

Keywords: strategic HRM, social exchange theory, mediators, human capital, relative establishment performance

Many researchers have examined the potential benefits of using high-performance work systems (HPWS) as a means to maximize employee contributions toward competitive advantage (Becker & Huselid, 1998; Huselid, 1995). HPWS refer to a group of separate but interconnected human resource (HR) practices designed to enhance employees' skills and effort (Datta, Guthrie, & Wright, 2005; Huselid, 1995; Way, 2002; Wood & Wall, 2002).[1] Although a precise definition of HPWS is difficult to formulate (Datta et al., 2005), previous research (e.g., Batt, 2002; Datta et al., 2005; Delery & Shaw, 2001; Huselid, 1995; Guthrie, 2001; Lepak & Snell, 2002; Way, 2002; Wood & Wall, 2002; Zacharatos, Barling, & Iverson, 2005) has suggested that HPWS involve flexible job assignments, rigorous and selective staffing, extensive training and development, developmental and merit-based performance appraisal, competitive compensation, and extensive benefits.

Although prior research generally has demonstrated a positive relationship between HPWS and organizational performance (e.g.,

Arthur, 1994; Batt, 2002; Huselid, 1995; Way, 2002; Zacharatos et al., 2005), some researchers recently have challenged the validity of this finding (e.g., Wall & Wood, 2005; Wright, Gardner, Moynihan, & Allen, 2005). Wright et al. (2005) found that, after controlling for past firm performance, the positive relationship between HPWS and organizational effectiveness diminished. Similarly, Wall and Wood (2005) and Wright and Gardner (2003) suggested that the relationship between HR systems and organizational outcomes might be more complicated than typically is depicted.

Some of the inconsistency in the findings regarding the HR–performance relationship reported in the literature might be due to the fact that the underlying mechanisms explaining how HPWS relate to organizational performance have not been well established, either theoretically or empirically (Delery, 1998; Wright & Gardner, 2003). Although a consensus may be emerging that human factors serve as a key mediator in the causal link that "flows from practices through people to performance" (Ramsey, Scholarios, & Harley, 2000, p. 502), "prior research [in strategic HR management] is theoretically undeveloped and has not specified the mediating employee behaviors that explain the relationship between HR practices and performance" (Batt, 2002, p. 587). Furthermore, whereas some researchers have suggested that em-

[1] Wood, de Menezes, and Lasaosa (2003) noted that the terms *high commitment*, *high involvement*, and *high performance* are used interchangeably by various scholars in describing these systems. For example, Datta et al. (2005) treat high-performance work systems and high-involvement HR systems as synonymous. The term *high-performance work systems* has been adopted in this study.

ployee attitudes and behaviors may serve as potential mediators, Shore et al. (2004) noted that empirical examination of the mechanisms by which HR practices may affect organizational performance is lacking.

Our primary objective in this study was to examine the intermediate linkages through which HPWS relate to organizational effectiveness, both theoretically and empirically. Elucidating these links would contribute to the strategic human resources management (HRM) literature theoretically by integrating the resource-based view of the firm and social exchange theory perspectives. We hope that incorporating research findings on aggregate attitudes and performance might then allow the development of a conceptual model in which collective human capital and social exchange mediate the HPWS–organizational performance relationship. In addition, we contribute to the literature empirically by examining these relationships with a unique data set on 76 Japanese establishments. *Establishment* is used here to describe "a stand-alone entity with a business address but distinct from a company" (Osterman, 1994, p. 174). These data were provided by multiple respondents from two different sources (managers and employees) within each establishment.

Theoretical Overview

HRM scholars commonly assert that understanding the impact of HR practices on organizational outcomes requires a focus on the overall HR system. Although the empirical evidence regarding the importance of internal fit and synergy among HR practices is not entirely conclusive (Becker & Gerhart, 1996; Gerhart, Trevor, & Graham, 1996), the logic is that employees are typically exposed to a host of HR practices simultaneously, and these practices do not always influence the employees independently. As a result, any empirical investigation of HR activities and their organizational outcomes should operate at the system level (Ichniowski, Shaw, & Prennushi, 1997; MacDuffie, 1995).

When specifically discussing HPWS, the mechanisms by which HR practices operate are less clear. But if HR systems can be considered to work by influencing both employees' skills (ability) and attitudes (motivation) in ways that affect performance (e.g., Delery & Shaw, 2001; Huselid, 1995; Wright & Snell, 1991), it should be possible to build on and extend this existing conceptual framework to develop the argument that the relationship between HPWS and organizational performance is mediated by an establishment's collective level of human capital and the degree of social exchange taking place there. The proposed model is depicted in Figure 1, and we develop this argument below.

The relationship between HPWS and the level of collective human capital is rather straightforward (e.g., Arthur, 1994; Guthrie, 2001; Huselid, 1995; Wright & Snell, 1991) as there are several components of HPWS that contribute to achieving this objective. In a HPWS environment, the emphasis on rigorous and selective staffing and comprehensive training contributes to a high level of collective human capital for the workforce (e.g., Huselid, 1995; Way, 2002; Zacharatos et al., 2005). For example, Guthrie and Olian (1991) showed that selection practices have an effect on the characteristics of the employees and managers selected for jobs. Delaney and Huselid (1996) drew attention to the value of HRM practices that emphasize hiring individuals of higher quality, or of raising the level of skills and abilities among the current

workforce, or both. In addition, providing competitive compensation and extensive benefits to employees, another component of HPWS, helps attract and recruit high-caliber individuals (e.g., Arthur, 1994; Guthrie, 2001; Huselid, 1995). Finally, HPWS emphasize flexible job assignments, which provide employees with opportunities to learn and to develop their skills. In light of these influences, we expected the following:

Hypothesis 1: The use of HPWS is positively related to the level of collective human capital among employees.

The potential impact of human capital on firm performance has been widely recognized in both the HRM and the strategy literature (Barney, 1991; Carpenter, Sanders, & Gregersen, 2001; Coff, 1999; Hatch & Dyer, 2004; Pennings, Lee, & van Witteloostuijn, 1998). At a very basic level, an organization's stock of human capital dictates the nature and extent of employees' potential contributions to the organization (e.g., Wright & Snell, 1991). According to the resource-based view of the firm, competitive advantage stems from an organization's possession of valuable, rare, and difficult to imitate resources (e.g., Barney, 1991). A resource is valuable if it enables an organization to take advantage of opportunities or neutralize threats in the environment. Furthermore, if the resource is also rare, and it is costly for competitors to imitate the resource or to substitute it with another resource that can perform the same tasks, the firm may achieve long-term superior performance and sustained competitive advantage from the resource (e.g., Amit & Schoemaker, 1993).

High-quality human capital can be considered to satisfy the above criteria for creating and sustaining superior performance and competitive advantage. In addition to its conventional contributions, human capital is generally embedded in an organization's complex social systems, which may cause it to take on firm-specific features that make it more useful for a particular firm than for others. For example, a firm's human capital may have developed so as to fit with the firm's particular strategy and structure and to have complex interrelationships with its other physical, financial, legal, or information resources (e.g., Grant, 1991). As a result of this complexity, the link between human capital and firm performance is often difficult to explain, even if it is clearly appreciated. These features of human capital also make it less likely to be freely traded (Dierickx & Cool, 1989; Doeringer & Piore, 1971) or to be readily imitated or substituted without incurring very significant costs (Barney, 1991; Williamson, 1981). The firm specificity of human capital and the ambiguity in the human capital–performance link thus enable a firm to profit from its human capital more stably and over a longer period of time than is typical of other resources. Human capital thus has considerable potential for generating superior financial performance and competitive advantage (e.g., Coff, 1999; Grant, 1996; Kogut & Zander, 1992, 1996). This led to the following expectation:

Hypothesis 2: The level of collective human capital is positively related to overall establishment performance.

As Huselid (1995) and Delery and Shaw (2001) noted, however, it is also important to take into account how HPWS affect the motivation of employees to exert effort on behalf of the organization. Kozlowski and Klein (2000) noted that aggregate employee
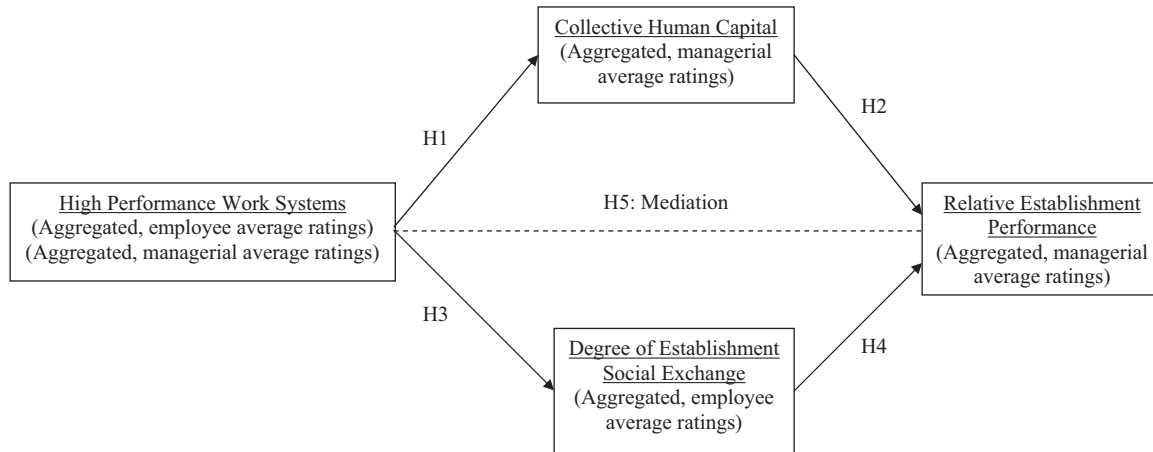
Figure 1. Proposed mediating model of high-performance work systems. Ratings sources are noted in parentheses.

attitudes and behaviors can be considered a shared construct, which "describes the characteristics that are common to—that is, shared by—the members of a unit" (p. 30). Van Maanen and Schein (1979) also have argued that socialization in an organization "entails the learning of a cultural perspective . . . [i.e.,] a perspective for interpreting one's experiences in a given sphere of the work world" (p. 212). Moreover, Ashforth and Saks (1996) suggested that institutionalized socialization tactics that allow all newcomers to go through similar processes together create stronger identification with the organization's values and norms.

Following these arguments, formal training practices for employees, such as those included in HPWS, also may serve as socialization tactics that help develop social capital. In addition, the attraction–selection–attrition perspective (e.g., Schneider, 1987; Schneider & Goldstein, 1995) proposes that these three interrelated dynamic processes produce homogeneity within an organization. Extending this logic, the selective recruitment and rigorous staffing practices involved in HPWS may serve to attract employees who hold similar values. The rigorous training then molds a group of employees with similar values and expectations.

Furthermore, building on the arguments of social exchange theory and findings from research on the relationships between aggregate attitudes and organizational performance (e.g., Fulmer, Gerhart, & Scott, 2003; Harter, Schmidt, & Hayes, 2002; Ostroff, 1992; Ryan, Schmit, & Johnson, 1996), a positive association might be expected between the degree of social exchange and organizational performance. Social exchange theory (e.g., Blau, 1964; Gouldner, 1960; Homans, 1961; March & Simon, 1958) might also provide insight into the mechanisms through which HPWS may relate to organizational performance.

According to Blau (1964), *social exchange* can be defined as "favors that create diffuse future obligations, not precisely specified ones, and the nature of the return cannot be bargained about but must be left to the discretion of the one who makes it" (p. 93). When social exchange takes place in an employer–employee relationship, March and Simon's (1958) inducement–contribution formulation appears relevant and provides additional insight. According to March and Simon, an organization's ". . . survival and continued existence is contingent upon the contributions of em-

ployees being sufficient to generate the inducements that subsequently are perceived as adequate by employees in terms of eliciting the necessary contributions" (Coyle-Shapiro & Conway, 2004, p. 8). Employers who can balance these inducements and contributions are likely to be able to develop better social exchange relationships with their employees and, as result, reap higher performance.

When HR practices are interpreted by employees as expressing appreciation, investment, and recognition, they begin to perceive themselves in a social exchange, as opposed to a purely mercantile, relationship (Shore & Shore, 1995). For example, rigorous recruitment and selection procedures may signal to employees that the organization values them highly. HPWS performance appraisal is likely to entail praise and perhaps opportunities for promotion. Empowerment in decision making, high wages, and extensive benefits may be viewed by employees as recognition of their value to the organization. Rigorous training also represents organizational investment in and commitment to the employee, and it signals that they are considered important to the survival and success of the organization. All of these constitute an incentive for the high-caliber employees to remain with the organization and to perform at a high level (e.g., Guthrie, 2001; Way, 2002). Thus, we expected the following:

Hypothesis 3: The use of HPWS is positively related to a high degree of social exchange within an establishment.

An individual employee's social exchange relationship has been found to be positively related to extrarole behaviors (e.g., Masterson, Lewis, Goldman, & Taylor, 2000; Rupp & Cropanzano, 2002; Wayne, Shore, & Liden, 1997). When employees regard their social exchange relationship with an organization as involved (i.e., a high degree of social exchange), they are more likely to provide help to their coworkers. Employees who share a high social exchange relationship thus benefit from receiving extra help from coworkers and, in turn, help others. This process is clearly likely to lead to positive synergies among employees and, as a result, improved productivity from the unit (Podsakoff, Ahearne, & MacKenzie, 1997). For example, Podsakoff et al. (1997) found

that an individual's organizational citizenship behaviors were related to quality and quantity aspects of his or her work group's performance.

In addition, a stream of research has found a significant relationship between aggregate employee attitudes and performance at both the business-unit level and the firm level. For example, Ryan et al. (1996) found a significant relationship between aggregate job and company satisfaction for bank branch employees and indicators of company performance. In a meta-analysis, Harter et al. (2002) found significant correlations between employee attitudes (satisfaction and engagement) and outcomes at the business-unit level (customer satisfaction, productivity, profit, employee turnover, and accidents). Similarly, Podsakoff and MacKenzie (1994) found that good unit-level organizational citizenship behaviors were positively related to objective unit performance. Further support for this argument has also been found at the firm level. Ostroff (1992) found that job attitudes (job satisfaction, commitment, adjustment, and psychological stress) accounted for between 2% and 49% of additional variance in the various performance indicators for 298 schools, with a mean of 10%, after school characteristics had been controlled for. Therefore, we expected the following:

> *Hypothesis 4:* The degree of social exchange in an establishment is positively related to the establishment's overall performance.

Viewed in combination, the effects of HPWS on organizational performance should be mediated by workforce characteristics such as its collective human capital and the degree of social exchange. This logic is consistent with the work of Delery and Shaw (2001), who specifically acknowledged knowledge, skills, abilities, and motivation as linking pins that connect the HR system to labor productivity (an indicator of an organization's performance). In addition, Cropanzano and Mitchell (2005) noted that, "[a] social exchange relationship evolves when employers 'take care of employees,' which thereby engenders beneficial organizational consequences. In other words, the social exchange relationship is a mediator or intervening variable" (p. 93). Therefore, the arguments of the resource-based view of the firm, behavioral perspectives, and social exchange theory suggest that both collective human capital and the degree of social exchange play a mediating role in the HPWS–organizational performance relationship.

> *Hypothesis 5:* The collective human capital and the degree of social exchange in an establishment will mediate the relationship between HPWS and the establishment's performance.

Method

Research Design

Given the concerns related to single-rater biases (Gerhart, Wright, McMahan, & Snell, 2000), it is important that these hypotheses be tested with data from multiple independent establishments and from multiple respondents within each establishment. For these reasons, we included only organizations for which data were available from both managers and employees in the study. The original population consisted of a convenience sample of Japanese companies with which a Japanese faculty member on

the research team had a personal connection. Japanese culture places a heavy emphasis on building or having interpersonal relationships given the culture's stress on in-group versus out-group status differentials (Hofstede, 1980). Japanese business emphasizes a high-context communication style in which "most of the information is either in the physical context or internalized in the person" (Hall, 1976, p. 79). Thus, because of response rate considerations, we considered it necessary to use personal contacts. To minimize any potential bias this might introduce, we took care to select companies that were representative of various industry sectors. Of the 120 companies approached, 56 agreed to participate (46.67%). Once the consent of the top management of each participating company had been secured, we asked the HR managers to arrange site visits. The data collection procedure involved surveying managers and employees at each establishment. All the survey responses, from both managers and white-collar, full-time, permanent employees, were returned to the fourth author's university address in Tokyo, Japan, using prepaid and self-addressed envelopes.

In the cover letter to the survey, we described the purpose of the project and the voluntary nature of participation. Respondents were assured of the anonymity of their responses and the opportunity to receive feedback, if they so desired. Given that participation was voluntary and anonymous, participants were not asked to sign an informed consent form. To maximize the response rate, we contacted the managers in charge by phone or e-mail 2 weeks after the initial distribution of the survey. A second round of follow-up was conducted by mail, enclosing another set of surveys. This was reinforced again by phone calls or e-mails to all potential respondents. A final round of contact or communication was conducted by mail, again enclosing a survey packet. There was no incentive (cash or otherwise) for participating in this project.

Sample

The final sample for this study consisted of 76 business establishments from 56 different companies located in Japan, covering a range of industries and geographical regions. The final sample included 33 establishments from manufacturing; 4 from construction; 7 from the transportation, communication, electric, gas, and sanitary services sectors; 7 from wholesale trade; 5 from retail trade; 6 from finance, insurance, and real estate; and 14 others. These 76 establishments each provided at least the minimum level of response (at least 1 managerial and 2 employee responses) necessary to ensure multiple data sources for each establishment. The managerial sample consisted of 324 managers with supervisory responsibilities in the 76 establishments. The average number of managerial responses for each establishment was 4.26 (range = 1–26). There were 23 units from which only 1 managerial response was obtained. The managers, on average, had 19.02 years of work experience at the establishment ($SD = 11.63$), had 10.16 years of job tenure ($SD = 10.44$), were 47.73 years old ($SD = 7.91$), were predominantly male (95.80%), and were at least at the level of supervisor (36.50%) or middle management (36.80%). The total number of nonmanagerial employee respondents was 525, with an average of 6.89 responses per unit (range = 2–48). The employees averaged 35.90 years of age ($SD = 8.43$), were predominantly male (80.50%), and, on average, had 8.05 years of work experi-

Table 1
Factor Loadings for the Employee-Rated High-Performance Work Systems Scale

High-performance work systems item	Factor loading
1. Employees are involved in job rotation.	.39
2. Employees are empowered to make decisions.	.40
3. Jobs are designed around their individual skills and capabilities.	.61
4. Selection is comprehensive (uses interviews, tests, etc.).	.55
5. Selection emphasizes their ability to collaborate and work in teams.	.64
6. Selection involves screening many job candidates.	.60
7. Selection focuses on selecting the best all-around candidate, regardless of the specific job.	.37
8. Selection emphasizes promotion from within.	.45
9. Selection places priority on their potential to learn (e.g., aptitude).	.60
10. Training is continuous.	.69
11. Training programs are comprehensive.	.59
12. Training programs strive to develop firm-specific skills and knowledge.	.40
13. The training programs emphasize on-the-job experiences.	.67
14. Performance is based on objective, quantifiable results.	.64
15. Performance appraisals include management by objective with mutual goal setting.	.67
16. Performance appraisals include developmental feedback.	.76
17. Incentives are based on team performance.	.75
18. Compensation packages include an extensive benefits package.	.44
19. Our compensations include high wages.	.68
20. The incentive system is tied to skill-based pay.	.63
21. Our compensation is contingent on performance.	.48

Note. Principal axis factoring analysis with single-factor extraction.

ence at the establishment ($SD = 8.12$) and 6.14 years of job tenure ($SD = 6.46$).

Survey Translation Procedure

The procedures recommended by Brislin (1990) for survey translations across different languages were applied. First, the primary researcher, who is fluent in Japanese, created the English version and then translated it into Japanese. This primary researcher and another Japanese faculty member specialized in Japanese human resource management (and who is proficient in English) improved the translation through an iterative process where any concerns about discrepancies between the English and Japanese versions were detected and addressed. To validate the translation, we asked two Japanese employees in no way affiliated with this study to read through the Japanese version to test its readability and ease of comprehension. Any concerns were noted and addressed.

Measures

To help ensure the survey's validity, we obtained all of the items used from measures that had been applied in previous studies. Multiple-item scales were employed, with 7-point Likert-type anchors ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). This applied to all of the variables except for the items on establishment performance.

HPWS. To alleviate concerns regarding the particular HR practices included in the HPWS (e.g., Becker & Gerhart, 1996; Delery, 1998; Wright & Gardner, 2003), we used two different measures of HPWS in this study: One was aggregated from the employee responses, and the other was aggregated from the managerial responses. For the employees' HPWS ratings, we adapted

21 HR policy items from Lepak and Snell's (2002) commitment HR system to fit the Japanese context. Both the importance and the difficulty of developing appropriate systems of measurement across cultures have been generally recognized in the literature (e.g., Brislin, 1990; Lonner, 1990). With this in mind, we asked a member of the Faculty of Human Resource Management at the Tokyo Keizai University who specializes in comparative studies of Japanese and American HRM to select HR policies from Lepak and Snell's (2002) commitment HR system that he considered as belonging to HPWS in the Japanese context. In addition, extra care was taken to ensure that the selected items were phrased to be familiar and meaningful for the Japanese (cf. Lonner, 1990).

To examine the factor structure of these items, we performed a factor analysis[2] with principal axis factoring extraction by imposing a single-factor solution because a unidimensional conceptualization of HPWS was considered the most appropriate concept for the ideas being tested in the study (e.g., Batt, 2002; Guthrie, 2001; Way, 2002; Zacharatos et al., 2005; see also Becker & Huselid, 1998; Delery, 1998). All of the 21 items had factor loadings of .37 or above on a single factor, and this factor explained 35.82% of the variance, with an eigenvalue of 7.88. These factor loadings are shown in Table 1. The resulting 21-item scale had a reliability of .90. This alpha was comparable to the one that Lepak and Snell (2002) obtained for their commitment-based HR system scale ($\alpha = .89$).

For HPWS ratings obtained from the managers, the 13-item HPWS scale of Huselid (1995) and an additional single item

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[2] Confirmatory factor analysis in structural equation modeling would have been the most desirable analytical method. However, given the small sample size (76), we could not use structural equation modeling, especially with the large number of items that were used to measure HPWS.

capturing the extent of job security was used. Cronbach's alpha for this 14-item HPWS scale was .83. Furthermore, the two HPWS concepts were significantly positively correlated ($r = .41$, $p < .01$), providing further evidence for the convergent validity of the employee-rated and manager-rated HPWS.[3]

Collective human capital (aggregated, average ratings of managers). Managers assessed the average level of human capital for the employees in their unit, using Youndt and colleagues' human capital scale (e.g., Subramaniam & Youndt, 2005; Youndt, Subramaniam, & Snell, 2004). The items were the following: Our employees working in the unit . . . "are highly skilled," "are widely considered to be the best in our industry," "are creative and bright," "are experts in their particular jobs and functions," and "develop new ideas and knowledge." Cronbach's alpha for this five-item human capital scale was .91.

Degree of establishment social exchange (aggregated, average ratings of employees). The five items from Shore, Tetrick, and Barksdale's (1999) social exchange scale were reworded to make them more appropriate for the establishment level of analysis of this study. Their original scale has subsequently been improved (Shore, Tetrick, Lynch, & Barksdale, 2006). For this variable, the employee responses were used. This was deemed to be appropriate because of the psychological nature of the concept (e.g., Rupp & Cropanzano, 2002). The employee responses were aggregated up to the establishment level. The reworded establishment social exchange items used in this study were, "Our relationship with the establishment continues to evolve and develop," "The things employees do on the job today will benefit their standing in the long run," "We have significant opportunities to take on assignments that enhance our value," "We don't mind working hard today—We know we will eventually be rewarded by our establishment," and "We try to look out for the best interest of the establishment because we can rely on our establishment to take care of us." The establishment social exchange scale had a reliability of .86, comparable to previous studies that had reported coefficient alphas of .86 to .87 for the social exchange scale at the individual level (Shore et al., 1999, 2006). Rupp and Cropanzano (2002) used these items to assess the degree of social exchange relationships for both supervisor and their organization (at the individual level of analysis) and obtained alphas of .89 and .91, respectively.

Relative establishment performance (aggregated, average ratings of managers). Delaney and Huselid's (1996) eight-item organizational performance scale was used to assess an establishment's relative performance, as its results are comparable among similar establishments. A typical example asks the manager, "How would you compare the establishment's [performance] over the past 3 years to those of other establishments that do the same kind of work?" with a response scale as follows: 1 = *substantially worse*, 2 = *much worse*, 3 = *worse,* 4 = *comparable*, 5 = *better*, 6 = *much better*, 7 = *substantially better.* The reliability of this eight-item scale in this study was .91. Delaney and Huselid found a reliability of .85 for perceived organization performance with a nationally representative sample of 590 U.S. work establishments. Gupta and colleagues (Gupta, 1987; Gupta & Govindarajan, 1984, 1986) used a similar comparative, subjective measure of business-unit performance.

Although there are always concerns about the use of subjective performance measures, such as increased measurement errors and the potential for common method biases, there are still some compelling reasons for using such measures (Delaney & Huselid,

1996). First, Gupta and colleagues (Gupta, 1987; Gupta & Govindarajan, 1984, 1986) noted that objective financial performance data on individual units that reveal their organizational identities are very difficult, indeed virtually impossible, to obtain. In addition, Wall et al. (2004) tested the assumption that subjective measures of company performance (relative to competitors) are equivalent to objective measures. They found that "(a) subjective and objective measures of company performance were positively associated (convergent validity); (b) those relationships were stronger than those between measures of differing aspects of performance using the same method (discriminant validity); and (c) the relationship of subjective and objective company performance measures with a range of independent variables were equivalent (construct validity)" (Wall et al., 2004, p. 95).

Control variables. Six industry dummies (1 = construction; 2 = manufacturing; 3 = transportation, communication, electric, gas, and sanitary services; 4 = wholesale trade; 5 = retail trade; and 6 = finance, insurance, and real estate) were created to control for potential industry effects (e.g., Datta et al., 2005). Furthermore, we controlled for the average tenure (establishment tenure, organizational tenure, and job tenure, all measured in months) of employee respondents, aggregated for each establishment. In addition, we controlled for the average tenure (establishment tenure, organizational tenure, and job tenure, all measured in months) of the managerial respondents, aggregated for each establishment. The tenure variables were included to account for any potential biases that may be associated with the respondents and for more experienced employees and managers.

Aggregation Issues

The survey items were reworded to reflect the establishment-level analysis by changing the focus of the items to the establishment (reference-shift consensus model; Chan, 1998). For instance, an item for measuring the degree of establishment social exchange was adapted by rewording it as follows: "The employees make personal sacrifices for this establishment." The respondents were asked to answer in terms of the average for the employees in the establishment. This reference-shift approach is consistent with the guidelines created by scholars focusing on multilevel issues (Klein, Dansereau, & Hall, 1994) to specify and explicate the level of the constructs in a study.

Interrater agreement was assessed using R_{wg} (James, Demaree, & Wolf, 1984, 1993) for each variable. The mean R_{wg} was .96 for the 21-item HPWS scale (employee rated), which was comparable to the .97 obtained by Lepak and Snell (2002). Similarly, the 14-item HPWS scale (manager rated) from Huselid (1995) had a mean R_{wg} of .97. For collective human capital, the mean R_{wg} was .92; for the degree of establishment social exchange, the mean R_{wg} was .86; and for relative establishment performance, the mean R_{wg} was .94 (Table 2). The average of the R_{wg}s for all of the variables was well above the rule of thumb value of .60 (James, 1982) and

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[3] Although the magnitude of this correlation may not seem large, it is larger than the correlations typically found in the literature (Brett & Atwater, 2001; Harris & Schaubroeck, 1988). For instance, Mabe and West (1982) found a correlation of .29, and Harris and Schaubroeck (1988) found a .35 correlation between self-supervisory ratings in their meta-analyses.

Table 2
Descriptive Statistics

Variable	M	SD	R_{wg}	ICC(1)	ICC(2)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1. Industry dummy 1	0.05	0.22																				
2. Industry dummy 2	0.43	0.50				−.21																
3. Industry dummy 3	0.09	0.29				−.08	−.28*															
4. Industry dummy 4	0.09	0.29				−.08	−.28*	−.10														
5. Industry dummy 5	0.07	0.25				−.06	−.23*	−.08	−.08													
6. Industry dummy 6	0.08	0.27				−.07	−.26*	−.09	−.09	−.08												
7. Average establishment tenure of employees	12.43	7.22				.13	.31**	.14	−.03	−.14	−.08											
8. Average organizational tenure of employees	8.03	5.94				.13	.20	.02	.01	.01	−.08	.64**										
9. Average job tenure of employees	6.27	4.26				.06	.12	−.02	.09	.13	−.13	.47**	.64**									
10. Average establishment tenure of managers	12.02	8.33				−.02	.04	.11	.15	.07	.00	.06	.21	.24*								
11. Average organizational tenure of managers	20.16	9.78				.14	.17	.08	.17	.02	−.22	.41	.36**	.23*	.43**							
12. Average job tenure of managers	10.88	8.27				−.01	.21	.08	.06	.09	−.14	.19	.38**	.30**	.54**	.55**						
13. Employee-rated HPWS	4.15	0.55	.96	.23	.68	−.01	.26*	.06	−.14	.09	−.15	.33**	.04	−.16	−.10	.15	.08	(.89)				
14. Manager-rated HPWS	4.73	0.71	.97	.22	.55	−.02	.29**	−.21	.13	−.07	−.17	.14	.05	.02	−.09	.21	−.17	.41**	(.90)			
15. Collective human capital	4.57	0.76	.92	.22	.54	.03	−.02	−.02	.24*	−.05	−.08	−.08	−.05	−.14	−.07	.15	−.08	.26*	.53**	(.91)		
16. Degree of establishment social exchange	4.50	0.70	.86	.16	.56	−.03	.16	−.01	−.21	.19	−.14	.19	.08	.01	.00	.06	.09	.54**	.18	.05	(.86)	
17. Relative establishment performance	4.70	0.65	.94	.20	.52	−.12	.02	−.02	.17	.13	.01	−.14	−.16	−.04	.06	−.05	−.17	.30**	.36**	.56**	.29**	(.91)

Note. $n = 76$. Industry dummy 1 = construction; industry dummy 2 = manufacturing; industry dummy 3 = transportation, communication, electric, gas, and sanitary services; industry dummy 4 = wholesale trade; industry dummy 5 = retail trade; industry dummy 6 = finance, insurance, and real estate; HPWS = high-performance work systems.
* $p < .05$. ** $p < .01$.

the more commonly accepted value of .70, indicating that the aggregation was justified.

The intraclass correlations—ICC(1)s and ICC(2)s—were calculated using Bartko's (1976) formula with a one-way, random-effects analysis of variance. The ICC(1)s for employee-rated HPWS, manager-rated HPWS, collective human capital, degree of establishment social exchange, and overall establishment performance were .23, .22, .22, .16, and .20, respectively. The ICC(2)s for the same set of variables were .68, .55, .54, .56, and .52, respectively. Although there is no standard for the ICC(1) value, the values for these variables exceeded the median value of .12 reported by James (1982). The ICC(2) values for manager-rated HPWS, collective human capital, degree of establishment social exchange, and relative establishment performance, on the other hand, were lower than the .60 cutoff point recommended by Glick (1985), as well as the more commonly accepted cutoff of .70. However, these values are comparable to the ones reported by, for example, Schneider, White, and Paul (1998). Thus, the ICC(2) values did not ". . .seem low enough to prohibit aggregation" (Schneider et al., 1998, p. 155), especially given the R_{wg} and ICC(1) values.

In fact, Bliese (2000) recommended examining all aggregation statistics to make an informed decision. More specifically, however, in strategic HRM, Gerhart et al. (2000) recommended the use of ICC(1), which is what Datta et al. (2005) adopted. Therefore, the responses from all the managers in each establishment were averaged to create the HPWS (14-item scale), collective human capital, and relative establishment performance scores. Similarly, all of the responses from the employees in each establishment were averaged to create the HPWS (21-item scale) and degree of establishment social exchange scores.

Analysis

The main analysis involved hierarchical regression analyses with a path analytic procedure, as we were interested not only in the individual relationships but also in the interrelationships among the variables (i.e., mediating effects). To alleviate concerns about common method bias, we performed the same set of regressions twice, once with the employee-rated HPWS scores and once with manager-rated HPWS scores. In addition, we applied Intercooled Stata 8.2 for Windows (StataCorp, 2004) with its Robust and Cluster alternative estimation procedures in an attempt to account for any interdependencies that might arise from obtaining responses from multiple units within a company. Stata's Robust option produces consistent standard errors even if the data are weighted or the residuals are not identically distributed. The Cluster option specifies that the observations are independent across groups (clusters) but not necessarily independent within groups (StataCorp, 2004), as might be the case with observations collected from different units of the same company.

Results

Table 2 shows descriptive statistics, including the means, standard deviations, R_{wg}s, ICC(1)s, ICC(2)s, correlations, and interitem reliabilities calculated from the data. For the substantive variables, all but two of the correlations between the manager-rated HPWS scores and the degree of establishment social ex-

change, and collective human capital and the degree of establishment social exchange were significant at the .05 level.

Tables 3 and 4 show the regression results for the hypotheses. The parameter estimates shown are unstandardized coefficients (b), standard error for the unstandardized coefficients ($SE\ b$), 95% confidence intervals (CIs), standardized beta (β) coefficients, and t statistics with significance level for each step. For each dependent variable, two sets of regression results are described, one for each of the two HPWS measures (from the employees and from the managers). As shown in Table 3, in Step 1, all of the control variables, including the six industry dummies, the three employee-related tenure variables, and the three manager-related tenure variables, were entered. Step 2 was performed twice, once with the employees' HPWS ratings (2a) and once with the managers' HPWS ratings (2b). Table 4 shows the results for relative establishment performance. In Step 1, all of the control variables were entered and, in Step 2, the employees' HPWS ratings (2a) or the managers' HPWS ratings (2b) were entered. In the third step, collective human capital and the degree of establishment social exchange were entered together (in Table 4).

Hypothesis 1 stated that HPWS are positively related to collective human capital. As shown in Table 3, for collective human capital, the control variables as a set accounted for 17% of the variance, $F(12, 61) = 1.36$, $p > .05$. In Step 2, the employee HPWS ratings explained 11% additional variance, $\Delta F(1, 60) = 8.07$, $p < .01$, whereas managers' HPWS ratings explained 22% additional variance, $\Delta F(1, 60) = 19.53$, $p < .01$. The parameter estimate for employee-rated HPWS (Model 2a) was significant and positive ($\beta = .40$, $p < .01$). The parameter estimate for manager-rated HPWS was also significantly positive ($\beta = .56$, $p < .01$). Furthermore, the 95% CI did not include zero (0.22 to 1.26 for employee-rated HPWS, and 0.41 to 1.18 for manager-rated HPWS), and the lower bound CI did not approach zero. Together, these results provide support for Hypothesis 1.

Hypotheses 2 proposed that collective human capital would be positively related to relative establishment performance. In Table 4, the control variables as a set explained 19% of the variance in relative establishment performance, $F(12, 61) = 1.72$, $p > .05$, with a significant beta for the wholesale trade dummy ($\beta = .32$, $p < .05$) and for the average job tenure of managerial respondents ($\beta = -.35$, $p < .05$). In the second step, the employee and manager HPWS ratings explained 17%, $\Delta F(1, 60) = 14.33$, $p < .01$, and 10%, $\Delta F(1, 60) = 7.56$, $p < .01$, of incremental variance in relative establishment performance with significant, positive betas ($\beta = .51$, $p < .01$, and $\beta = .38$, $p < .01$, for employee-rated HPWS and manager-rated HPWS, respectively). In the third step, both collective human capital and the degree of establishment social exchange were entered, and these two variables together explained 22% of additional variance, $\Delta F(2, 58) = 14.16$, $p < .01$, in relative establishment performance when employee HPWS rating was included in the second step, and 27% incremental variance, $\Delta F(2, 58) = 17.29$, $p < .01$, when manager HPWS rating was included in the second step.

The parameter estimates associated with collective human capital were significant and positive for both models ($\beta = .50$, $p < .01$, when employee-rated HPWS was included in the second step, and $\beta = .55$, $p < .01$, when manager-rated HPWS was included). The 95% CI did not include zero (0.21 to 0.43 with employee-rated HPWS, and 0.20 to 0.27 with manager-rated HPWS), and the

Table 3

Hierarchical Regression Results for Collective Human Capital and Degree of Establishment Social Exchange

Variable	Collective human capital					Degree of establishment social exchange				
	b	$SE\ b$	95% CI	β	t	b	$SE\ b$	95% CI	β	t
				Step 1: Controls						
Industry dummy 1	.36	.60	−.83, 1.56	.08	.61	−.35	.53	−1.40, .71	−.08	−.66
Industry dummy 2	.38	.47	−.56, 1.33	.19	.81	−.06	.39	−.84, .72	−.03	−.16
Industry dummy 3	.39	.56	−.73, 1.51	.11	.69	−.35	.70	−1.76, 1.06	−.10	−.50
Industry dummy 4	1.04	.53	−.03, 2.11	.30	1.95	−.69	.60	−1.90, .52	−.20	−1.14
Industry dummy 5	.17	.62	−1.08, 1.42	.04	.27	.82	.60	−.39, 2.03	.20	1.36
Industry dummy 6	.13	.59	−1.05, 1.32	.04	.22	−.62	.48	−1.59, .35	−.17	−1.28
Employee ratings										
Average organizational tenure of employees	−.04	.04	−.12, .04	−.27	−.92	.05	.02	.01, .09	.37	2.79**
Average establishment tenure of employees	.03	.05	−.07, .12	.16	.60	−.01	.03	−.06, .04	−.07	−.45
Average job tenure of employees	−.03	.05	−.13, .06	−.14	−.73	−.04	.02	−.09, .01	−.16	−1.55
Manager ratings										
Average organizational tenure of managers	−.02	.02	−.05, .02	−.15	−1.03	.00	.02	−.03, .04	.03	.21
Average establishment tenure of managers	−.03	.02	−.01, .08	.32	1.40	−.01	.02	−.04, .02	−.09	−.59
Average job tenure of managers	−.03	.02	−.06, .01	−.21	−1.53	.01	.02	−.02, .05	.11	.84
ΔR^2 (ΔF[12, 61])			.17 (1.36)					.17 (1.26)		
				Step 2: HR system						
2a. HPWS (aggregated, employee average ratings)	.74	.26	.22, 1.26	.40	2.84**	.96	.17	.61, 1.31	.52	4.92**
ΔR^2 (ΔF[1, 60])			.11 (8.07**)					.18 (15.15**)		
2b. HPWS (aggregated, manager average ratings)	.79	.19	.41, 1.18	.56	4.11**	.37	.18	.07, .73	.26	2.04*
ΔR^2 (ΔF[1, 60])			.22 (19.53**)					.05 (3.27*)		
R^2			.28 (for 2a); .39 (for 2b)					.35 (for 2a); .22 (for 2b)		
F			2.72** (for 2a); 2.91** (for 2b)					5.15** (for 2a); 2.11** (for 2b)		

Note. $n = 76$. Industry dummy 1 = construction; industry dummy 2 = manufacturing; industry dummy 3 = transportation, communication, electric, gas, and sanitary services; industry dummy 4 = wholesale trade; industry dummy 5 = retail trade; industry dummy 6 = finance, insurance, and real estate; HPWS = high-performance work systems. The parameter estimates are from each step.
* $p < .05$.   ** $p < .01$.

lower bound of the confidence interval also did not include zero. These results provide support for Hypothesis 2.

Hypothesis 3 proposed a positive relationship between HPWS and the degree of social exchange prevalent in an establishment. The results in Table 3 show that the control variables as a set explained 17% of the variance in an establishment's degree of social exchange, $F(12, 61) = 1.26, p > .05$, although the average organizational tenure of the employee respondents was the only significant variable ($\beta = .37, p < .05$) included in the first step. In the second step, the employees' HPWS ratings explained 18% additional variance in establishment social exchange, $\Delta F(1, 60) = 15.15, p < .01$, and manager-rated HPWS scores explained an additional 5% of the variance, $\Delta F(1, 60) = 3.27, p < .05$. For the parameter estimates, employee's HPWS scores had a positive and significant beta of .52 ($p < .01$), and managers' HPWS scores had a positive and significant, albeit smaller, beta of .26 ($p < .05$). Moreover, the 95% CI did not include zero (0.61 to 1.31 for employee-rated HPWS, and 0.07 to 0.73 for manager-rated HPWS). These results provide support for Hypothesis 3.

Hypotheses 4 proposed that the degree of social exchange would be positively related to relative establishment performance. As noted above, the first step explained 19% of the variance in relative establishment performance, $F(12, 61) = 1.72, p > .05$, and the employee and manager HPWS ratings explained 17%, $\Delta F(1, 60) = 14.33, p < .01$, and 10%, $\Delta F(1, 60) = 7.56, p < .01$, of incremental variance in relative establishment performance in the

second step, respectively. In the third step, both collective human capital and degree of establishment social exchange together explained 22% of additional variance, $\Delta F(2, 58) = 14.16, p < .01$, in relative establishment performance when employee-rated HPWS was included in the second step, and 27% incremental variance, $\Delta F(2, 58) = 17.29, p < .01$, when manager-rated HPWS was included in the second step.

The parameter estimates associated with the degree of establishment social exchange were also significant and positive for both models ($\beta = .26, p < .05$, for employee-rated HPWS, and $\beta = .32, p < .01$, for manager-rated HPWS). The 95% CI did not include zero (0.03 to 0.30 with employee-rated HPWS, and 0.07 to 0.35 with manager-rated HPWS), and the lower bound of the confidence interval did not include zero. Taken together, these results provide support for Hypotheses 4.

Finally, the mediating effects of collective human capital and the degree of establishment social exchange on the relationship between HPWS and relative establishment performance were examined. To establish a mediating relationship, Baron and Kenny (1986) stipulated that four conditions need to be satisfied. First, the independent variable (i.e., the HPWS scores) should be directly related to the dependent variable (i.e., relative establishment performance). The second condition is that the independent variable should be related to the mediator (collective human capital or the degree of establishment social exchange in our case). The third condition is that the mediator (collective human capital or the

Table 4
Hierarchical Regression Results for Relative Establishment Performance

Variable	Model 1					Model 2a				
	b	$SE\ b$	95% CI	β	t	b	$SE\ b$	95% CI	β	t
Step 1: Controls										
Industry dummy 1	.15	.35	−.55, .85	.05	.44	.12	.23	−.34, .59	.04	.52
Industry dummy 2	.52	.32	−.12, 1.17	.40	1.62	.39	.24	−.10, .88	.30	1.59
Industry dummy 3	.44	.31	−.18, 1.07	.20	1.42	.38	.26	−.13, .90	.17	1.50
Industry dummy 4	.72	.31	.09, 1.35	.32	2.30*	.71	.24	.23, 1.19	.32	2.98**
Industry dummy 5	.70	.37	−.04, 1.44	.27	1.89	.35	.25	−.16, .86	.14	1.39
Industry dummy 6	.31	.29	−.27, .90	.13	1.07	.41	.27	−.14, .96	.17	1.49
Organizational tenure (employee)	−.02	.01	−.04, .01	−.18	−1.21	−.04	.01	−.07, −.02	−.47	−3.22**
Establishment tenure (employee)	−.01	.02	−.04, .01	−.08	−.58	−.00	.01	−.03, .02	−.02	−.14
Job tenure (employee)	.01	.01	−.02, .04	.07	.79	.04	.02	.01, .08	.28	2.64*
Organizational tenure (manager)	.01	.01	−.01, .03	−.14	.99	.01	.01	−.01, .03	.18	1.46
Establishment tenure (manager)	.00	.01	−.01, .02	.05	.36	.00	.01	−.01, .02	.07	.62
Job tenure (manager)	−.03	.01	−.05, −.00	−.35	−2.30*	−.03	.01	−.06, −.01	−.42	−2.88**
ΔR^2 (ΔF[12, 61])			.19 (1.72)							
Step 2: HR system										
HPWS (employee)						.60	.15	.30, .91	.51	3.94**
HPWS (manager)										
ΔR^2 (ΔF[1, 60])								.17 (14.33**)		
Step 3: Mediators										
Human capital										
Social exchange										
ΔR^2 (ΔF[2, 58])										
Overall F(15, 58)			1.72					3.49**		
R^2			.19					.36		

Note. $n = 75$. Industry dummy 1 = construction; industry dummy 2 = manufacturing; industry dummy 3 = transportation, communication, electric, gas, and sanitary services; industry dummy 4 = wholesale trade; industry dummy 5 = retail trade; industry dummy 6 = finance, insurance, and real estate; HPWS = high-performance work systems.
* $p < .05$. ** $p < .01$.

degree of establishment social exchange) should be related to the dependent variable (relative establishment performance). Finally, the fourth condition is that when the effect of the mediator is accounted for, the direct relationship between the independent and dependent variables should become nonsignificant (full mediation) or substantially smaller (partial mediation).

The results in Table 4 show that both the employee-rated and manager-rated HPWS scores were significantly and positively related to relative establishment performance (β = .51, $p < .01$, and β = .38, $p < .05$, respectively), satisfying the first condition. The second condition that the independent variable be related to the mediator was also satisfied, given the support found for Hypotheses 1 and 3. Moreover, the third condition that the mediator should be related to the dependent variable was also satisfied (Hypotheses 2 and 4). Finally, the beta coefficients associated with the HPWS scores became smaller and nonsignificant when collective human capital and the degree of establishment social exchange were included in the model in Table 4 (from β = .51, $p < .01$, to β = .20, $p > .05$, for Model 2a with employee HPWS ratings, and from β = .38, $p < .05$, to β = −.02, $p > .05$, for Model 2b with manager HPWS ratings), satisfying the fourth and last condition for establishing mediation. We also conducted the Sobel test using

Preacher and Hayes's (2004) procedure for simple mediation for each of the mediators. The results provided support for human capital acting as the mediator ($z_{Sobel} = 2.83$, $p < .01$, with employee-rated HPWS, and $z_{Sobel} = 3.05$, $p < .01$, with manager-rated HPWS). Similarly, the results provided support, albeit weaker, for the mediating role of the degree of social exchange ($z_{Sobel} = 2.23$, $p < .05$, with employee-rated HPWS, and $z_{Sobel} = 1.70$, $p > .05$, with manager-rated HPWS). Viewed together, these results show that both collective human capital and the degree of social exchange in an establishment mediated the relationship between HPWS and relative establishment performance, thereby providing support for Hypothesis 5.

Discussion

The main objective of this study was to examine the underlying mechanisms through which HPWS affect overall establishment performance and, by doing so, to open up a "black box" in strategic HRM research (Wright & Gardner, 2003). Wright and Gardner (2003) noted that "[t]heoretically, no consensus exists regarding the mechanisms by which HR practices might impact on firm outcomes. This lack of theoretical development has resulted

	Model 3a					Model 2b					Model 3b			
b	$SE\ b$	95% CI	β	t	b	$SE\ b$	95% CI	β	t	b	$SE\ b$	95% CI	β	t
							Step 1: Controls							
.08	.22	−.35, .52	.03	.37	.13	.29	−.45, .72	.05	.46	.09	.23	−.37, .56	.03	.41
.36	.17	−.03, .70	.28	2.16*	.33	.28	−.23, .90	.26	1.19	.41	.20	.01, .80	.31	2.07*
.36	.23	−.10, .81	.16	1.58	.49	.28	−.08, 1.06	.22	1.74	.38	.23	−.07, .83	.17	1.68
.49	.23	.04, .95	.22	2.19*	.55	.28	−.02, 1.11	.25	1.94	.50	.23	.03, .97	.22	2.14*
.39	.24	−.08, .87	.15	1.66	.65	.29	.06, 1.24	.25	2.20*	.47	.28	−.09, 1.03	.18	1.68
.41	.18	.04, .77	.17	2.25*	.35	.25	−.16, .85	.14	1.36	.40	.18	.03, .77	.17	2.15*
−.02	.01	−.04, −.00	−.24	−2.30*	−.01	.01	−.04, .01	−.16	−1.25	−.01	.01	−.04, .01	−.16	−1.36
−.01	.01	−.03, .00	−.12	−1.48	−.01	.01	−.04, .01	−.10	−.90	−.02	.01	−.04, .00	−.15	−1.63
.04	.01	−.01, .07	.26	2.75**	.01	.01	−.02, .04	.07	.76	.03	.01	.00, .06	.20	2.11*
.02	.01	−.00, .03	.22	1.94	.01	.01	−.01, .03	.16	1.10	.02	.01	−.00, .03	.21	1.76
−.01	.01	−.02, .01	−.08	−.90	−.01	.01	−.02, .01	.10	−.75	−.01	.01	−.02, .01	−.09	−.91
−.02	.01	−.05, −.00	−.30	−2.18*	−.01	.01	−.04, .01	−.18	−1.07	−.02	.01	−.05, .00	−.28	−1.64
							Step 2: HR system							
.20	.10	−.01, .41	.17	1.93	.35	.14	.06, .64	.38	2.38*	−.02	.14	−.30, .27	−.02	−.11
							.10 (7.56**)							
							Step 3: Mediators							
.32	.01	.21, .43	.50	5.88**						.36	.08	.20, .52	.55	4.50**
.17	.07	.03, .30	.26	2.43*						.21	.07	.07, .35	.32	3.04**
		.22 (14.16**)										.27 (17.29**)		
		8.15**					2.14*					5.81**		
		.58					.29					.56		

in few empirical studies that explore the processes through which this impact takes place" (p. 312). This study, drawing on the resource-based view of the firm and social exchange theory, conceptualized and tested a model that provides insight into the linkages between HPWS and (establishment) performance. Establishment-level human capital and social exchange have been shown to act as mediators.

The findings provide support for the hypothesized relationships. In particular, HPWS were found to be positively associated with the level of collective human capital in an organization, as well as with the degree of social exchange employees collectively perceive. These, in turn, have been related to relative establishment performance. This is one of the first empirical studies to hypothesize and investigate these mediating mechanisms in detail, using data from multiple responses and two different sources (Gerhart et al., 2000). Although there are certainly other potential mediators that may play a role in linking HPWS and performance (e.g., Evans & Davis, 2005; Wright & Gardner, 2003), we believe that this study contributes both theoretically and methodologically to explaining how HR systems influence firm performance. Moreover, the findings provide empirical support for the resource-based view that human capital may be considered one of the resources that have a positive impact on (establishment) performance. Similarly, the findings support the assertion that social exchange relationships are a critical intervening mechanism by which HPWS affect (establishment) performance.

Implications for Research and Practice

The findings of this study have important implications for both researchers and managers. First, they provide insights into how HPWS work. Many HRM researchers and practitioners have argued for the benefits of HPWS from a conceptual point of view, but research has been lacking that examines how these systems really affect performance. The arguments and empirical results of this study indicate that HPWS are effective because they directly affect the level of human capital among employees, as well as the quality of the organization's social exchange relationships. Furthermore, the results of this study can be interpreted as illustrating the *equifinality* (Delery & Doty, 1996) of HPWS effects, in other words, that HPWS affect various mediators, which, in turn, positively influence practical outcomes. This may provide additional insights into synergistic effects in HR systems.

Second, identifying the linkages between HPWS and performance may provide insights into the contingency perspective in strategic HRM research. Previous empirical research has encountered difficulties when examining the moderating effects of contextual factors, such as business strategy on the HR system–firm performance relationship. Some of these difficulties might be attributed to the presence of intervening processes. It might be the case that strategy moderates the relationships between HPWS and the level of collective human capital or between HPWS and the degree of social exchange, but not both. Similarly, it may be the case that contextual variables such as strategy moderate the relationships between the level of human capital and firm performance, or those between the degree of social exchange and firm performance, but not necessarily both at the same time. Shore et al. (2004) noted that the type of employee–organization relationship ". . . is strongly linked to organizational level performance, [and] may be moderated by the organization's goals and competitive strategy" (p. 350). If researchers examined the moderating effect of strategy by regressing firm performance indicators against HPWS scores and strategy together with their interaction term, they would be presupposing that a firm's strategy moderates the relationships between HPWS and collective human capital and between collective human capital and firm performance in a similar manner. However, this may not be the case. Although speculative, future research might profitably examine if, and how, organizational characteristics such as strategy influence the HR system–performance relationship when these intervening relationships are explicitly taken into account.

The results from this study may also be helpful to managers seeking ways of increasing the benefits of their HPWS. The results indicate that the direct effect of HPWS on relative establishment performance is such that 1 standard deviation increase in the level of HPWS is associated with a 5.29% (with manager-rated HPWS) and a 7.02% (with employee-rated HPWS) increase in the relative establishment performance. Although not directly comparable because of the differences in the dependent variable, these numbers are higher than the reduction of 3.22% in turnover rate for the establishment (i.e., call centers) in Batt's (2002) study. Moreover, this does not take into account the indirect effects of HPWS on relative establishment HRM performance through positive increases in collective human capital and the degree of social exchange. Thus, if managers feel that they are not reaping the maximum benefit from the firm's HPWS, the source of the problem might be diagnosed by examining the level of collective human capital or the degree of social exchange in specific units in the organization. If a unit does not have sufficient employees with high levels of knowledge and skill, the relevant HPWS components, such as selection and recruitment or training and development, may be revised to enhance the quality of collective human capital in that unit. An alternative is that if a paucity of social exchange relationships is identified as the source of the problem, some other components of the firm's HPWS, such as performance appraisal and compensation, may be modified to improve the shared perceptions of social exchange. In this regard, this conceptual logic may help organizations target which HR practices to address to improve an organization's performance.

Limitations and Future Research Directions

We encourage caution in interpreting these results because of some limitations of the study. First, given the use of cross-sectional data, no causal inference can be made regarding the relationships in this study, although the relationships depicted in Figure 1 were based on prior theorizing (e.g., Becker & Huselid, 1998; Delery & Shaw, 2001). It is possible that establishment performance influences the level of HPWS implementation in that establishment (i.e., reverse causality), or past performance may influence the level of HPWS in place, which, in turn, should affect current establishment performance (i.e., reciprocal causality; cf. Wright et al., 2005). Thus, future research that adopts a longitudinal design is needed to uncover the dynamic influence of HPWS on overall performance. In addition, this research conceptualized and tested HPWS as a system (e.g., Bae & Lawler, 2000; Guthrie, 2001; Way, 2002; Zacharatos et al., 2005), rather than its subcomponents (e.g., Batt, 2002; Huselid, 1995), to illustrate the mediating roles of collective human capital and the degree of establishment social exchange. However, it is possible that some subcomponents of HPWS have different, independent impacts on the mediators. For example, it may be the case that comprehensive training and development affect the degree of social exchange in the unit more strongly than rigorous and selective staffing. It is also possible that rigorous and selective staffing may even hurt the degree of social exchange felt by the unit's employees, although the overall effect can be positive on an aggregate level. Future research that extends these findings by examining the specific influence of HPWS' subcomponents on the mediating mechanisms would be beneficial.

Because this analysis was conducted using data from a sample of Japanese firms, the generalizability of the present research may be limited to Japanese companies or companies that incorporate Japanese management styles. Moreover, even among Japanese companies, caution still needs to be used when companies in time periods different from the current study are examined. For example, Morishima (2000) discussed the changing nature of psychological contracts in Japan, which implies that the significance of the relationship found in the current study may vary over time. Hence, future research is needed to replicate and extend the present research findings in different contexts, as well as using longitudinal data. On the other hand, given that the theoretical underpinning of the present study was derived from Western theories, the Japanese sample may also be considered a strength of this study, because it was able to illustrate theoretically derived relationships in a non-Western setting. In addition, each establishment provided multiple responses from managers and employees (for the majority of cases); therefore, the findings should be generalizable to many different research settings.

Although we were careful to avoid common method bias by collecting data from two different sources (employees and managers), we were not able to eliminate completely the potential for such a bias. The inclusion of HPWS ratings from two different sources certainly should mitigate some of the concern that the results are entirely due to same-source bias. Future studies, however, should strive to improve this research design further by obtaining additional different rating sources or more objective performance measures.

Finally, we were able to obtain only subjective measures of relative establishment performance, given the difficulty associated with obtaining more objective measures of performance by "establishment" (Gupta, 1987). Although Wall et al. (2004) recently demonstrated the convergent, discriminant, and construct validities of subjective measures of relative performance, this type of measure does not allow conversion to a meaningful metric, such as the dollar increases associated with having HPWS 1 standard deviation above the mean. As a result, the practical significance of HPWS cannot be drawn (cf. Huselid, 1995). Thus, we caution the use of such measures in future studies and recommend that scholars obtain additional performance measures that are more objective, including but not limited to turnover rate and labor productivity (e.g., Huselid, 1995). Further research is also needed to replicate and extend the findings of this study.

Despite these limitations, these results contribute to our understanding of how the HPWS–performance process unfolds, and it does so on the basis of both employee and management responses from a multiestablishment, multiple response sample. We believe that these results provide insights into the underlying theoretical logic linking HPWS and important performance outcomes.

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