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HOW MUCH DO HIGH-PERFORMANCE WORK PRACTICES MATTER? A META-ANALYSIS OF THEIR EFFECTS ON ORGANIZATIONAL PERFORMANCE

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Although there is growing evidence that high performance work practices (HPWPs) affect organizational performance, varying sample characteristics, research designs, practices examined, and organizational performance measures used has led extant findings to vary dramatically, making the size of the overall effect difficult to estimate. We use meta-analysis to estimate the effect size and test whether effects are larger for (a) HPWP systems versus individual practices, (b) operational versus financial performance measures, and (c) manufacturing versus service organizations. Statistical aggregation of 92 studies reveals an overall correlation that we estimate at .20. Also, the relationship is stronger when researchers examine systems of HPWPs and among manufacturers, but it appears invariant across performance measures. We use our findings as a basis to offer 4 suggestions intended to shape research practices such that future meta-analyses might answer today's emerging questions.

Human resources can be an organization's largest and most difficult-to-control expense, but it can also be central ingredients affecting organizational performance (Pfeffer, 1998). Thus, a key task for researchers has been to understand how human resources can be managed to maximize productivity and enhance creativity while controlling costs. Rising to this challenge is a body of research labeled strategic human resource management (SHRM), which is devoted to understanding how human re-

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source management practices affect organization-wide outcomes (Ferris, Hochwarter, Buckley, Harrell-Cook, & Frink, 1999; MacMillan & Schuler, 1985).

Human resource practices that SHRM theorists consider performance enhancing are known as high-performance work practices (HPWPs—Huselid, 1995). HPWPs include, for example, incentive compensation, training, employee participation, selectivity, and flexible work arrangements (Huselid, 1995; Pfeffer, 1998). SHRM theory asserts that these practices increase employees' knowledge, skills, and abilities (KSAs), empower employees to leverage their KSAs for organizational benefit, and increase their motivation to do so (Becker & Huselid, 1998; Delery & Shaw, 2001). The result is greater job satisfaction, lower employee turnover, higher productivity, and better decision making, all of which help improve organizational performance (Becker, Huselid, Pickus, & Spratt, 1997). HPWPs also operate through organizations' internal social structures to increase flexibility and efficiency (Evans & Davis, 2005).

Researchers have devoted significant empirical effort toward understanding the HPWP–organizational performance relationship. Indeed, our literature search uncovered 92 studies that report relevant statistics on the link. As suggested by this volume of research, the question of how much HPWPs affect organizational performance is important to both managers and researchers. Understanding the degree to which HPWPs affect organizational performance and the conditions that moderate the relationship helps researchers build contingencies into SHRM theory and aids practitioners seeking to justify investments in HPWPs.

Studies have attempted to synthesize the literature via narrative review. Several conclude that published research provides support for the notion that HPWPs positively affect organizational performance (e.g., Becker & Huselid, 1998; Becker & Gerhart, 1996; Wright & Boswell, 2002). However, varying sample characteristics, research designs, practices examined, and performance measures used has led extant findings to vary dramatically, making the size of the overall effect difficult to estimate (Becker & Gerhart, 1996; Ferris et al., 1999; Wood, 1999).

A logical next step is to statistically aggregate the evidence using meta-analysis. When research streams are meta-analyzed, methodological artifacts (such as sampling and measurement error) are often found to be the drivers of variance in results across studies (Hunter & Schmidt, 1990). Once such effects are removed, the size of a relationship can be more accurately estimated. Furthermore, meta-analysis permits examination of whether study attributes, such as the type of organizations sampled or measures used, affect studies' outcomes. Given the importance of human resources to organizations, the considerable interest in understanding the effects of HPWPs on organizational performance, and the wide variance

among extant findings, there is a need to take advantage of meta-analytic procedures.

Accordingly, we use meta-analysis to offer five contributions. First, we statistically aggregate extant evidence concerning the claim that HPWPs affect organizational performance and offer a conservative point estimate of the relationship's size. In so doing, we also report the effects of individual HPWPs on organizational performance. Second, we test a central assertion of SHRM theory stating that HPWPs reinforce and support each other when used in coordinated systems of HPWPs (Huselid, 1995). Third, we investigate whether the relationship varies based on the distance between performance measures and employees' daily work (i.e., operational measures vs. financial measures). Fourth, we develop and test theory suggesting that HPWPs are more important in manufacturing than in service settings. Finally, we offer four suggestions to guide future research. The goal of these suggestions is to ensure that subsequent efforts to accumulate research findings will answer today's emerging questions.[1]

Theory and Hypotheses

SHRM researchers point to three mediators through which HPWPs affect organizational performance. HPWPs operate by (a) increasing employees' knowledge, skills, and abilities (KSAs), (b) empowering employees to act, and (c) motivating them to do so (Becker & Huselid, 1998; Becker et al., 1997; Delery & Shaw, 2001; Huselid, 1995). Broad recruiting and selectivity in staffing bring KSAs into organizations (Hoque, 1999). KSAs are further advanced through practices such as training, job design, and compensation tied to skill development (Hoque, 1999; Russell, Terborg, & Powers, 1985). Bailey (1993) argued that employees often perform below their potential because they possess discretionary use of their time and talent. Thus, employees must be motivated to leverage their KSAs. HPWPs such as incentive compensation, performance appraisal, and internal promotion policies are thought to offer incentives to aid motivation (Delery & Shaw, 2001; Huselid, 1995). HPWPs such as employment security, flexible work schedules, procedures for airing grievances, and high overall compensation can also increase motivation by increasing employee commitment (Pfeffer, 1998; Youndt, Snell, Dean, & Lepak, 1996). Finally, even knowledgeable, skilled, and motivated employees will not deploy their discretionary time and talent unless the organizational structure and job designs offer the latitude to act (Bailey, 1993; Huselid, 1995).

[1]There is at least one important moderator in SHRM theory that meta-analysis is ill equipped to address. HPWPs should work best when aligned with organizational strategy (Delery & Doty, 1996; Wright, Smart, & McMahan, 1995; Youndt et al., 1996). Unfortunately, as we explain in the discussion section, data are not available to test whether HPWP-organizational strategy alignment affects organizational performance.

The needed latitude can be enhanced by HPWPs such as participation programs, self-managed teams, information sharing, and employment security (Delery & Shaw, 2001; Pfeffer, 1998). Overall, HPWPs improve organizational performance by increasing KSAs, empowering employees to leverage their KSAs for organizational benefit, and motivating them to do so.

In addition to building KSAs and unlocking employees' discretionary effort through increased motivation and empowerment, Evans and Davis (2005) argue that the effect of HPWPs on organizational performance is furthered by their impact on organizations' internal social structures. For example, HPWPs such as self-managed teams and flexible job designs link people who do not typically interact with each other, which facilitates information sharing and resource exchange. Furthermore, HPWPs such as training, compensation, and selectivity in staffing increase generalized norms of reciprocity by helping select and retain people most likely to develop such norms. Reciprocity norms build organizational flexibility by increasing cooperation in complex problem solving (Tsai & Ghoshal, 1998). Also, HPWPs such as selectivity, training, and information sharing help establish shared mental models among employees. These are similar and overlapping knowledge sets, attitudes, and beliefs regarding tasks, coworkers, and the organization that facilitate cooperation and decision making (Cannon-Bowers & Salas, 2001). These positive changes in the internal social structure increase organizational flexibility and efficiency (Evans & Davis, 2005).

In sum, HPWPs improve organizational performance through two interactive and overlapping processes. First, they give employees the KSAs needed to perform job tasks and both the motivation and opportunity to do so (Delery & Shaw, 2001). Second, HPWPs improve the internal social structure within organizations, which facilitates communication and cooperation among employees (Evans & Davis, 2005). Jointly, these processes increase job satisfaction and help employees work more productively and make better decisions. These in turn reduce employee turnover and improve organizational performance vis-à-vis competitors (Becker et al., 1997). Therefore, we expect that:

Hypothesis 1: The use of HPWPs is positively related to organizational performance.[2]

Although most studies have examined individual practices, many researchers now direct their attention toward HPWP systems (Wright &

[2]This hypothesis is often motivated by the resource-based view from the strategic management literature. The basic argument is that HPWPs induce behaviors that are valuable, rare, and difficult for competitors to imitate, which gives rise to beneficial performance differences among firms using HPWPs (Wright, Dunford, & Snell, 2001).

Boswell, 2002). A HPWP system is defined by organizations' use of multiple, reinforcing HPWPs (Huselid, 1995). SHRM theorists have offered two reasons for why the value of HPWPs increases when multiple practices are combined into a coordinated system (Delery, 1998; MacDuffie, 1995). The first is that practices have additive effects (MacDuffie, 1995). This might occur, for example, when two different selection tools identify unique job skills (Delery, 1998). The second reason is that synergies occur when one practice reinforces another (Delery, 1998; Huselid, 1995). For example, training enhances participation programs because employees are better equipped to make the decisions that participation programs empower them to make.

It is possible, however, for multiple practices to reduce organizational performance (Becker et al., 1997). This happens when two practices are substitutes, such as when training is provided to develop a skill that, because of a selection device, employees already have. In the case of substitution, the cost of implementing the second practice is wasted (Delery, 1998). Two practices might also produce a "deadly combination" wherein they work against each other (Becker et al., 1997). This happens to managers who implement teams while leaving compensation focused on individual performance (Delery, 1998). On balance, however, SHRM researchers assert that HPWP systems should out perform individual practices. More importantly, the particular systems advocated by researchers have been critically studied and thus should theoretically be void of "deadly combinations." Higher performance should result.

The notion that a combination of interventions should have stronger effects than a single intervention is supported in other research streams (e.g., Jennings, 2006). However, in this literature, the superior value of HPWP systems is not only a central pillar of SHRM theory (Delery & Shaw, 2001; Huselid, 1995), but research on HPWP systems is largely replacing research on individual practices (Wright & Boswell, 2002). Yet, we found only two direct tests of this hypothesis (i.e., Guerrero & Barraud-Didier, 2004; Ichniowski, Shaw, & Prennushi, 1997). Meta-analysis offers a unique opportunity to confirm that extant evidence justifies researchers' increasing focus on HPWP systems. Stated formally:

> *Hypothesis 2*: The positive relationship between HPWPs and organizational performance is larger for HPWP systems than for individual practices.

Because HPWPs increase employee KSAs, empower employees to leverage their KSAs, and motivate them to do so (Delery & Shaw, 2001), they influence employee discretionary effort, creativity, and productivity (Becker et al., 1997). These, in turn, increase operating performance measures such as employee turnover and job satisfaction (Dyer & Reeves,

1995), which ultimately translates into increased accounting returns and market value (Becker et al., 1997; Dyer & Reeves, 1995; Huselid, 1995).

Based on this logic, HPWPs should affect operational performance measures, such as retention and productivity, more than financial measures, such as accounting returns, growth, or market returns. Although HPWPs should eventually affect both sets of measures, operational outcomes are much closer to the behavioral improvements employees are expected to make (Dyer & Reeves, 1995). There should be little slippage between the implementation of HPWPs, improved employee behaviors, and the operational performance measures that register these behaviors. In contrast, accounting returns, growth, and market returns reflect organizational performance dimensions that are further removed from HPWPs (Becker et al., 1997; Dyer & Reeves, 1995; Huselid, 1995) and are affected by a wide variety of factors such as diversification strategy or recent acquisition activity (e.g., O'Shaughnessy & Flanagan, 1998). The result is greater variability in accounting returns, growth, and market returns, and HPWPs represent a smaller portion of this variability. Consequently, the relationship between HPWPs and the operational performance measures of turnover or productivity should be stronger than for more remote financial performance dimensions such as accounting returns, growth, and market returns. Accordingly:

> *Hypothesis 3*: The positive relationship between HPWPs and organizational performance is larger for operational measures than for financial measures.

One way for SHRM research to advance is to identify contexts where the influence of HPWPs on organizational performance varies (Delery, 1998). One potentially important moderator that deserves attention is industry context (Batt, 2002; Datta, Guthrie, & Wright, 2005). At first glance, it might appear that service organizations would benefit most from HPWPs because their employees appear to have more discretion than their manufacturing counterparts (Rosenthal, Hill, & Peccei, 1997), and motivating employees to put forth discretionary effort is an important outcome of HPWPs (Bailey, 1993). Service employees are also closer to customers, so the effects of HPWPs on employee behavior should more directly affect quality (Batt, 2002). In support of these arguments, Datta et al. (2005) found that HPWP effects on labor productivity were greater in industries having low capital intensity or high growth rates. Such industries are more likely to be services where discretionary behavior is high and customer contact is common. Nevertheless, there are four reasons why we expect the effect of HPWPs to be greater among manufacturers.

First, manufacturing jobs often involve complex and potentially dangerous machinery. In response, organizations develop complex bureaucratic rules and standardized procedures to ensure adequate training

and safety. When technological and environmental change give rise to the need to build new products or use different equipment, these rules and procedures make adapting to change difficult and costly (Dunlop, 1958). HPWPs interact with other programs such as total quality management and lean manufacturing to significantly increase manufacturers' flexibility and ability to adapt (Lawler, Mohrman, & Ledford, 1995). Service organizations, such as hotels, restaurants, or call centers, are generally less reliant on complex or dangerous machinery. Accordingly, service organizations are less likely to depend on their employees' ability to respond to changes in physical infrastructure in order to adapt to environmental change (Lawler et al., 1995). Because manufacturers depend more than services on their ability to flexibly adapt to changes in their physical infrastructure and increased workforce flexibility is a major benefit of HPWPs (Evans & Davis, 2005), manufacturers have more to gain from HPWPs.

A second reason to expect manufacturing organizations to realize greater gains is because they rely more than service organizations do on their human resource system to deliver two key HPWP outcomes—KSAs and motivation. Service employees can be roughly grouped as either low skilled (e.g., housekeeping, food service) where broadly applicable KSAs can be honed on-the-job through informal socialization (e.g., Erickson, 2004), or professional (e.g., nursing, law) where KSAs are often advanced by external organizations such as professional associations (Konrad & Mangel, 2000). Motivation is strengthened by direct customer contact (Mills, Chase, & Margulies, 1983). Desire to have a pleasant interaction with customers (Erickson, 2004), fear of negative interpersonal evaluations (Baumeister, 1982), and satisfaction arising from successful co-production (van Dolen, de Ruyter, & Lemmink, 2004) all motivate employees to offer good customer service. Manufacturers, in contrast, do not benefit from these sources of KSA development or motivation. Because the KSAs needed in manufacturing are often organization-specific, generally trained workers usually must receive formal training on machine use and production procedures. Similarly, manufacturers must motivate employees to put forth discretionary effort without the benefits of direct customer contact.

The third reason we expect manufacturers to benefit more from HPWPs arises from the co-production of services by employees and customers (Bowen & Ford, 2002). In manufacturing, product quality is determined mostly by people, processes, and equipment under the direct or indirect control of managers. Service organizations additionally depend on the interaction between employees and customers. This means that in addition to managing employees, service organizations must effectively manage customers (Bowen, 1986). The involvement of customers in production makes productivity and performance more uncertain and complex (Batt, 2000; Bowen, 1986). For example, once manufacturers ensure the

availability of raw materials (e.g., JIT, inventory buffering), HPWPs facilitate fast, consistent, high-quality transformations of those materials. In contrast, whereas service managers have tools for queuing customers, considerable variability remains surrounding which customers will show-up at appointed times. This acts as a ceiling on how much HPWPs can affect final outcomes. Even the most effective HPWP system can only influence a range of production outcomes that is limited by customers' varying levels of ability and willingness to participate (Bowen, 1986; Groth, 2005). Manufacturers confront no such limitation in controlling production outcomes (e.g., productivity, quality). Consequently, the impact of HPWPs on manufacturing performance can be larger because their influence is not capped by a limited ability to control final outcomes.

A final reason we expect HPWPs to have larger effects among manufacturers is that some HPWPs appear better aligned with manufacturing work. Teams, for example, are effective because they help workers solve complex problems arising from high task interdependence among manufacturing stages (Lawler et al., 1995). Service work, in contrast, is often characterized by low task interdependence (Bowen, 1986), and thus the gain from teams is likely smaller. Furthermore, practices that might be more important in services appear to have garnered less research attention. For example, although direct customer contact increases motivation, it also creates relatively high stress (Hochschild, 1983). However, none of the commonly investigated HPWPs focuses specifically on stress reduction, though some indirectly affect stress (e.g., flextime). Thus, we assert that at least some of the practices investigated by researchers are better suited to manufacturing work, whereas others that might be important for service workers appear under investigated. Consequently, the level of alignment between HPWPs and the work environment is less in service organizations, and the observed effects are likely smaller.

We do expect HPWPs to have a positive and significant effect on organizational performance in service organizations. In addition to KSAs and motivation, empowerment is the third key outcome of HPWPs (Delery & Shaw, 2001). Empowering HPWPs foster a service climate (Gelade & Ivery, 2003) that enables service workers to offer the best service possible (Schneider, Ehrhart, Mayer, Saltz, & Niles-Jolly, 2006). HPWPs can also increase KSAs among low-skilled workers (Russell et al., 1985) and give professional workers easier access to KSA development opportunities (Konrad & Mangel, 2000). Finally, HPWPs offer service workers motivational incentives to engage in extra-role activities that lead to higher customer satisfaction (Morrison, 1996; Schneider et al., 2006). However, whereas the benefits of HPWPs to service organizations is, we believe, large, their potential to impact organizational performance among manufacturers is even greater. The reasons are that (a) manufacturers benefit more from the flexibility wrought by HPWPs, (b) services have alternative

sources for KSA development and motivation that reduce the available HPWP gain, (c) customer participation in service production places a ceiling on the range in which HPWPs work, and (d) some HPWPs align better with manufacturing work. Thus:

> *Hypothesis 4*: The positive relationship between HPWPs and organizational performance is larger for manufacturing organizations than for service organizations.

Method

Sample and Coding

To identify published and unpublished studies that investigate the relationship between at least one HPWP and organizational performance, we searched for the keywords "performance" or "productivity" or "turnover" and "human resource" or "personnel" or "staffing" in ABI/Inform, Lexis-Nexis, and Dissertation Abstracts. ABI/Inform and Lexis-Nexis were searched again using the authors' names from the initial search. We then culled the reference sections of each of the identified studies as well as six reviews of the SHRM literature (i.e., Becker & Gerhart, 1996; Becker & Huselid, 1998; Ferris et al., 1999; Wood, 1999; Wright & Boswell, 2002; Wright, Gardner, Moynihan, & Allen, 2005). Finally, we sent an e-mail requesting help identifying unpublished research to authors who had published relevant studies. To be included in the analysis, (a) a study needed to report bivariate measures of effect size, (b) HPWPs had to have been used broadly in the organizations studied, not only among top managers (e.g., Bloom & Milkovich, 1998), and (c) the study's measures had to reflect the use of or emphasis on HPWPs, not the value or effectiveness of the HR function (cf. Huselid, Jackson, & Schuler, 1997). Applying these criteria furnished a set of 92 studies that examined a total of 19,319 organizations.

We identified 22 practices that researchers described as HPWPs. However, because there is not unanimity among SHRM researchers as to which practices are HPWPs (Becker & Gerhart, 1996), we eliminated nine practices from consideration that appeared in fewer than five studies. This was to ensure that we focused only on those practices where some consensus has emerged regarding the practice's status as a HPWP. Thus, our focus was on 13 practices: incentive compensation (31 effects), training (29), compensation level (18), participation (18), selectivity (15), internal promotion (12), HR planning (10), flexible work (8), performance appraisal (8), grievance procedures (8), teams (8), information sharing (7), and employment security (6). Thirty-eight studies contained measures depicting the extent to which organizations deployed a system of HPWPs. The number of practices included in the HPWP systems ranged between 2 and 13. The average and median HPWP system contained 6.2 and 5 practices, respectively.

Based on research on the dimensions of organizational performance (Combs, Crook, & Shook, 2005) and the heavy use of productivity and retention measures the SHRM literature (Dyer & Reeves, 1995), we divided organizational performance measures into five dimensions: productivity, retention, accounting returns, growth, and market returns. Some studies combined two or more dimensions into a single, overarching measure; We placed these in a sixth category labeled multidimensional. Accounting returns were most frequently studied (35 effects), followed by productivity (32), retention (23), multidimensional (22), growth (16), and market returns (8). Following Dyer and Reeves (1995) and Huselid (1995), we categorized productivity and retention measures as operational performance and accounting returns, growth, market returns, and those multidimensional measures that did not include an operational component as financial performance measures.

Finally, studies were coded as to whether (a) sampled organizations were manufacturers, (b) services, or (c) a mix of manufacturing and service organizations. Overall, coders agreed on 93% of initial codes. Discrepancies were resolved after discussion among the authors. Table 1 shows the studies included in the meta-analysis and the types of effects reported in each vis-à-vis our moderators of interest.

Meta-Analytic Techniques

We began by converting all statistics of relationship (e.g., *t*-tests from event studies) to correlations.[3] Many studies reported correlations among multiple measures of HPWPs and organizational performance. Because the "study" is the unit of analysis in meta-analysis (Hunter & Schmidt, 1990), within-study correlations were averaged to derive the overall relationship for each study. Eight studies reported correlations for multiple HPWPs and for the HPWP system; these were averaged to test Hypothesis 1 (overall effects) but separated to test Hypothesis 2 (individual HPWP vs. HPWP systems). Multiple publications from the same data set were treated as one study. Hypothesis tests were based on the mean of the sample size weighted correlations ($\bar{r}$) among the 92 primary studies. This estimate offers increased accuracy relative to those obtained from any one

[3]Meta-analysis necessarily focuses on bivariate effect size and ignores the role of intervening variables (e.g., organization size) that can be statistically controlled in primary research. Partial correlation coefficients from regression models can only be statistically aggregated if all studies use the same set of independent variables (Hunter & Schmidt, 1990). The role of intervening variables can be partially assessed via moderator analysis as we did here. A goal of future research might be to estimate all relevant bivariate correlations via meta-analysis and test complex theory by using the estimates in structural equation models (Viswesvaran & Ones, 1995).

TABLE 1

Studies Alphabetically by Source and Codes for Hypotheses Tests[a,b]

Abowd et al., 1990[13] (PFM)
Ahmad & Schroeder, 2003[22] (POM)
Arthur, 1994[1] (SOM)
Arthur, 2003[1] (SFR)
Bae & Lawler, 2000[1] (SCR)
Bae et al., 2003[14] (SFR)
Banker et al., 1996[1] (PBS)
Barksdale, 1994[29] (Georgia State U.) (PBS)
Batt et al., 2002[13] (POS)
Batt, 2002[1] (SBS)
Bennett et al., 1998[9] (PBR)
Bhattacharya et al., 2005[10] (SOR)
Brown et al., 2003[1] (PFS)
Buck et al., 2003[15] (SOM)
Buller & Napier, 1993[5] (PFR)

Campos e Chuna et al., 2003[23] (PFR)
Chadwick, 1999[29] (U. Pennsylvania) (POR)
Chandler & McEvoy, 2000[6] (PFM)
Chandler et al., 2000[6] (SFM)
Collins, 2000[29] (U. Maryland) (SOR)
Deepak, et al., 2004[1] (SBR)
Delaney & Huselid, 1996[1] (PFR)
Delery & Doty, 1996[1] (PFS)
Fey et al., 2000[14] (PFR)
Gelade & Ivery, 2003[26] (PBS)
Gerhart & Milkovich, 1990[1] (PFR)
Gomez-Mejia, 1988[28] (SFM)
Guerrero & Barraud-Didier, 2004[14] (POR)
Guest et al., 2003[4] (SBR)
Guthrie, 2001[1] (SOR)
Harel & Tzafrir, 1999[9] (PFR)
Harrell-Cook, 1999[29] (U. Illinois) (SBM)
Harris & Ogbonna[18] (PFR)
Hartog et al., 1999[10] (BBR)
Hatch & Dyer, 2004[28] (POM)
Huselid, 1995[1] (SBR)
Jayaram et al., 1999[21] (POM)
Kallenberg & Moody, 1994[2] (PFR)
Katz et al., 1985[1] (BOM)

Khatri, 2000[14] (PFR)
Konrad & Mangel, 2000[28] (BOR)
Liao, 2005[27] (BFM)
Liouville & Bayad, 1998[12] (SFM)
Litz & Stewart, 2000[6] (POS)
Lui, et al., 2004[24] (BFR)
Luthans, 1997[29] (U. Nebraska) (PFS)
MacDuffie, 1995[13] (SOM)
Martell, 1989[29] (U. Maryland) (PFM)
Michel, 1995[29] (Columbia U.) (PFS)
Montemayor, 1996[19] (PFR)
Neal, et al. 2005[19] (SOM)
Ngo et al., 1998[14] (SBR)
Nkomo, 1983[29] (U. Massachusetts) (PFR)
Noble, 2000[29] (Wayne State U.) (POR)
Nowicki, 2001[29] (U. Colorado) (POS)
O'Shaughnessy, 1994[29] (U. Pennsylvania) (PFR)
Ostrow, 1992[29] (U. Maryland) (PFR)
Park et al., 2003[14] (SFR)
Patterson et al., 2003[30] (U. Sheffield) (SOM)
Paul & Anantharaman, 2003[14] (PFM)
Perry-Smith & Blum, 2000[1] (PFR)
Phoocharoon, 1995[29] (U. Illinois) (PFR)
Richard & Johnson, 2004[17] (SFS)
Russell et al., 1985[26] (POS)
Shaw et al., 1998[1] (POS)
Shaw et al., in press, (#1)[1] (BPM)
Shaw et al., in press, (#2)[1] (BBS)
Sim, 1996[29] (Drexel U.) (POM)
Singh, 2004[3] (PFR)
Skaggs & Youndt, 2004[28] (SFS)
Snell & Youndt, 1995[19] (SFR)
Spencer, 1986[1] (POS)
Steingruber, 1996[29] (U. North Texas) (PFR)
Storey, 2002[25] (PFR)
Terpstra & Rozell, 1993[26] (PFR)
Vandenberg et al., 1999[7] (PBS)
Varma et al., 1999[11] (PFM)
Way, 2002[19] (SOR)
Welbourne & Andrews, 1996[1] (PFR)
White, 1998[29] (Pennsylvania State U.) (POM)
Wright et al., 1998[9] (PFM)
Wright et al., 1999[14] (PFM)

TABLE 1 (continued)

Lam & White, 1998[8] (SFM)	Wright et al., 2005[26] (SBS)
Lee & Chee, 1996[3] (PBM)	Wu, 2004[30] (National Chengchi U.) (PCM)
Lee & Miller, 1999[28] (SFM)	Youndt & Snell, 2004[20] (SFM)
Lepak et al., 2003[19] (PFR)	Youndt et al., 1996[1] (SOR)
Li, 2003[14] (PBR)	Youndt, 1998[29] (Pennsylvania State U.) (SFR)

[a]Codes in parentheses in hypothesis order. H2: P = practice; S = system; B = both. H3: O = operational performance; F = organizational (firm)-wide performance; B = both; C = combined operational- and organization-wide measures (not used to test H3). H4: M = manufacturers; S = services; R = random mix of manufacturers and services (not used to test H4).

[b]Journals are footnoted in alphabetical order: (1) *Academy of Management Journal, (2) American Behavioral Scientist, (3) Asia Pacific Journal of Human Resources, (4) British Journal of Industrial Relations, (5) British Journal of Management, (6) Entrepreneurship: Theory and Practice, (7) Group and Organization Management, (8) Human Resource Development Quarterly, (9) Human Resource Management, (10) Human Resource Management Journal, (11) Human Resource Planning, (12) Human Systems Management, (13) Industrial Relations Labor Review, (14) International Journal of Human Resource Management, (15) Journal of International Business Studies, (16) International Journal of Human Resource Management, (17) Journal of Business Strategies, (18) Journal of Business Research, (19) Journal of Management, (20) Journal of Managerial Issues, (21) Journal of Operations Management, (22) Journal of Operations Management, (23) Journal of the Iberoamerican Academy of Management, (24) Management International Review, (25) Omega-International Journal of Management Science, (26) Personnel Psychology, (27) Personnel Review, (28) Strategic Management Journal*, (29) unpublished dissertation, (30) working paper.

study because positive and negative sampling errors cancel out (Hunter & Schmidt, 1990).

After sampling error, measurement error has the largest impact on effect sizes. For most studies, internal consistency among measures (i.e., alpha) was the only reported reliability statistic. Two studies surveyed two respondents and reported interrater reliability (i.e., ICC(2))[4] but did not report alpha. For these two studies (i.e., Lam & White, 1998; Wright et al., 2005), ICC(2) was used as the reliability estimate. Many studies do not report reliability coefficients, making it impossible to correct each study individually for measurement error. Thus, the mean of the available reliabilities was used to correct $\bar{r}$ according to $\bar{r}_c = \frac{\bar{r}}{\sqrt{\bar{r}_{xx}}\sqrt{\bar{r}_{yy}}}$. In these data, $\bar{r}_{xx} = .74$ (HPWP) and $\bar{r}_{yy} = .82$ (organizational performance).

Variance among correlations comprises true variance in the population relationship (i.e., moderators) and variance due to artifacts such as sampling and measurement error. When artifacts do not explain a large

[4]Other studies reported r_{wg}, which is a measure of interrater agreement rather than reliability and thus was not used to correct for attenuation due to measurement error (Kozlowski & Hattrup, 1992).

proportion of variance, the probability increases that moderators shape the relationship (Hunter & Schmidt, 1990). Whether the amount of unexplained variance is large can be tested by $\chi^2_{K-1} = \frac{T}{(1-\bar{r}^2)^2} s^2_{\bar{r}}$, where K is the number of effects, T is the total sample size, and $s^2_{\bar{r}}$ is the observed variance of $\bar{r}$ (Sagie & Koslowsky, 1993).

When χ^2_{K-1} was not significant, the effect was considered homogeneous (i.e., one population effect with no remaining moderators). All variance is assumed to be due to sampling error, and the standard error of sampling error variance was used to create confidence intervals for the homogeneous case. When significant variance remained unexplained, a wider confidence interval was used based on the standard error of the total effect size variance, that is, $\sqrt{\sigma^2_{\bar{r}}/K}$ (Whitener, 1990). The $\bar{r}$ depicting the overall HPWP–organizational performance relationship was used to test Hypothesis 1 (Whitener, 1990). We tested the three moderator hypotheses by calculating $\bar{r}$ for each level of the moderator and testing for differences (Hunter & Schmidt, 1990).

Results

Hypothesis 1 predicted that HPWPs enhance organizational performance. As shown in Table 2, it was supported with $\bar{r} = .15$ ($p < .01$). Correcting for measurement error, our estimate of the size of the effect is $\bar{r}_c = .20$. Sampling and measurement error explain only 37% of the variance and $\chi^2_{K-1} = 257.63$ ($p < .001$), suggesting moderators are present.

Hypothesis 2 predicted that the relationship between HPWPs and organizational performance is stronger when measures depict HPWP systems rather than individual practices. For individual practices, $\bar{r} = .11$ ($\bar{r}_c = .14$) versus $\bar{r} = 21$ ($\bar{r}_c = .28$) for HPWP systems. The difference between them is significant ($p < .01$), supporting Hypothesis 2. Hypothesis 3 was not supported. Operational performance measures did not reveal stronger effects than financial measures ($\bar{r} = .14$ [$\bar{r}_c = .18$] vs. $\bar{r} = .16$ [$\bar{r}_c = .21$]; *ns*). Finally, Hypothesis 4 predicted that studies of manufacturing organizations would show larger effects than studies of service organizations. Hypothesis 4 was supported. The effect was $\bar{r} = .24$ ($\bar{r}_c = .30$) for studies of manufacturing organizations versus $\bar{r} = .13$ ($\bar{r}_c = .17$) for studies of service organizations.

There was some nonindependence among the samples used to test Hypotheses 2 and 3. Eight studies reported both individual practice and HPWP system effects from the same sample (e.g., Gelade & Ivery, 2003) and 15 studies reported both operational and financial performance measures (e.g., Huselid, 1995). Including these studies does not materially affect the results.

TABLE 2
Meta-Analytic Results

Hypothesis	N	K	$\bar{r}$	$\bar{r}_c$	$\sigma^2_{\bar{r}}$	σ^2_e	$\sigma^2_{Residual}$	% of $\sigma^2_{\bar{r}}$ from artifacts	χ^2	99% confidence interval[a]	95% confidence interval	p value
1. Overall SHRM	19,319	92	.15	.20	.013	.005	.008	37.32%	257.63***	.12 : .18	.13 : .18	*<.01*
2. Individual practices	11,928	61	.11	.14	.006	.005	.001	78.68%	78.68 ns	.09 : .13	.09 : .13	*<.01*
HPWP systems	8,615	38	.21	.28	.014	.004	.010	30.58%	109.12***	.16 : 26	.18 : .25	
3. Operational performance	10,003	43	.14	.18	.009	.005	.004	48.43%	93.03***	.10 : .18	.11 : .17	ns
Financial performance	12,499	64	.16	.21	.016	.005	.010	32.39%	205.47***	.12 : .20	.13 : .19	
4. Manufacturing	3,989	29	.24	.30	.021	.006	.015	31.56%	94.80***	.17 : .31	.19 : .29	*<.05*
Service	3,013	19	.13	.17	.011	.006	.005	57.71%	34.01***	.07 : .19	.09 : .18	

[a]Confidence intervals are based on $\bar{r}$ (see Whitener, 1990). They are partially determined by the amount of residual variance after removing sampling error variance. If χ^2 is significant, we assume residual variance is heterogeneous. Otherwise, homogeneity is assumed.

*p < .05; **p < .01; ***p < .001.

Several robustness tests were performed to ensure the integrity of results. First, although the SHRM literature generally does not discriminate among HPWPs as to the strength of their performance impact, the variety of practices advocated by SHRM researchers opens the possibility that different HPWPs affect organizational performance differently. Thus, we tested for effect size differences among the 13 HPWPs. As depicted in Table 3, consistent with SHRM researchers' view, the confidence intervals for all of the practices overlap. However, the confidence interval for three practices—performance appraisal, teams, and information sharing—include zero. Second, a single organizational performance dimension could outweigh others. For example, forward-looking market measures might better predict the HPWP impact than backward looking accounting measures. Thus, we also report the results from the separate organizational performance dimensions in Table 3; none are significantly different from each other or zero. Third, we tested the possibility that our results were affected by our decision to include only more frequently studied practices (i.e., $\geq$5 times). However, including less studied practices did not alter our results, and a comparison of less frequently (i.e., $\leq$5 and $\leq$10) versus more frequently studied practices revealed no differences. Fourth, we examined the possibility that effects were larger among more homogeneous samples, first by removing four studies that used business units within a single organization and rerunning the analysis; there were no material differences. We also examined homogeneity by testing whether effects from single-industry ($K = 29$; $\bar{r} = .12$) and single-country ($K = 85$; $\bar{r} = .15$) studies were greater than their more heterogeneous multi-industry ($K = 63$; $\bar{r} = .16$) and multi-country ($K = 7$; $\bar{r} = .18$) counterparts; they were not. Finally, we tested for differences among studies using only survey data ($K = 56$; $\bar{r} = .16$), only archival data ($K = 11$; $\bar{r} = .11$), and those that combined survey measures of HPWPs with archival organizational performance measures ($K = 25$; $\bar{r} = .14$); all effects are greater than zero and none of the differences are significant.

Discussion

This study offers five contributions. First, we find that HPWPs materially affect organizational performance. However, as part of our analysis, we found that studies to date show no significant effects for three practices that theorists previously deemed HPWPs. Second, we find support for the hypothesis that systems of HPWPs have stronger effects than individual HPWPs. Third, contrary to SHRM theory, the relationship appears invariant to the choice of organizational performance measure. Fourth, we develop theory explaining why HPWPs should have stronger effects

TABLE 3

Robustness Tests: Individual HPWPs and Performance Measures

	N	K	$\bar{r}$	$\bar{r}_c$	$\sigma^2_{\bar{r}}$	σ^2_e	$\sigma^2_{Residual}$	% of $\sigma^2_{\bar{r}}$ from artifacts	χ^2	99% confidence interval[a]	95% confidence interval	p value
Individual HPWPs												
Incentive compensation	8,156	31	.11	.15	.010	.004	.006	38.04%	83.63***	.07 : .16	.08 : .15	*<.01*
Training	6,691	29	.12	.15	.011	.004	.007	40.19%	73.88***	.07 : .17	.08 : .15	*<.01*
Compensation level	4,666	18	.14	.18	.018	.004	.014	21.42%	86.23***	.06 : .22	.08 : .20	*<.01*
Participation	3,322	18	.10	.13	.007	.005	.002	74.83%	24.28 ns	.05 : .14	.06 : .13	*<.01*
Selectivity	3,689	15	.11	.14	.003	.004	.000	100.00%	12.27 ns	.07 : .15	.08 : .14	*<.01*
Internal promotion	1,804	12	.12	.15	.009	.006	.003	70.19%	17.36 ns	.06 : .18	.07 : .16	*<.01*
HR planning	1,323	10	.16	.21	.015	.007	.007	49.90%	20.37*	.06 : .26	.08 : .23	*<.01*
Flextime	3,745	8	.08	.11	.008	.002	.006	27.27%	38.75***	.00 : .17	.02 : .15	*<.05*
Performance appraisal	1,062	8	.03	.04	.015	.008	.007	50.97%	15.91*	−.08 : .15	−.05 : .12	ns
Grievance procedures	1,717	8	.10	.13	.008	.005	.003	60.89%	13.44*	.02 : .18	.04 : .16	*<.01*
Teams	3,105	8	.05	.06	.005	.003	.002	57.95%	14.32*	−.01 : .11	.00 : .10	ns
Info sharing	760	7	.09	.12	.019	.009	.010	48.59%	14.57*	−.04 : .23	−.01 : .19	ns
Employment security	1,468	6	.11	.15	.01	.004	.006	42.28%	14.53*	.01 : .22	.03 : .19	*<.01*
Performance dimensions												
Accounting returns	6,790	35	.13	.16	.009	.005	.004	57.91%	61.27**	.09 : .17	.10 : .16	*<.01*
Productivity	6,709	32	.15	.19	.014	.005	.010	32.11%	101.34***	.09 : .20	.11 : .19	*<.01*
Retention	6,105	23	.12	.16	.010	.004	.008	31.89%	74.18***	.06 : .18	.08 : .17	*<.01*
Multidimensional	4,154	22	.19	.24	.011	.005	.006	46.53%	48.22***	.13 : .24	.14 : .23	*<.01*
Growth	2,731	16	.18	.23	.035	.006	.029	16.04%	101.57***	.06 : .30	.09 : .27	*<.01*
Market returns	1,629	8	.11	.14	.011	.005	.006	45.03%	18.13*	.02 : .21	.04 : .18	*<.01*

[a]Confidence intervals are based on $\bar{r}$ (see Whitener, 1990). They are partially determined by the amount of residual variance after removing sampling error variance. If χ^2 is significant, we assume residual variance is heterogeneous. Otherwise, homogeneity is assumed.

*p < .05; **p < .01; ***p < .001.

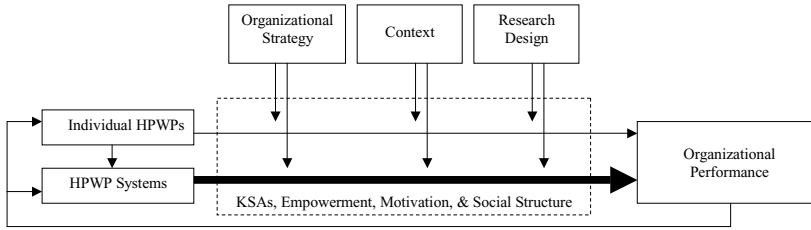

Figure 1: **Major Relationships Surrounding the HPWP–Organizational Performance Relationship.**

among manufacturers than service organizations, and we furnish evidence in support of the theory. Finally, based on the results and our experience conducting this meta-analysis, we offer four suggestions to guide future SHRM research. We use Figure 1 to organize our discussion of these contributions and to point toward how subsequent inquiry might best move forward. The model depicts (a) main effects and a feedback loop between HPWPs and HPWP systems, and organizational performance, (b) the mediators that drive the HPWP–performance relationship according to SHRM theory, and (c) the three major classes of moderators found in the literature, that is, research design, context, and organizational strategy. The purpose of the model is not to furnish a specific testable model but to guide our discussion by describing broadly the pertinent relationships and classes of moderators in SHRM theory.

Our first contribution is to offer a conservative point estimate of the overall main effect of HPWPs on organizational performance. Prior efforts to estimate the magnitude of the relationship relied on one or a small set of studies (e.g., Becker & Huselid, 1998), and narrative reviews were hampered by varying sample characteristics, research designs, practices examined, and performance measures used. A point estimate based on 92 studies will help practitioners justify investments in HPWPs and offer researchers a baseline for identifying moderators of the relationship. Although significance tests are conducted using $\bar{r}$ (Whitener, 1990), $\bar{r}_c$ includes a correction for measurement error and thus reflects our best estimate of the effect's size: $\bar{r}_c = .20$.

Whereas .20 might not appear large, it is much larger than what is found among other organization-level phenomena where long-held organizational performance hypotheses either do not stand up to the evidence (e.g., Dalton, Daily, Ellstrand, & Johnson, 1998) or are much smaller than predicted by theory (e.g., Tosi, Werner, Katz, & Gomez-Mejia, 2000). It means that 20% of the utility available from predicting performance differences among organizations is given by HPWPs. Increasing use of HPWPs by one standard deviation increases performance by .20 of a

standard deviation. For example, Huselid (1995) reports means of 5.1 and 18.4% and standard deviations of 23 and 21.9% for gross ROA (i.e., returns plus non-cash items) and turnover, respectively. In this sample, a one standard deviation increase in the use of HPWPs translates, on average, to a 4.6 percentage-point increase in gross ROA from 5.1 to 9.7 and a 4.4 percentage-point decrease in turnover from 18.4 to 14.0%. Thus, HPWPs' impact on organizational performance is not only statistically significant, but managerially relevant.

Whereas HPWPs have an important positive effect on organizational performance, our robustness tests reveal that the effects for three practices—that is, performance appraisals, teams, and information sharing—have not thus far been shown to be greater than zero. With respect to teams, a deeper look at the eight studies investigating teams suggests that the nonsignificant effect might be due to second-order sampling error. Sampling error occurs when samples differ randomly from the population from which they were drawn. Second-order sampling error occurs when a sample of studies differs randomly from the population of possible studies (Hunter & Schmidt, 1990). Of the eight studies that report teams effects, two are dissertations that use data from large-sample surveys designed for other purposes (i.e., Chadwick, 1999 uses U.S. Census Bureau data, and Noble, 2000 uses the Workplace Employee Relations Survey conducted in the U.K.). Both studies reported small effects from large samples (1,584 in Chadwick, and 758 in Noble). Removing them explains most of the variability in reported effects for teams, leaving $\bar{r} = .14$ ($p < .01$; $\bar{r}_c = .19$).

Although the number of studies is still small, performance appraisal and information sharing do not appear unduly influenced by outlying studies. Youndt et al. (1996) point out that different performance appraisals have different foci, including developmental, control, and results oriented. Delery and Shaw (2001) argue that performance appraisals need to be developmental to be effective. Although there is less debate surrounding information sharing, it seems apparent that some types of information are more critical than others for empowering employees. A machinist might consider knowing raw-material-inventory levels for different orders more essential than the organization's quarterly financial performance. A key implication is that all HPWPs are not equal (Delery, 1998). For some practices, such as incentive compensation, the specific version of the practice, such as group versus individual bonuses, might matter less than for other practices, such as developmental versus control-oriented performance appraisal. Similarly, the mere implementation of some practices might affect organizational performance whereas the effectiveness of the implementation might determine outcomes for others (Huselid et al., 1997). More research is needed that directly compares alternative versions of specific

practices (Delery, 1998) as well as conditions under which implementation effectiveness is most critical.

Our second contribution is testing the assertion that HPWP systems have stronger organizational performance effects than individual HPWPs. We estimate $\bar{r}_c = .28$ for HPWP systems versus $\bar{r}_c = .14$ for individual HPWPs. This difference might actually be larger because our individual HPWP effect estimate is potentially upwardly biased to the extent that individual HPWP measures also depict the progressiveness of the HPWP system in which they are embedded (Huselid, 1995). We presented HPWP systems as a moderator of the overall HPWP–organizational performance relationship, which it is empirically. However, as depicted in Figure 1, HPWP systems are viewed conceptually as a superior alternative to individual HPWPs. Following well-accepted theory (e.g., Huselid, 1995; McDuffie, 1995), SHRM research has shifted its focus away from individual HPWPs toward HPWP systems (Wright & Boswell, 2002). Yet we found only two studies offering empirical tests to justify such a shift (i.e., Guerrero & Barraud-Didier, 2004; Ichniowski et al., 1997). Although the notion that a combination of interventions has stronger effects than single interventions is supported in other research venues (e.g., Jennings, 2006), certain combinations of practices might reduce performance in this context (Becker et al., 1997). Thus, establishing the superiority of HPWP systems in this context offers SHRM researchers firmer grounds for justifying the shift away from individual HPWPs.

Our third contribution results from examining one aspect of research design as a potential moderator (see Figure 1); existing evidence does not support the contention that the HPWP–organizational performance relationship is affected by researchers' choice of organizational performance measures. There are at least two possible explanations. One possibility is that in the case of HPWPs there is no meaningful slippage across performance dimensions. This finding lends credence to Pfeffer's (1998) contention that human resources are the key to competitive advantage. Perhaps the effects of HPWPs carry through to financial performance with little or no slippage because, unlike other functions (e.g., customer service), human resources permeate organizations. A key implication is that researchers can select among a number of alternative valid organizational performance measures without jeopardizing the size of the effects they are likely to find.

An alternative explanation involves the feedback loop depicted in Figure 1. Perhaps operational effects are greater than financial effects as SHRM theory predicts (e.g., Dyer & Reeves, 1995; Huselid, 1995), but the feedback loop partially inflates the financial effects because organizations use slack resources derived from high financial performance to implement more HPWPs (Wright et al., 2005). This interpretation suggests a degree of

reverse causality; at least one longitudinal study shows that financial performance effects diminish greatly when prior performance is statistically controlled (Wright et al., 2005). Although studies examining shareholder reaction to the implementation of HPWPs (e.g., Arthur, 2003) and field studies that follow productivity after the introduction of HPWPs (e.g., Schuster, Dunning, Morden, Hagan, Baker, & McKay, 1997) show that part of the overall effect is from HPWPs to organizational performance, more longitudinal studies such as Wright et al. (2005) are needed so that main and feedback effects can be estimated separately.

The fourth contribution comes from investigating a contextual moderator of the HPWP–organizational performance relationship (see Figure 1). The effect size among manufacturers is almost twice as large as among services ($\bar{r}_c = .30$ vs. .17). One reason is that manufacturers' dependence on complex machinery and concomitant standardized procedures requires HPWPs to help maximize adaptation to environmental change. The need for HPWPs to aid adaptation is less among services because they are less burdened by complex machinery (Lawler et al., 1995). A second reason is that for two of the processes that mediate the HPWP–organizational performance relationship—that is, KSAs and motivation—service organizations have alternative sources. Although service organizations can benefit by increasing KSAs among low-skilled workers (e.g., Hoque, 1999), KSAs can often be adequately developed on-the-job through informal socialization (e.g., Erickson, 2004), and professional service workers often advance KSAs through external organizations such as professional associations (Konrad & Mangel, 2000). A third reason HPWPs affect manufacturers more is that whereas the full range of productive outcomes are largely under the control of manufacturers and thus potentially influenced by HPWPs, production outcomes among services are heavily influenced by customers' ability and willingness to participate (Bowen, 1986). Customers therefore limit the range of possible productive outcomes under the influence of HPWPs. A final reason is that some HPWPs appear better aligned with manufacturing work. HPWPs clearly matter among service organizations—they empower workers to give excellent customer service (Schneider & Bowen, 1993; Schneider et al., 2006), provide resources needed to reduce the stress created by direct customer contact (Bakker, Demerouti, & Euwema, 2005), and build KSAs and motivation beyond baseline levels (Morrison, 1996). However, manufacturers rely more on their HPWP systems to develop KSAs, motivate employees, control quality, and adapt to change. Some HPWPs also appear better aligned with manufacturing work. Consequently, HPWPs' performance enhancing effects are greater among manufacturers.

There are at least two implications of this finding for future research. First, perhaps the "best" set of HPWPs in a given organization depends on the type of work being conducted. For example, research on the effects

of direct customer contact suggests that a great deal of stress is created when organizations frustrate employees' ability to satisfy customer demands (Bakker et al., 2005). Thus, one avenue for future research might be to investigate HPWP systems developed specifically for services. Our results suggest that it might take different HPWPs to bring out the performance potential of service employees due to the unique characteristics of service work, such as low task interdependence, high workflow uncertainty, and the role of the customer in the production process (Batt, 2002; Bowen, 1986; Mills et al., 1983). Perhaps HPWPs that increase empowerment, such as broad job designs (Delery & Shaw, 2001), or reduce stress, such as flexible work schedules (Baltes, Briggs, Huff, Wright, & Neuman, 1999), matter more in service settings than among manufacturers.

A second implication of the finding is that, as suggested by Figure 1, it shows that context matters. Several more fine-grained contextual moderators have been proposed. Konrad and Mangel (2000) examined work–life practices and found that their effects were greater in firms with large numbers of women and professional workers. Datta et al. (2005) found that industry-specific variables such as capital intensity, growth rate, and the level of product differentiation affect HPWP effectiveness. Delery and Shaw (2001) argue that HPWPs have different effects on workers performing core versus non-core activities. Finally, Batt (2000) shows greater gains from HPWPs among employees working with higher valued-added customers. The goal should be to investigate these more fine-grained potential moderators enough so that a future meta-analysis can go beyond the simple distinction between services and manufacturers to determine which contextual variables warrant managerial attention.

As is the case with meta-analysis generally, the major limitations of this study arise partly from the state of accepted SHRM research practice. Therefore, as a final contribution, we offer four suggestions for future scholars. The first guideline is important for better understanding the main effects depicted in Figure 1. Whereas our results agree with Wright and Boswell (2002) that the emphasis needs to be on HPWP systems, we recommend that correlation tables also report correlations for individual HPWPs. As Becker and Gerhart (1996) point out, there is little consensus concerning what is, versus what is not, a HPWP. Our robustness tests revealed three non significant practices (i.e., performance appraisal, teams, and information sharing). There were another nine practices, such as diversity programs (Wright, Ferris, Hiller, & Kroll, 1995) and broad recruiting (Terpstra & Rozell, 1993), where fewer than five individual effects were reported. This is not enough evidence to draw conclusions. The two studies that examine employee socialization programs (Youndt, 1998; White, 1998) show an effect, but the two investigations of diversity programs (White, 1998; Wright, Smart, & McMahan, 1995) and dependent

care (Barksdale, 1994; White, 1998) do not. At this point, it is difficult to tell whether such disparities are due to second-order sampling error or the practices themselves. Reporting individual effects in correlation tables will allow future meta-analyses to clarify which practices really are HPWPs.

Our second suggestion is targeted toward further clarifying a potential moderator from the research design class depicted in Figure 1. Sources of measurement error in HPWP research need more investigation. We elected to present a conservative estimate of the effect of HPWPs on organizational performance by correcting only for known measurement error in the studies under investigation. However, there has been a healthy debate in *Personnel Psychology* as to the effect of measurement error caused by using single raters in surveys of HPWPs (Gerhart, Wright, McMahan, & Snell, 2000; Huselid & Becker, 2000). In our data, uncorrected effects in studies with survey measures of HPWPs ($\bar{r} = .16$) are not significantly different from those with archival measures ($\bar{r} = .11$). However, if we assume rater reliability error is unique to survey data and use the average ICC(1) = .24 reported among the five studies reporting such data (e.g., Gerhart et al., 2000; Lam & White, 1998; Lepak & Snell, 2002; Wright, Gardner, Moynihan, Park, Gerhart, & Delery, 2001; Wright et al., 2005) to apply an additional correction (i.e., $\bar{r}_c = \frac{\bar{r}}{\sqrt{\bar{r}_{xx}}\sqrt{\bar{r}_{yy}}\sqrt{\bar{r}_{ICC(1)}}}$) to the single respondent survey studies, $\bar{r}_c$ increases markedly to .40 while remaining at $\bar{r}_c = .14$ among archival data studies where rater reliability is not an issue.

There are three possible explanations for the disparity. First, data source might be a true moderator, but because rater reliability error depresses survey effects so much, this can only be seen once error due to rater reliability is removed. Second, the $\bar{r}_c = .40$ for survey data might be inflated because it is corrected upward for rater reliability error but not correspondingly downward for unmeasured common method bias (Gerhart et al., 2000). If true, survey and archival data sources might have similar effect sizes close to our estimate of $\bar{r}_c = .20$. The third possibility is that both survey and archival scores have similar amounts of error but that we have only identified it (as rater reliability error) in surveys. If this prospect is correct, the true population effect might be closer to the $\bar{r}_c = .40$ found by correcting survey studies for both measurement and rater reliability error.

Discerning what combination of these three possibilities is at play will require research in two directions. First, studies are needed to estimate the degree to which common method bias inflates effects in SHRM surveys. Second, sources of error in archival data need to be codified and estimated. Several sources of error have been identified for some archival measures of organizational performance (e.g., Fisher & McGowan, 1983) and efforts to estimate the validity of alternative measures are beginning (Combs et al.,

2005), but similar efforts have not yet begun among archival measures of HPWPs.

The third suggestion focuses on organizational strategy, which is the one class of moderator in Figure 1 that we were not able to at least partially address. SHRM theory asserts that matching HPWP systems with organizational strategy enhances organizational performance (e.g., Delery & Doty, 1996; Wright et al., 1995; Youndt et al., 1996). Unfortunately, we were unable to investigate this "strategic fit" hypothesis for two reasons. First, the way to test for moderation in meta-analysis is to separate reported effects (or studies) into groups based on the moderator variable of interest and test for effect size differences between groups. In the case of strategic fit, this requires separating studies into groups according to whether the HPWP systems investigated fit with the strategies of the organizations sampled. However, because studies typically sample firms that use different strategies, it is impossible to code studies according to whether the HPWP system under investigation had "good" versus "bad" fit with the strategies of the sampled organizations. A second way to accumulate knowledge about fit would be to use fit statistics. Researchers typically assess fit by examining the significance of interaction terms in regression analysis. These interaction terms are the product of scores on strategy and HPWP measures. Unfortunately, they are rarely included in correlation tables. Thus, in order for future inquiry to properly assess whether HPWP-strategy fit improves organizational performance beyond the global effects of HPWPs, researchers need to report the correlation between organizational performance and strategy-HPWP interaction terms.

Our final guideline is suggested by the dashed box in Figure 1 depicting causal mediators. Although we can estimate the size of the relationship between HPWPs and organizational performance, meta-analysis is ill equipped to examine causal mediators because of its focus on bivariate effects. SHRM theory asserts that HPWPs affect organizational performance by increasing employees' KSAs, empowering them to use their KSAs, and motivating them to do so. Recent theory also suggests HPWPs interact with organizations' internal social structures to increase performance (Evans & Davis, 2005). However, as our results for Hypothesis 3 (operational vs. financial performance) and other evidence (e.g., Wright et al., 2005) suggest, the relationship appears at least partially affected by reverse causality. Alternatively, the relationship could be spurious as when good leadership both improves organizational performance and institutes HPWPs (Becker & Gerhart, 1996; Wright et al., 2005). Thus, it is imperative that the causal mechanisms linking HPWPs to organizational performance are rigorously examined (Ferris et al., 1999).

Whereas many studies exist at the individual level of analysis tying specific HPWPs to one or more of the mediators described in SHRM

theory (e.g., training to skill development—Wexley, 1984), with a few exceptions (e.g., Paul & Anantharaman, 2003) little effort has focused on understanding how these mediators respond to HPWPs at the organizational level, nor have the mediators, in turn, been systematically linked to organizational performance. In the short term, studies need to be designed to test different mediating relationships between HPWPs and organizational performance. Over time, perhaps enough studies will investigate relationships among HPWPs, KSAs, motivation, empowerment, key elements of internal social structure, and organizational performance so that a future meta-analysis might accumulate all of the known correlations among them as input into a structural equation model that tests causal mediation (Viswesvaran & Ones, 1995).

Conclusion

SHRM researchers have long argued that human resources should be managed strategically (MacMillan & Schuler, 1985) and that certain practices are essential to improving organizational performance (Russell et al., 1985). However, the wide variety of sample characteristics, research designs, practices examined, and organizational performance measures used has frustrated efforts to estimate the size of the link between HPWPs and organizational performance. By using meta-analysis to reduce the effects of sampling and measurement error, our results lay to rest any doubt about the existence of a relationship, and more importantly, offers researchers a baseline estimate of its size. We estimate that organizations can increase their performance by .20 of a standardized unit for each unit increase in HPWP use. We have also taken a step toward explaining the wide variance in effect sizes among studies. Not only does a focus on HPWP systems improve effect sizes, but context also matters. The challenge for future research is to reach beyond the service versus manufacturing designation found here to identify other important contextual variables and to programmatically match HPWP systems to both context and strategy.

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