# Does Human Capital Matter? A Meta-Analysis of the Relationship Between Human Capital and Firm Performance

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Theory at both the micro and macro level predicts that investments in superior human capital generate better firm-level performance. However, human capital takes time and money to develop or acquire, which potentially offsets its positive benefits. Indeed, extant tests appear equivocal regarding its impact. To clarify what is known, we meta-analyzed effects drawn from 66 studies of the human capital–firm performance relationship and investigated 3 moderators suggested by resource-based theory. We found that human capital relates strongly to performance, especially when the human capital in question is not readily tradable in labor markets and when researchers use operational performance measures that are not subject to profit appropriation. Our results suggest that managers should invest in programs that increase and retain firm-specific human capital.

*Keywords:* human capital, performance, resource-based theory, meta-analysis

Maximizing the impact and efficiency of human capital in organizations is one of the cornerstones of industrial and organizational psychology inquiry. It is commonly believed that such maximization benefits individuals as well as the organizations in which they work. Indeed, research in applied psychology and strategic human resource management clearly indicates that investing in human capital can yield positive individual- as well as organization-level performance outcomes (e.g., Becker & Huselid, 2006; Bowen & Ostroff, 2004; Huselid, 1995; Le, Oh, Shaffer, & Schmidt, 2007; Subramony, Krause, Norton, & Burns, 2008). Thus, a key tenet within micro organizational inquiry is that the human capital available to an organization has potentially important performance implications (Takeuchi, Lepak, Wang, & Takeuchi, 2007).

Within macro organizational inquiry, understanding the key determinants of organizational performance has long been an important goal (Rumelt, Schendel, & Teece, 1994; Summer et al., 1990). Over the last 15 years, researchers working to develop a resource-based theory (RBT) of competitive advantage have highlighted the role of human capital as a key factor explaining why some firms outperform others (Acedo, Barroso, & Galan, 2006; Barney, 1991; Barney, Wright, & Ketchen, 2001; Coff, 1999). RBT argues that the heterogeneous distribution of valuable resources among firms—such as human capital—explains performance differences. Firms possessing valuable resources that others cannot easily duplicate or substitute for will outperform competitors lacking such resources (Barney, 1991; Peteraf, 1993). As efforts have progressed to describe the types of resources most likely to shape competitive advantage and performance, researchers quickly converged on knowledge embedded in human capital as perhaps the most universally valuable and imperfectly imitable resource (Coff, 1997; Grant, 1991, 1996; Kogut & Zander, 1992).

RBT is now well established in the strategic management literature (Barney, 2001), its application is growing within micro research (e.g., Gong, Law, Chang, & Xin, 2009; Takeuchi et al., 2007), and efforts are beginning in earnest to take stock of findings related to its key predictions (e.g., Barney & Arikan, 2001; Crook, Ketchen, Combs, & Todd, 2008; Newbert, 2007). With respect to the particular role of human capital on performance, however, Newbert reported that of the 33 tests of the human capital–performance relationship he identified in the literature, just 11 (33%) supported the notion that human capital is positively and significantly related to firm performance.

Although Newbert (2007) collected this evidence from just seven articles, this finding suggests—in contrast to RBT and micro research—that human capital might not be an important determinant of firm performance. There are at least three potential reasons for the contradictory evidence Newbert presented. The first is that the value of human capital might be path dependent. RBT suggests that truly unique and valuable skills likely develop over time (Coff, 1997; Grant, 1996; Penrose, 1959). If this is the case, cross-sectional studies that do not capture the lagged effects of investments in human capital or changes in performance over time from a buildup of superior human capital might be less likely to find effects.

A second reason for the seemingly contradictory evidence is that the "strategic factor market" (Barney, 1986) for labor is more efficient for some types of human capital than others. People with valuable but general (e.g., industry experience) human capital can move among the highest bidding competitors until their costs roughly equal the value that they add (Coff, 1997). Firm-specific human capital, in contrast, is valuable because it helps employees make decisions that are congruent with a firm's unique strategy, organizational context, and competitive environment (Kor & Mahoney, 2005). Moreover, it is not easily transferred and applied in other firms, and this makes it difficult for employees to demand compensation that is commensurate with their full value to the firm (Becker, 1983). Thus, seemingly equivocal results from prior research might be due to a failure to separate out the different effects that firm-specific and general human capital have on firm performance.

A third potential reason for the seemingly conflicting results is due to what has become known within RBT as the appropriability condition. According to Coff (1999), there are numerous stakeholders that all compete for a share of the profits. When human capital creates profits, the individuals possessing such capital are more likely able to leverage it to gain higher pay (Coff, 1997). Even if the employees possessing the human capital do not appropriate the value that they generate, their managers might (Coff, 1999). Under such conditions, there might not be a tight link between human capital and global measures of firm performance (e.g., stock returns), because some of the profits that would otherwise be attributable to superior human capital are appropriated by employees and managers in the form of higher pay before this shows up in global organizational performance measures (Barney & Clark, 2007). Consequently, the value created by human capital might not translate into higher performance, at least in terms of global performance metrics.

In short, there are several potentially important theoretical moderators of the human capital–performance relationship. Given the prominence of human capital as a determinant of performance differences within micro and macro inquiry, the initial evidence suggesting that the empirical evidence is mixed, and theory suggesting that there are important moderators of the human capital–performance relationship, a meta-analysis designed to clarify extant evidence seems both timely and warranted. Meta-analysis quantitatively aggregates prior studies' empirical findings in order to detect whether a relationship exists and to estimate the magnitude of the effect by taking into account study artifacts, such as sampling and measurement error (Hunter & Schmidt, 2004). Meta-analysis also allows investigation of moderators that help explain why results vary systematically among studies of the same relationships.

Grounding our study in RBT, we investigate three potential moderators: (a) path dependence (i.e., cross-sectional vs. longitudinal study designs), (b) firm-specific versus general human capital, and (c) operational versus global firm performance measures. Estimating the overall effect of human capital offers a benchmark for understanding the extent to which it broadly impacts performance. Our tests for moderation support RBT, suggesting that it matters where human capital resides and how researchers attempt to capture it.

## RBT, Human Capital, and Performance

The term *human capital* refers to the knowledge, skills, and abilities (KSAs) embodied in people (Coff, 2002). It includes not just factual, "how-to" KSAs that can be made explicit but also tacit KSAs, which can often be difficult to articulate (Polanyi, 1966). Researchers have long understood that human capital, especially one's education and training, plays an important role in organizations (Becker, 1983; Mincer, 1974). Compensation for employees and managers is strongly related to the education and experience they possess (Becker, 1964; Fisher & Govindarajan, 1992; Harris & Helfat, 1997), and investments in training designed to build human capital influence performance (Combs, Liu, Hall, & Ketchen, 2006). Taken together, KSAs, including the experiences, education, and training managers bring, have consistently been viewed as central drivers of strategy and performance (Andrews, 1965; Chandler, 1962; Hambrick & Mason, 1984).

The introduction of RBT (Barney, 1986; Lippman & Rumelt, 1982) offered a theoretical explanation for why superior human capital might lead to sustainable performance advantages for firms. Valuable resources must be in short supply and semipermanently tied to the firm in order to deliver lasting above-average performance. Otherwise, competitors would simply purchase the resources (or resources that perform the same function) and compete away any advantage the firm might have (Peteraf, 1993). Researchers quickly pointed to knowledge embedded in human capital as being among the most universal of resources that meet these criteria (Grant, 1991; Kogut & Zander, 1992). Indeed, an entire literature, called the knowledge-based view, emerged from RBT, arguing that knowledge embedded within people is ultimately the only source of competitive advantage (cf. Grant, 1996).

Overall, human capital has a long history in strategic management of being viewed as a source of value, both at the managerial level (Andrews, 1965; Chandler, 1962) and the individual level (Becker, 1964, 1983). The reason is that it is unevenly distributed among firms and, at least with respect to superior managers and individuals, often in short supply. A study by Castanias and Helfat (1991) elaborated on this notion; they asserted that superior human capital—such as an above-average CEO—is rare indeed. Finally, it is difficult for competing firms to assess, copy, and/or acquire human capital, at least at a cost that makes doing so worthwhile (e.g., Coff, 2002). Accordingly, firms possessing superior human capital should outperform others. Thus, we begin with a baseline prediction:

*Hypothesis 1:* Human capital is positively related to performance.

## Contingencies Surrounding the Human Capital–Performance Relationship

As suggested by Newbert (2007), at least preliminarily, the effect of human capital on firm-level performance seems to vary considerably. RBT has offered three concepts—path dependence (Peteraf, 1993), imperfect strategic factor markets (Barney, 1986), and appropriability (Coff, 1999)—that we believe might help explain variance in the relationship found among studies.

### Path Dependence and Longitudinal Relationships

RBT is concerned primarily about long-term, or sustainable, advantages (Barney, 2001). The possession of human capital might provide an explanation for these sustained advantages, because valuable, rare, and hard to copy or imitate KSAs typically develop over time and in a path-dependent way. Penrose (1959) was first to describe the path-dependent effect of human capital on firms. She explained why the time needed to develop managerial talent placed a limit on existing managerial efforts to expand. In addition, the path-dependent way in which human capital is built likely increases heterogeneity among firms and thus makes it more likely that firms benefit from prior investments in human capital. In other words, there might be a temporal component that might not be captured unless a study takes a longer term view of the relationship between human capital and performance.

Because of this, cross-sectional studies may not allow researchers to capture the full utility of human capital and how it influences performance over time (Rouse & Daellenbach, 1999). One reason is that there is likely to be some lag period after a firm builds or acquires superior human capital before the resulting impact is reflected in performance measures. However, because an unknown number of firms in any cross-sectional design are potentially in this lag period, such designs will underestimate the overall impact of human capital on firm performance. Similarly, cross-sectional designs capture a blend of short- and long-tenured human capital but will likely not capture changes in performance due to increased investments in human capital. Lagged and longitudinal designs, in contrast, should better capture the eventual results of human capital on firm performance. This is because sample firms are unlikely to be caught in that period wherein programs introduced by newly built human capital have not yet impacted performance. Thus, we made the following prediction:

> *Hypothesis 2:* The relationship between human capital and performance is stronger among studies using longitudinal data than among studies using cross-sectional data.

### Path Dependency, Imperfect Strategic Factor Markets, and Firm-Specific Human Capital

The concept of path dependency suggests that the value of resources such as human capital increases as they become idiosyncratic to solving problems that are specific to the firm's unique competitive context (Grant, 1996; Penrose, 1959). In line with this concept, recent research suggests that the value of human capital increases as it becomes increasingly firm specific (e.g., Dutta, Narasimhan, & Rajiv, 2005). Kor and Mahoney (2005), for example, reported that managers "with tacit knowledge of employee

skills and interests can more accurately dedicate funds to high-margin R&D projects and also can do a superior job of matching skills to R&D projects, resulting in superior economic performance" (p. 495). When their firm-specific human capital (e.g., years of experience with a firm) increases, managers might become more effective resource allocators within firms, thus enabling better decisions and enhanced performance.

For firms to retain any performance advantage attributable to human capital, however, competitors must not be able to purchase the resource in a competitive "strategic factor market" (i.e., labor market; Barney, 1986). In contrast to general human capital that all competitors need, firm-specific human capital is tied semipermanently to the firm and is thus very difficult to trade or exchange without loss of value (Chi, 1994). According to Coff (1997, p. 377), employees are "free to quit at will." Individuals with general human capital can quit more easily because their nonspecific skills can be more easily "traded" in competitive labor markets. Coff described a situation in which stockbrokers—who possess mostly general capital—became disenchanted with their present employer, in part, because they were being underpaid. However, because brokers' skills could be applied in other contexts, other firms hired the brokers and, in the process, bid up wages. Consequently, when human capital is general in nature, wages and the threat of turnover are higher because the labor market is more competitive. Taken together, the potentially positive effects of specific human capital combined with the potentially negative effects of general human capital suggest that the former will have beneficial performance implications. Thus, we made the following prediction:

> *Hypothesis 3:* The relationship between human capital and performance is stronger when measures capture specific human capital rather than when measures capture general human capital.

### Appropriability and the Choice of Dependent Variable

The appropriability condition suggests that linking valuable resources to global firm performance measures underestimates their potentially positive effects (Collis & Montgomery, 1995). Under conditions wherein powerful stakeholders exist, such as dominant unions or influential top management team members, these stakeholders might use their power to appropriate potential profits (Coff, 1999). According to Crook et al. (2008), "When stakeholders are powerful, they may successfully extract above-market prices for their contributions to the organization" (p. 1145). An important implication is that extracting such prices reduces the positive impact of resources, such as human capital, on the firm's global performance measures, such as returns on assets (ROA; Coff, 1999).

In addition to the potential effects of powerful stakeholders, organizational performance is by its nature a highly aggregated construct (Richard, Devinney, Yip, & Johnson, 2009), and global measures of firm performance—such as ROA or returns on sales—might not capture the real and sometimes competing impacts of different resources (Ray, Barney, & Muhanna, 2004). Instead, performance advantages are more likely to be revealed in operational performance measures (e.g., customer service satisfaction or innovation) that are unaffected by appropriability and are closer to

the actual competitive advantages created by superior human capital. Because operational performance measures capture the performance of specific value chain activities within the firm, but not the firm globally, the performance implications of human capital should impact them more directly. Thus, we predicted that operational performance measures are more likely to capture the effects of human capital on performance:

> *Hypothesis 4:* The relationship between human capital and performance is stronger when performance is measured with operational performance measures than when it is measured with global performance measures.

## Method

### Sample

Our objective was to collect the population of studies that examined whether human capital relates to performance. We began by conducting a keyword search of ABI Inform, Business Source Premier, and JSTOR using the keywords *resource, resource-based, knowledge-based, human capital,* and *performance.* We used 1991 as the starting date for the search because that was the year Barney (1991) published his landmark paper and because 1991 is also the generally accepted year in which RBT became popular (Barney et al., 2001). Our search yielded 66 usable studies with 68 samples involving 12,163 observations.[1] These studies are listed in our reference section and are marked with an asterisk. The number of studies is significantly larger than the seven studies involving human capital examined by Newbert (2007).

To be considered usable in our meta-analysis, a study had to contain a measure of human capital, contain a measure of performance, and report the bivariate relationship (i.e., correlation) between the two. Our major constructs and how we coded each primary study are reported in Table 1. To code for the main effect described by Hypothesis 1, we recorded the correlation between a human capital measure (e.g., top management team executive experience; Combs & Ketchen, 1999) and a performance measure (e.g., ROA). To test for the moderator effects described in Hypotheses 2–4, we coded each study according to a study characteristic that reflected the relevant underlying theoretical concept from RBT. In particular, to capture effects due to path dependency (Hypothesis 2), we coded whether a study relied on cross-sectional or longitudinal data. We coded as "cross sectional" those studies wherein human capital and performance measures were taken at the same time. Building on the guidance offered by Ployhart and Vandenberg (2010), we coded as "longitudinal" those studies wherein performance measures were taken after human capital measures. Firm-specific human capital should be subject to greater strategic factor market imperfections. Thus, for Hypothesis 3, we grouped studies according to whether the human capital under investigation was general or firm specific. Finally, we captured the appropriability condition by dividing effects according to whether the dependent measure depicts operational or global organizational performance.

The first 20 studies were coded as a calibration sample by two of the coauthors. There was agreement on 90% of initial codes. If there was disagreement, it was resolved through discussion. A standard coding approach for the remaining studies was then developed, and the remaining studies were coded by the lead author.

Because the study is the unit of analysis, if a study used multiple measures of one or more human capital measures or one or more performance measures and reported correlations separately, the correlations were averaged to yield a single estimate for the study (Hunter & Schmidt, 2004).[2]

## Meta-Analytic Procedures

Meta-analysis statistically aggregates findings to establish whether a relationship exists and, if so, estimates its size (Hunter & Schmidt, 2004). Effect size estimates were calculated as the mean of the sample size weighted correlations ($\bar{r}$) from primary studies. This estimate offers more accuracy than estimates obtained from any one study, because positive and negative sampling errors cancel out (Hunter & Schmidt, 2004).

After sampling error, measurement error has the largest impact on study findings. Unfortunately, most human capital studies do not report reliability coefficients, making it impossible to correct each study individually for measurement error. Thus, we used the mean of the available reliabilities to correct $\bar{r}$ (i.e., $\bar{r}_c$) according to formulas offered by Hunter and Schmidt (2004). In particular, the average reliability for human capital ($\bar{r}_{xx}$) is .81, and the average reliability for performance ($\bar{r}_{yy}$) is .91. Following Hunter and Schmidt, we corrected $\bar{r}$ according to $\bar{r}_c = \dfrac{\bar{r}}{\sqrt{\bar{r}_{xx}}\sqrt{\bar{r}_{yy}}}$, wherein we took the product of the square roots of the available reliabilities. Thus, we used .82 to correct $\bar{r}$. To test our hypotheses, we created confidence intervals around each $\bar{r}$ (Whitener, 1990). Chi-square statistics were used to determine the stability of $\bar{r}$ and to create appropriate confidence intervals. Significant chi-square statistics indicate heterogeneity in $\bar{r}$ and, thus, the need for wider confidence based on the total variance of $\bar{r}$, whereas nonsignificant chi-square statistics indicate $\bar{r}$ in a homogeneous population and, thus, the need for a narrower confidence interval based on the residual variance of $\bar{r}$ after sampling error is taken into account.

The main effect of human capital described by Hypothesis 1 was tested by whether the confidence interval for $\bar{r}$ included zero. Hypotheses 2–4 were tested by calculating the $\bar{r}$ for groups of studies at each level of the moderator (i.e., cross-sectional vs. lagged studies, firm specific vs. general, and operational vs. global performance) and testing for differences between groups (Hunter & Schmidt, 2004). If the confidence intervals did not overlap between the groups, this suggested the presence of a moderating effect (Hunter & Schmidt, 2004).

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[1] We report the number of observations rather than firms because some primary studies likely contain some of the same firms in their samples (e.g., *Fortune* 500).

[2] When a study contained measures of two different constructs and reported separate effect sizes for the two, the effect size for the relationship of interest became the unit of analysis. For example, Berman, Down, and Hill (2002) reported separate effect sizes for both general and firm-specific human capital. In this case and others like it, the effect size became the unit, because moderator tests were accomplished by groupings of measures and the respective effects, not studies.

Table 1
*Studies Used in the Meta-Analysis*

| Study[a] | Sample size | Human capital construct labels[b,c] | Performance construct labels[d] | Overall effects[e] |
|---|---|---|---|---|
| Bae & Lawler (2000) | 138 | Management HRM values (S,D) | Firm performance (G) | .31 (C) |
| Batjargal (2005) | 56 | Industry experience; managerial experience (G,T,D) | Revenue growth (G) | .16 (L) |
| Bergh (2001) | 104 | Organizational tenure (S,T,A) | Post-acquisition performance (G) | .09 |
| Berman et al. (2002) | 23 | Shared team experience; average draft position; coach tenure (B,A) | Wins (G) | .19 |
| Brown et al. (2007) | 28 | Project management human capital (G,A) | Performance (G) | .28 (C) |
| Brush & Chaganti (1999) | 195 | Owner resources (G,T,D) | Net cash flow (G); log of employment growth (G) | .01 (C) |
| Carmeli (2004) | 98 | Strategic human capital (S,C,A) | Self-income ratio (G); collecting efficiency ratio (G) | .40 (O) |
| Carmeli & Tishler (2004) | 99 | Human capital (S,C,A) | Self-income ratio (G); collecting efficiency ratio (G); unemployment rate of local authorities (G); municipal development (G) | .22 (O) |
| Carpenter et al. (2001) | 245 | CEO international assignment experience (G,T) | ROA (G); stock market returns (G) | .11 (L,O) |
| Chandler & Lyon (2009) | 124 | Education; industry experience (G,T) | Venture performance (G) | .19 |
| Combs & Ketchen (1999) | 94 | Top management team experience; top management team tenure (B,T) | ROA (G); market to book (G) | .06 (C) |
| De Carolis (2003) | 14 | Technological competence; regulatory competency; marketing competence (S,C,A) | ROA (G); market to book value (G) | .01 (C,O) |
| De Carolis & Deeds (1999) | 98 | Location (G,C,D) | Firm performance (G) | .14 (C) |
| De Carolis et al. (2009) | 269 | Education; relational capital (B,T,D) | Progression of new venture creation (G) | .22 (C) |
| Dimov & Shepherd (2005) | 112 | Top management team education; industry experience (B,T,A) | Portion gone public (G) | −.13 (C) |
| Edelman et al. (2005) | 192 | Managerial talent (G,T,A) | Change in return on sales (G) | .01 (C) |
| Ethiraj et al. (2005) | 1 | Client-specific capabilities (G,D) | Project contribution (O-operations) | .10 (C) |
| Fasci & Valdez (1998) | 604 | Education level; work experience (G,T,D) | Income/profit (G) | .13 (C) |
| Frese et al. (2007; 3 samples) | 117; 215; 73 | Cognitive ability; human capital (G,T,D) | Growth (G); expert evaluation (G); interviewer evaluation (G) | .38 (C); .23 (C); .29 (C) |
| Garg et al. (2003) | 105 | Level of scanning (G,T,D) | Accounting return (G); sales growth (G); overall performance (G) | .09 (C) |
| Gong (2003) | 695 | Percentage of expatriate parent country nationals in workforce (G,T,D) | Labor productivity (O-operations) | .42 (C) |
| Haber & Reichel (2007) | 305 | Managerial skills index; education level of entrepreneur; prior entrepreneurial experience (G,T,D) | Average growth in revenues (G); average growth in employees (G); profitability compared to competitors (G); occupancy and customer satisfaction index (O-service); development and growth index (O-marketing); tourism and business strength index (O-operations) | .10 (C) |
| Hatch & Dyer (2004) | 25 | Statistical process control training; vendor training; machines qualification (S,L,N,D) | Defect density (O-operations) | .25 (C) |
| Hitt et al. (2001) | 93 | Human capital (T,A) | Firm performance (G) | .16 (O) |
| Hitt et al. (2006) | 72 | Human capital (G,T,A) | Firm performance (G) | .13 (B,O) |
| Hmieleski & Baron (2009) | 201 | Education and entrepreneurial experience (G,T,A) | Revenue growth (G); employment growth (G) | .05 (C) |
| Hult & Ketchen (2001) | 181 | Organizational learning (T,D) | Return on investment (G); income (G); stocks (G) | .21 (C) |
| Huselid et al. (1997) | 293 | HRM capabilities and business-related capabilities (G,A) | Gross rate of returns on assets (G); Tobin's $Q$ (G); employee productivity (G) | .06 (C,O) |

(*table continues*)

Table 1 (*continued*)

| Study[a] | Sample size | Human capital construct labels[b,c] | Performance construct labels[d] | Overall effects[e] |
|---|---|---|---|---|
| Keller (2004) | 94 | Leadership capabilities (S,A) | Profitability (G); speed to market (O-technological development) | .30 (L) |
| Kor (2006) | 77 | Managers' firm tenure (S,T,A) | Profitability (G) | .26 (C) |
| Kor & Leblebici (2005) | 105 | Human capital leverage (C,D) | Profit per partner (G) | .56 (O) |
| Kor & Mahoney (2005) | 60 | Top management firm-specific experience (S,T,A) | Tobin's $Q$ (G) | −.07 (L,O) |
| Lee et al. (2001) | 137 | Internal capabilities (S,T,D) | Sales growth (G) | .47 (C) |
| Lee & Miller (1999) | 129 | Organizational commitment to employees (S,T,A) | ROA (G) | .23 (C) |
| Lopez (2003) | 72 | Human capital (S,C) | ROA (G) | .57 (C) |
| Luneborg & Nielsen (2003) | 259 | IT knowledge (G,A) | Performance (G) | .15 (C) |
| Macher & Boerner (2006) | 26 | Therapeutic area experience; Phase experience (S,C,D) | Development time (O-technological development) | −.06 (C,O) |
| Manev et al. (2005) | 160 | Education; technical experience; managerial experience (G,T,A) | Firm performance; growth in employees (G) | .03 (C) |
| Menguc & Barker (2005) | 102 | Selling skills and collaborative skills (B,A) | Field sales unit performance (O-marketing) | .22 (C) |
| Miller & Shamsie (1996) | 7 | Discrete property-based resources; discrete knowledge-based resources (S,A) | Return on sales without theaters (G); return on sales with theaters (G) | .12 |
| Nixon et al. (2004) | 364 | Level of downsizing; reallocation strategy; disengagement incentive (S,C,D) | Market valuation of the firm (G) | .18 (C) |
| Park et al. (2003) | 52 | Employee skill; attitudes; motivation (B,C,A) | Firm performance (G) | .09 (C) |
| Park & Luo (2001) | 128 | Resource strength (S,C,A) | Sales growth; profit growth (G) | .33 (C,O) |
| Ployhart et al. (2009) | 1255 | Unit service orientation (G,L,A) | Sales per employee (G); adjusted controllable profit (G); percentage sales growth (G) | .02 (C) |
| Ployhart et al. (in press) | 238 | Generic human capital (G,L,A); unit-specific human capital (S,L,A) | Receipts vs. flow through (G); sales per labor hour (G) | .16 (C,O) |
| Powell & Dent-Micallef (1997) | 65 | IT training (G,C,A) | IT performance (O-structural); overall performance (G) | .38 (B) |
| Roth (1995) | 74 | Locus of control: information-gathering style, information evaluation style, broad-based experience, marketing management, technical management, core business experience, international experience (G,T,A) | Income growth (G) | .01 (C) |
| Schlemmer & Webb (2006) | 106 | Integration (S,C,D) | Internet performance (G); financial performance (G) | .38 (C) |
| Shrader & Siegel (2007) | 198 | Industry experience, technical experience, marketing experience, finance experience, international experience, start-up experience (G,T,A) | Profitability; sales growth (G) | .05 (L) |
| Simonin (1997) | 151 | Collaborative management know-how (S,T,A) | ROI, ROA (G) | .23 (C,O) |
| Skaggs & Youndt (2004) | 234 | Human capital (S,C,D) | Firm performance (G) | .27 (C) |
| Smith et al. (2005) | 72 | Knowledge stock (G,T,A) | Number new products/services (O-technological development) | .19 (C) |
| Takeuchi et al. (2007) | 76 | Collective human capital (L,A) | Relative establishment performance (G) | .56 (C) |
| Tanriverdi & Venkatraman (2005) | 303 | Knowledge synergy; Human resource relatedness; technological relatedness; (B,T,D) | ROA (G), ROE (G), Tobin's $Q$ (G) | .12 (L,O) |
| Thompson & Heron (2005) | 78 | Management capabilities (B,D) | Value added per employee (G) | .01 (L) |
| Tippens & Sohi (2003) | 271 | IT knowledge (G,C,D) | Firm performance (G) | .18 (C) |
| Van Iddekinge et al. (2009) | 861 | Human capital (G,L,A) | Retention (O-human resources); customer service performance (O-service); profits (G) | .14 (B) |
| Wang et al. (2009) | 211 | Self patent citations (S,L,D) | Log of Tobin's $Q$ (G) | .15 (L,O) |
| West & Noel (2009) | 177 | Start-up experience (G,T,D) | New venture performance (G) | .19 (C) |
| Wright et al. (2008) | 349 | Business knowledge, academic knowledge, previous ownership of SMEs (G,T,D) | Employment growth (G); firm performance (G) | .04 (C) |

Table 1 (*continued*)

| Study[a] | Sample size | Human capital construct labels[b,c] | Performance construct labels[d] | Overall effects[e] |
|---|---|---|---|---|
| Wright et al. (1999) | 38 | Operator skills (G,L,A) | Financial performance (G) | −.02 (C) |
| Wright et al. (1995) | 134 | Basketball skill (B,C,A) | Team performance (G); power ratings (G) | .20 (C) |
| Yeoh (2004) | 258 | International experience (G,T,A) | Satisfaction with performance (G); export sales performance (G); change in export intensity satisfaction (G); change in international sales satisfaction (G) | .30 (C) |
| Yip et al. (2000) | 68 | Human resources (G,C,D) | Performance (O-operations) | .20 (C) |
| Youndt & Snell (2004) | 208 | Human capital (G,C,A) | Organizational performance (G) | .35 (L) |
| Zahra & Nielsen (2002) | 97 | Internal sources (C,D) | Technology commercialization speed (O-technological development) | .29 (L) |

*Note.* HRM = human resource management; ROA = returns on assets; SMEs = small and medium enterprises; ROI = returns on investments; ROE = returns on equity.
[a] Complete references can be found in the reference section. [b] Codes in parentheses depict human capital as specific (S), nonspecific or general (G), study contains both (B) specific and general, top management team (T), lower level core employees (L), the collective organization (C), and whether the human capital required aggregation (A) or did not require aggregation (D). There were some cases where the measures potentially captured both specific and general human capital or cases where we could not clearly code human capital into one category or another. In such cases, we did not list one of the aforementioned codes in parentheses. [c] Construct labels in the tables are those used within primary studies; labels are sometimes context specific but reflect knowledge, skills, and/or abilities. De Carolis and Deeds (1999), for example, studied the biotechnology industry. Their human capital label is location. In their study, location is measured by a factor-analyzed score derived from an average of eight measures of scientific and technical knowledge available in a geographic location vis-à-vis other locations. Similarly, Miller and Shamsie (1996) studied the film studio industry. One of their human capital labels—discrete based property resources—is measured by the number of (film) stars under long-term contract. On the surface, the construct label does not reflect human capital, but the underlying measure captures human capital. [d] Codes in parentheses depict performance as global performance (G) or operational performance (O). With the latter, we also included the value chain function, such as service or technological development (Porter, 1985), that pertains to the measure. [e] Effect is the study-level effect, and the codes depict whether the study contained human capital-performance effects that were cross sectional (C), lagged (L), or both (B). We also coded for studies with samples that potentially overlap with other studies' samples (O).

## Results

Table 2 shows the results. Because some studies did not contain the requisite information for a moderator test, the sample size is different for each test.

Hypothesis 1, which predicted that human capital would be positively related to performance, was supported with $\bar{r} = .17$ ($p < .01$; $\bar{r}_c = .21$). Hypothesis 2 predicted that the human capital–performance relationship would be stronger when studies lagged performance than when studies relied on cross-sectional data. This hypothesis was not supported with $\bar{r} = .10$ versus .19 (n.s.). Hypothesis 3 predicted that the human capital–performance relationship would be stronger among specific measures of human capital than general measures; this hypothesis was supported with $\bar{r} = .24$ versus .14 ($p < .01$). Hypothesis 4 predicted that the positive relationship between human capital and performance would be stronger for studies relying on operational performance measures than for studies relying on global performance measures. This hypothesis also received support with $\bar{r} = .26$ versus .15 ($p < .05$).

### Post Hoc Robustness Tests

To ensure the robustness of the results, we conducted several post hoc tests. The results of these tests are shown in Table 3. First, we examined whether the human capital–performance relationship was being shaped by potential overlapping samples from different studies, such as multiple studies relying on the *Fortune* 500 for their samples. We estimated the overall human capital–performance effect with and without any studies that we thought might

overlap. In particular, we carefully reviewed each of the primary studies for evidence of overlapping samples (i.e., different studies that may have been based on data that were the same or partially the same). We then categorized studies into two groups. One group contained studies that we felt confident had no overlapping samples (53 studies with 9,791 firms). The second group contained studies in which samples might potentially overlap (15 studies with 2,372 firms). A reexamination of Hypothesis 1 based only on the studies that did not overlap resulted in an estimate of $\bar{r} = .18$, which did not change substantively from the estimate when potential overlapping studies were not accounted for (i.e., our overall human capital–performance estimate of $\bar{r} = .17$) nor from our estimate for studies that potentially overlapped (i.e., $\bar{r} = .16$).

Second, we examined whether there were different performance implications of human capital depending on the referent level in the hierarchy from which data were drawn. The performance implications of human capital (a) in the top management team, (b) in core employees, and (c) across multiple levels of hierarchy (i.e., the collective organization) were $\bar{r} = .17$, .10, and .27, respectively. The effect for the collective organization vis-à-vis core employees or top management was stronger at $p < .01$ and $p < .05$, respectively. Third, we examined whether there were different performance implications of human capital depending on the whether studies' human capital measures required aggregation. The performance implications of human capital for measures requiring aggregation (e.g., the total number of years of executive-level food service experience and total number of years in the firm; Combs & Ketchen, 1999) were lower than with studies whose measures did not require aggregation (e.g., self-patent citations as

Table 2
*Hypothesis Test Results*

| Hypothesis | $N$[a] | $k$ | Sample size weighted correlations | Corrected correlations | Sampling error variance | $SE$ | Residual variance | % artifactual variance | $\chi^{2b}$ | 99% CI | 95% CI | $p$ | 80% credibility interval |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. Human capital | 12,163 | 68 | .17 | .21 | .01 | .02 | .01 | 28.7 | 242*** | [.14, .21] | [.15, .20] | <.01 | [.03, .39] |
| 2. Cross-sectional | 8,844 | 49 | .19 | .23 | .01 | .02 | .01 | 31.3 | 160*** | [.15, .23] | [.16, .22] | n.s. | [.06, .40] |
| Lagged | 2,581 | 10 | .10 | .12 | .00 | .02 | .02 | 19.4 | 53*** | [.00, .20] | [.02, .17] | | [−.08, .32] |
| 3. Specific | 3,298 | 28 | .24 | .30 | .01 | .01 | .01 | 57.1 | 50*** | [.19, .30] | [.21, .28] | <.01 | [.18, .41] |
| General | 9,337 | 43 | .14 | .17 | .00 | .02 | .01 | 29.7 | 149*** | [.09, .18] | [.11, .17] | | [.00, .33] |
| 4. Operational performance | 2,411 | 12 | .26 | .32 | .00 | .02 | .01 | 25.4 | 49*** | [.17, .35] | [.20, .32] | <.05 | [.14, .49] |
| Global organizational performance | 9,234 | 47 | .15 | .19 | .00 | .02 | .01 | 29.0 | 166*** | [.11, .20] | [.12, .18] | | [.01, .36] |

*Note.* Confidence intervals are based on chi-square statistics and are shaped by the amount of residual variance after removal of sampling error variance (Whitener, 1990). All chi-square statistics are significant; thus, we assume residual variance is heterogeneous for all results. The credibility intervals also reveal heterogeneity. $SE$ = standard error; CI = confidence interval; n.s. = nonsignificant.
[a] In the results, the $N$s and $k$s vary by test. For Hypothesis 1, $k$ is 68 because Frese et al. (2007) reported effects from three independent samples. In addition, the $N$s and $k$s for the other results vary because studies' effects could not be grouped into a particular category. This was typically because studies contained measures that overlapped between categories, such as a study with a measure of human capital that captures specificity and generality (e.g., education quality [general] and firm experience [specific]; Hitt et al., 2001).　　b*** $p$ < .01.

Table 3
*Post Hoc Robustness Test Results*

| Variable | $N$ | $k$ | Sample size weighted correlations | Corrected correlations | Sampling error variance | $SE$ | Residual variance | % artifactual variance | $\chi^2$ | 99% CI | 95% CI | $p$ | 80% credibility interval |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| No overlapping samples | 9,791 | 53 | .18 | .21 | .01 | .02 | .02 | 26.1 | 208*** | [.13, .22] | [.14, .21] | n.s. | [.03, .40] |
| Potential overlap | 2,372 | 15 | .16 | .20 | .01 | .01 | .01 | 43.8 | 35** | [.09, .23] | [.11, .21] | | [.06, .34] |
| Top management | 5,458 | 29 | .17 | .21 | .01 | .02 | .02 | 24.8 | 120*** | [.11, .24] | [.13, .22] | <.05 | [.02, .40] |
| Core employees | 2,704 | 7 | .10 | .12 | .00 | .01 | .01 | 26.0 | 28*** | [.01, .19] | [.04, .16] | <.01 | [−.01, .26] |
| Collective organization | 2,213 | 17 | .27 | .23 | .01 | .01 | .01 | 47.1 | 37*** | [.21, .34] | [.23, .32] | | [.20, .46] |
| Requiring aggregation | 6,347 | 36 | .14 | .17 | .01 | .02 | .01 | 35.6 | 103*** | [.09, .19] | [.10, .17] | <.10 | [.01, .32] |
| No aggregation | 5,744 | 31 | .21 | .25 | .00 | .02 | .01 | 28.4 | 112*** | [.15, .26] | [.17, .25] | <.05 | [.08, .43] |
| Technological performance[a] | 289 | 4 | .30 | .37 | .01 | .02 | .01 | 64.4 | 6* | [.15, .46] | [.19, .41] | <.10 | [.25, .48] |
| Other operational performance | 2,122 | 8 | .25 | .31 | .00 | .02 | .01 | 19.9 | 42*** | [.16, .36] | [.18, .33] | <.10 | [.13, .49] |

*Note.* Confidence intervals are based on chi-square statistics and are shaped by the amount of residual variance after removal of sampling error variance (Whitener, 1990). All chi-square statistics are significant; thus, we assume residual variance is heterogeneous for all results. The credibility intervals also reveal heterogeneity. $SE$ = standard error; CI = confidence interval; n.s. = nonsignificant.
[a] Results for technological performance and other operational performance are compared to global organizational performance measures in Table 3.

proxies for specific knowledge capital; Wang, He, & Mahoney, 2009), $\bar{r} = .14$ versus .21. The effect for the latter was stronger at $p < .10$.

We also conducted two post hoc tests involving operational performance. First, we examined whether our results involving operational performance were being driven by one specific definition of operational performance. Four of the 11 operational performance measures appeared to relate to technological development within organizations, which Porter (1985) defined as "a range of activities that can be broadly grouped into efforts to improve the product and the process" (p. 42). We estimated the effects of human capital on just those four measures. The effect was $\bar{r} = .30$. Second, we estimated the operational performance implications of human capital while excluding these four measures ($\bar{r} = .25$). Using this estimate, we found that human capital's effect on operational performance remained marginally stronger than its implications on global performance ($\bar{r} = .17$, $p < .10$). Thus, we did not uncover any evidence that our results involving operational performance were being driven by one specific definition of operational performance.

In the second test, we used the structural equation modeling approach offered by James, Mulaik, and Brett (2006) to examine whether the relationship between human capital and organizational performance was mediated by operational performance.[3] The results are shown in Figure 1. We found evidence consistent with partial mediation. However, because there were only five studies of the operational performance–organizational performance relationship, we view these results as providing some initial, but not conclusive, evidence.

## Discussion

Arguably, all of the applied psychological research focusing on individual job performance is predicated on the assumption that individual-level differences impact organizational-level outcomes.
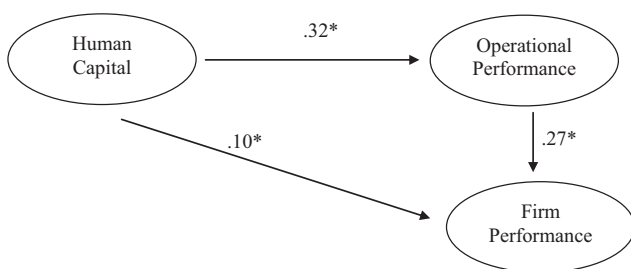


*Figure 1.* Mediation test results. We tested two mediation models based on a meta-analytic correlation matrix: a full mediation model and a partial mediation model. For both models, we used a harmonic mean sample size of 2,417. The full mediation model displayed marginal goodness of fit according to practical fit indices (goodness-of-fit index = .99, comparative fit index = .95, normed fit index = .95, root-mean-square error of approximation = .10), with path coefficients of human capital–operational performance = .32 and human capital–global firm performance = .27. The partial mediation model displayed perfect fit by design (i.e., there were zero degrees of freedom), with path coefficients of human capital–operational performance = .32, operational performance–global firm performance = .27, and human capital–global firm performance = .10. All paths were significant at $p < .01$.

This assumption is most clearly articulated in RBT. However, whereas RBT highlights human capital as a key determinant of firm performance, extant research has not yet shown a clear link between the possession of human capital and performance (Newbert, 2007). Because meta-analysis statistically aggregates research findings and substantially reduces the effects of primary study artifacts (e.g., sampling and measurement error), we were able to combine findings from 66 prior studies to estimate the size of the human capital–performance relationship. Overall, the results suggest that human capital is strongly related to performance but that the relationship is influenced by the competitiveness of the strategic factor market for the type of human capital under investigation and the extent to which measures are subject to the appropriability condition.

## Implications of Main Effects

Our finding for the human capital–performance relationship indicates that, on average, human capital relates to performance at $\bar{r}_c = .21$. We interpret this to mean that increasing human capital by one standard deviation increases performance by .21 of a standard deviation. Applying this result to an individual study demonstrates how human capital shapes performance. Combs and Ketchen (1999), for example, reported a mean and standard deviation of .05 and .16, respectively, for food services firms' ROA. In this sample, a one standard deviation increase in human capital (i.e., firms' collective number of years of executive-level experience) from 35.2 to 59.4 years, on average, translates to an increase in ROA from .05 to .09, an 80% improvement. A key implication is that, to improve performance, firms not only should attract, invest in, and develop human capital but should also retain experienced managers and employees, because doing so pays off handsomely.

Although this study takes a step toward answering the question surrounding the extent to which human capital shapes performance, several important questions remain unanswered. As RBT matures, some researchers are no longer simply correlating aggregate measures of human capital to performance but are examining the processes by which managers leverage it. Powell and Dent-Micallef (1997), for instance, showed that when human capital is joined with fundamentally sound business practices, high performance follows. More research into the potentially unique role of different types of human capital in the resource management process (Sirmon, Hitt, & Ireland, 2007) and into the processes by which human emerges and is enhanced (Ployhart & Moliterno, in press) seems merited. One set of processes that might be particularly important to study alongside human capital is the use of high-performance work practices and systems within organizations and how they enhance human capital.

## Implications of Resource-Based Moderators for Study Design Decisions

**Path dependency and longitudinal designs.** Contrary to our expectations, no significant difference was found in the magnitude of the relationship between human capital and performance for

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[3] We thank an anonymous reviewer for this insightful suggestion.

studies relying on longitudinal as opposed to cross-sectional data. The size of the relationship was not statistically different in cross-sectional and lagged studies ($\bar{r}$ = .19 vs. 10). The direct implication of this finding is that, despite the potential path dependence and temporal lag involving the acquisition of human capital, cross-sectional research appears to capture the human capital–performance relationship to about the same extent as does longitudinal research. This is certainly good news from a research efficiency standpoint. Yet it begs the question of the exact nature of the relationship between human capital and performance. Is human capital simply a direct precursor of performance, or is the relationship more complicated? It is possible, for example, that the relationship is reciprocal in that performance also affects a firm's ability to acquire and retain human capital. Another possibility is that other processes that could not be captured by our analysis help to increase the value of human capital. Whereas we can conclude that the size of the relationship—at least in our study—is not influenced by temporal factors overall, longitudinal studies, quasi-experimental field studies, and studies that tease out process elements are still necessary to account for causality.

Because RBT is a theory of sustained competitive advantages and performance (Barney, 2001; Crook et al., 2008), this nonfinding presents a potentially important question: At what point does the utility of human capital begin to diminish and lose its value? Strategic human resource management adherents would argue that human capital utility and value are best maintained through a combination of high-performance work practices (e.g., selectivity, training; Combs et al., 2006; Takeuchi et al., 2007). Moreover, in light of recent hypercompetition findings that few firms attain long-term advantages (Thomas & D'Aveni, 2007; Wiggins & Ruefli, 2002), investing in high-performance work practices seems particularly important. Examining the interactive effects of such practices and how they preserve human capital value seems to be a potentially fruitful avenue for future research.

**Imperfect strategic factor markets and firm-specific human capital.**    The results provide evidence that the link between human capital and performance is stronger when human capital is firm specific rather than general. In fact, the results are 71% larger ($\bar{r}$ = .14 vs. .24) when firm-specific human capital is compared to general human capital. In line with our assertions, this suggests that specific human capital is more strategic in nature, in that it produces greater value relative to its costs and it is difficult, if not impossible, for competitors to purchase in the strategic factor market for human capital (Amit & Schoemaker, 1993; Barney, 1986).

Yet this result also raises a number of seemingly important questions for both researchers and managers. For researchers, questions involve the extent to which firm-specific human capital advantages are sustainable, what actions managers might take to enhance firm-specific human capital, and what measures might best capture such capital. The sustainability of advantages due to firm-specific human capital might be subject to environmental conditions such that more dynamic environments lower the value of firm specificity by shortening the time in which such skills add value (Adner & Zemsky, 2006; Miller & Shamsie, 1996). Regarding the measurement of firm-specific human capital, organizational tenure has been an attractive measure to researchers, in part because it is readily available. Yet, it is a proxy, and as such it appears to offer limited construct validity. Thus, we encourage

future researchers interested in the performance implications of firm-specific human capital to seek out alternative, more direct measures.

In terms of actions managers might take to sustain advantages centered on firm-specific human capital, recent developments in RBT assert that managers must develop processes to continually structure, bundle, and leverage resources to achieve optimal performance (Sirmon et al., 2007). Perhaps investments in absorptive capacity and strategic human resource practices, such as ongoing training and development, will help managers develop these kinds of ongoing, firm-specific human capital development (Cohen & Levinthal, 1990; Combs et al., 2006).

For managers, the results also suggest that they should strive to develop a long-tenured workforce whose skills are tied to the firm's unique context. Such workers should become better resource allocators and decision makers, given their more intimate knowledge of the firm (Kor & Mahoney, 2005). Another interpretation, perhaps cynical, is that building workers' firm-specific human capital limits employee mobility and, thus, places a cap on wages (Coff, 1997).

**Appropriability and the choice of dependent variable.**    We found that operational performance measures correlate more strongly than global organizational performances measures with human capital. Indeed, the effects are more than 70% larger (i.e., $\bar{r}$ = .15 vs. .26) when measures are not shaped by potential appropriation by powerful stakeholders. Consistent with those of other investigations into the appropriability condition (Coff & Lee, 2003; Crook et al., 2008; Moliterno & Wiersema, 2007; Townsend & Busenitz, 2008), the results suggest that if research considers only global performance measures (e.g., ROA) and neglects to measure operational performance outcomes, important sources of competitive advantage and disadvantage within a firm might go undetected (Ray et al., 2004).

Indeed, the results of one of our post hoc tests provide preliminary evidence that the relationship between human capital and organizational performance might be mediated by operational performance. Although this finding is tentative and merits further inquiry, our overall results show that the utility of resources, such as human capital, is likely understated when correlated with global measures of firm performance. Of course, researchers are interested not only in whether a resource delivers an advantage but also in whether the owners benefit from the investments that they make to create the advantage. Thus, a key implication is that future research might benefit from testing theoretical relationships first by using operational measures and then by examining the degree to which the relationships carry through to global performance measures.

**Implications of post hoc test results.**    Our post hoc robustness test offers several implications. With regard to level of hierarchy, we found that when human capital is present across multiple levels of hierarchy, the performance implications are much stronger than when human capital is present at just one level. A key implication for managers is to not just focus on human capital at one just level—such as top managers or lower level employees—but instead to cultivate human capital across all levels within the hierarchy. Firms that invest in only one group are likely to miss important opportunities for enhancing performance. For researchers, this finding suggests that, when possible, the levels of hierar-

chy used as data sources should be accounted for in empirical analyses.

With regard to aggregation, we found that studies whose human capital measures required within-firm aggregation reported weaker results than studies whose measures did not. One possible explanation is that the former are more distant proxies that rely on simple addition across people, whereas the latter are more direct and more closely capture the synergies created among people. To the extent that this explanation is accurate, researchers could assess possible synergistic effects among people by including both measures that require aggregation and measures that do not require aggregation in their studies and then comparing the effect sizes associated with the two types of measures.[4] A final implication involves our finding that operational performance mediates the relationship between human capital and performance. In our view, this finding takes a step toward clarifying the relationship between human capital and organizational performance and suggests that researchers should begin to take stock of performance both within organizations and at the organizational level.

## Conclusion

Overall, our study takes a step toward better understanding the extent to which human capital shapes performance. As the global economy becomes increasingly knowledge based, the acquisition and development of superior human capital appears essential to firms' viability and success. For managers, our results leave little doubt that to achieve high performance, firms need to acquire and nurture the best and brightest human capital available and keep these investments in the firm. For researchers, the results suggest that received theory has correctly pointed to the importance of human capital, and, in particular, specific human capital, as key determinants of firm success, but that not all human capital is equal and not all benefits go to owners. We hope that our results form a foundation that future researchers can use to build theory about additional contingencies surrounding the human capital–performance relationship.

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[4] We thank an anonymous reviewer for this insight.

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