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Human Capital and Entrepreneurship Research: A Critical Review and Future Directions

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Human capital has emerged as a highly utilized theoretical lens through which scholars can better understand entrepreneurship. To synthesize the progress of this stream and promote its use, we review 109 articles in leading management and entrepreneurship journals over two decades. We organize our discussion in terms of multi-theory approaches, methods and analyses, constructs, and study focus. A number of research gaps and promising areas for inquiry are put forward. We develop a typology of human capital and discuss how future investigations of types of human capital related to the entrepreneurship process can benefit research and practice.

Introduction

The interest in human capital within the entrepreneurship literature is longstanding and has surged over the last two decades. Human capital theory was originally developed to study the value of education (Becker, 1964; Schultz, 1961) and indicates people have varying knowledge and skills that have economic value. Mincer (1958) first discussed the concept of human capital as an explanation for income inequality. Schultz observed that increases in national output were disproportionate relative to land, labor hours, or physical capital, and argued "investment in human capital is probably the major explanation" (p. 1). Becker built on these views and formulated the theory of investments in human capital based on the tremendous amount of evidence that "more highly educated and skilled persons almost always tend to earn more than others" (p. 12).

The theory has been increasingly applied within the realm of entrepreneurship, consistently linking human capital attributes to entrepreneurial success (Unger, Rauch,

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Frese, & Rosenbusch, 2011). A number of seminal arguments describe why human capital, or prior knowledge, is of distinctive importance to the field of entrepreneurship (i.e., Ardichvili, Cardozo, & Ray, 2003; Shane, 2000). First, human capital is vital to discovering and creating entrepreneurial opportunity (Alvarez & Barney, 2007; Marvel, 2013). Human capital also aids in exploiting opportunities by acquiring financial resources and launching ventures (Bruns, Holland, Shepherd, & Wiklund, 2008; Dimov, 2010). Third, human capital assists in the accumulation of new knowledge and the creation of advantages for new firms (Bradley, McMullen, Artz, & Simiyu, 2012; Corbett, Neck, & DeTienne, 2007). In practical application, human capital is the most frequently used selection criteria among venture capitalists when evaluating potential venture performance (Zacharakis & Meyer, 2000).

Given the emphasis on human capital within the entrepreneurship literature and the accumulation of this research stream, now is a particularly appropriate time to review the work conducted thus far. To date, meta-analytic reviews of human capital and firm outcomes can be found in the work of Unger et al. (2011) and a review of entrepreneurship education on human capital assets, behaviors, and performance in an article by Martin, McNally, and Kay (2013). Each provides compelling evidence that human capital is critical to promoting aspects of entrepreneurship, but they do not contain a comprehensive discussion of the human capital and entrepreneurship research stream. To the best of our knowledge, the present study is the first comprehensive review specifically focused on human capital and entrepreneurship research. As a body of literature develops, it is useful to take inventory of the work that has been accomplished and identify new directions and challenges for the future. This reflective process is essential to systematically derive the maximum benefit from future research (Low & MacMillan, 1988). Thus, the contributions and shortcoming of past human capital and entrepreneurship research—referred to hereafter as "human capital entrepreneurship research"—are examined, and we put forward recommendations for future research.

To conduct a comprehensive assessment, we begin by examining the pace of human capital entrepreneurship research in leading management and entrepreneurship journals. To analyze this line of inquiry, we are guided by Low and MacMillan (1988) who identified areas vital to a research program that include theoretical perspectives, methodology, analysis, and focus. Our study includes contributions in the leading management and entrepreneurship journals where the theoretical perspective of human capital is central. However, we believe it is important to embrace entrepreneurship as a multifaceted phenomenon that cuts across disciplinary boundaries—often benefiting from multiple theoretical lenses. Therefore, we take stock of the variety of theories applied in conjunction with human capital to explore the saliency of multi-theoretical approaches. We next explore the contexts of study, methodologies, and analyses in this research stream to report the progress. Entrepreneurship has emerged as a well-recognized area of inquiry, but the quality and usefulness of the theory that is developed will be tied to the ability of researchers to identify patterns of causality across contexts. Early studies may be understandably exploratory, but moving to systematic explanatory models is of greater benefit to theory—answering the question of "why." Considering human capital is of relevance to enterprising individuals, founding teams, firms, and economies, we take inventory of the levels of analysis examined. Multilevel research is increasingly called for in management (e.g., Payne, Moore, Griffis, & Autry, 2011; Ployhart & Moliterno, 2011) and we illustrate what can be gained by a richer, albeit more challenging, multilevel approach within this research stream.

We then turn our attention to human capital constructs and the focus of this stream. Early human capital research emphasized core constructs of the theory (i.e., knowledge

and skills) as well as higher order constructs, including general and specific human capital (Becker, 1964). However, when applied to the domain of entrepreneurship research, human capital constructs have been expanded and specified to include a multitude of abstractions. Thus, we take record of the human capital constructs employed in order to assess their development and determine if conceptualizations are distinctive for the field of entrepreneurship. To investigate the focus of human capital entrepreneurship research, we account for the specific phenomenon of interest in each study. The phenomenon of interest, or dependent variable, is examined in terms of a process-based view of entrepreneurship (Lumpkin, Hills, & Shrader, 2004) to explore potential research gaps. In sum, we pinpoint areas of human capital entrepreneurship research that have received attention and areas that have been replete of research but are in need of future examination.

To spur scholarship and advance this research stream, we put forward a more comprehensive taxonomy of human capital than previously available. Our review suggests the human capital construct has been underspecified in conceptualization and measurement, thus limiting understanding of entrepreneurship. To guide future scholarship, we deconstruct the human capital construct and provide a more detailed framework of human capital investments, human capital outcomes, and the interrelationships. Based on the developed framework, we put forward a research agenda for human capital entrepreneurship research using the process-based view. We illustrate how more precise examinations of human capital with a focus on specific milestones throughout the venture process can benefit future research and practice.

Overall, we review the human capital entrepreneurship research and organize our syntheses by the pace of the research stream, multi-theory approaches, study context, methods and analyses, levels of analysis, human capital constructs, and focus. We report the results of our review and discuss the accomplishments and shortcoming of this line of research. We then put forward a comprehensive taxonomy of human capital and prescribe investigations along the process of entrepreneurship. In the next section, we outline our methodology for examining the stream of human capital entrepreneurship research.

Method

To examine human capital entrepreneurship research, we focused on entrepreneurship research in which human capital is central to the article. Using EBSCO and ABI/Inform databases we searched for articles that met three criteria: (1) use of one or more keywords related to entrepreneurship including the article title and abstract (i.e., "entrepreneur," "entrepreneurship," "entrepreneurial," "opportunity," "opportunities," or "new venture"); (2) use of "human capital" in the keywords, article title, or abstract; and (3) publication on or before April 2014. In addition to the electronic databases used for our search, a manual title search was conducted for each journal considered to ensure inclusion of the relevant articles.

Consistent with prior review articles on entrepreneurship research, we included both management and entrepreneurship journals in our search for research contributions (Busenitz, West, Shepherd, Nelson, & Zacharakis, 2003). To ensure reasonably complete coverage of the human capital entrepreneurship literature, we included nine journals in our search that are generally considered premier outlets within the management literature as well as five leading specialized entrepreneurship journals. Editor notes, teaching cases, and teaching case notes were omitted so that the data would contain only research articles that were non-invited and peer reviewed. Each article was reviewed by the research team to ensure its focus on human capital entrepreneurship research. Our initial search yielded

a total of 130 articles meeting the basic search criteria. Twenty-one of the articles were omitted after further analysis. Articles were omitted in these cases if the research was not entrepreneurship focused or failed to include the human capital construct. Thus, our final data set included 109 articles meeting all of our selection criteria. Contributions from management-specific journals include: *Strategic Management Journal* (5), *Journal of Management* (5), *Administrative Science Quarterly* (3), *Management Science* (3), *Journal of Management Studies* (2), *Organization Science* (2), *Academy of Management Journal (1), Human Resource Management Review (1)*, and *Journal of International Business Studies* (1). Articles that were derived from entrepreneurship-specific journals include: *Journal of Business Venturing* (36), *Entrepreneurship Theory and Practice* (27), *Entrepreneurship and Regional Development* (15), *Strategic Entrepreneurship Journal* (5), and *Journal of Small Business Management* (3).

Articles were analyzed and coded across areas including theory, constructs, focus, and methods and analyses. Within each area of analysis, a variety of distinctions were made as the researchers sought to categorize aspects of each study. Given the ambiguity of this categorization process, three researchers separately categorized all possible areas of investigation. Differences were discussed until agreement was made on any aspect.

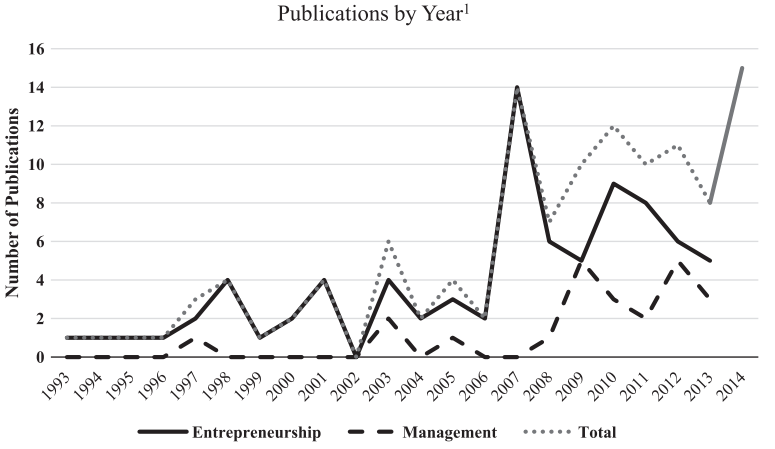
Current Status of Human Capital Entrepreneurship Research

Pace of Research Stream

To assess the pace of human capital entrepreneurship research, we examine its development in both management and entrepreneurship journals across single-year periods (Figure 1). In 1993, the first human capital entrepreneurship article was authored by Dolinsky, Caputo, Pasumarty, and Quazi, and the pace of publication has since

Figure 1

Human Capital Entrepreneurship Research in Management and Entrepreneurship Journals



[1]Total line includes a 2014 projection based on publications through April 2014 (i.e., five articles). Projection period is indicated by solid gray Total line.

accelerated. There has been an increase in human capital entrepreneurship research within both management and entrepreneurship journals, with general management journals showing notable growth in recent years. Only four publications within the general management journals met our study criteria prior to 2008. Since 2008, there have been 19 human capital entrepreneurship articles published in these top-tier mainstream management journals.

Within the entrepreneurship journals, human capital entrepreneurship research was relatively consistent from its initiation through 2006. In 2007, *Entrepreneurship Theory and Practice* published an eight-article special issue focusing on human capital and technology entrepreneurship. Prior to the special issue, there were 38 total studies published with only 11% of these being published in management journals. Since 2007, there have been 63 total articles published with 30% from the management journals. Most recently, in 2014, five articles were published through April, and we projected this trend through the end of the year (Figure 1).

Multi-Theory Approaches

Human capital was among the core theoretical foundation in each of the articles within this study. However, entrepreneurship research cuts across disciplines and integrates multiple theories to explain phenomena. Thus, we assess the degree of multi-theory research and the pervasiveness of other theories within this stream. In addition to human capital theory being utilized in each study, the 109 articles collectively use 142 other theoretical approaches indicating an average of over two theories per study. Of the total studies, 18 (16%) used human capital theory alone, and 52 (48%) employed a dual-theory approach. Thirty-nine (36%) leveraged three or more theories within the same study demonstrating the prevalence of multi-theory approaches.

To organize the 142 theories employed, we sorted each theory into their discipline of origin. The theories were categorized, and the frequencies are depicted in Table 1. Theories from strategy have been most commonly applied in conjunction with human capital (30.3%), and theories of cognition, learning, and psychology have also been prevalent (23.2%). The third most common theories to be incorporated are from entrepreneurship (21.8%). These included theories of opportunity discovery, creation, exploitation, entrepreneurial intentions, immigrant entrepreneurship, and gendered entrepreneurship. Theories of networks and social capital were applied with human capital in

Table 1

Theories Applied Within Human Capital Entrepreneurship Research

Theory typology	Count	Percent
Strategy	43	30.3%
Cognition, learning, or psychology	33	23.2%
Entrepreneurship	31	21.8%
Social capital or networks	25	17.6%
Economics and finance	8	5.6%
Population ecology	2	1.4%
Total	142	100%

17.6% of the studies. Of particular note, although human capital theory derived from the economics literature, only 5.6% of the articles within this stream applied economics or finance theories in conjunction with human capital. This observation is of particular interest and may represent a potential research gap that we revisit in the coming sections. Taken together, the findings suggest that human capital entrepreneurship research is highly multidisciplinary and fairly well diversified in terms of micro- and macro-oriented theories. However, strategy, cognition, and network approaches appear as the most pervasive domains drawn from.

Study Context

To examine the context within the studies, each article was reviewed to determine whether a broad or industry-specific sample was used. The samples employed a range of industries with some receiving considerably more attention than others. The two most common types of samples used in this stream are broad samples with varying industries (41%) and samples from high-technology industries (32%). The high-technology context has been described as particularly valuable to exploring human capital because of the knowledge intensive nature of technology entrepreneurship (Corbett, 2007; Marvel, 2013). While some studies focused on the manufacturing or retail contexts, each represented less than 4% of the research stream. Some very unique industries were the subject of study as well, including the Indian handloom industry (Bhagavatula, Elfring, van Tilburg, & van de Bunt, 2010) and reindeer husbandry (Dana & Light, 2011). Of note, 102 of the 104 empirical studies that met our criteria focused on a single sample as opposed to comparisons among varying samples across contexts.

Methods and Analyses

Our systematic review yields several insights regarding the methods and analyses used in this area of research. As shown in Table 2, the vast majority of studies applied some form of regression (e.g., logistic, hierarchical, ordinary least squares, generalized least squares) in their data analysis procedures. In fact, of the 104 empirical studies examined, 85 used some variant of regression. The most prominent use of the varying forms of regression is bivariate regression (i.e., probit models, logistic regression), which was used in 44 of the 104 empirical studies. Given the numerous forms of regression and other analytical techniques available, this emphasis on a single category of technique is considerable. One reason for this emphasis on bivariate regression may be the challenge of measuring "success" in entrepreneurship research. These forms of regression allow for categorizing dependent variables, resulting in clearer demarcations for analysis. For example, firm survival is a dependent variable construct that has been commonly used in entrepreneurship research (e.g., Cooper, Gimeno-Gascon, & Woo, 1994; Dencker, Gruber, & Shah, 2009) and is conducive to this form of coding. This approach may be particularly useful in instances where traditional performance measures such as degree of profitability, sales, and return on assets are inappropriate. Often, the goals of an emerging venture are not purely financial. For example, some dependent constructs in new venture studies include completing a business plan (Delmar & Shane, 2004), prototype development (Delmar & Shane, 2003), survival (Boden & Nucci, 2000), or receiving financing (Honig, 1998). Dependent constructs from the corporate entrepreneurship perspective also reflect bivariate approaches such as new venture creation or market entry (e.g., Marchisio, Mazzola, Sciascia, Miles, & Astrachan, 2010). Given the differences in success measures

Table 2

Methods by Unit of Analysis and Time Frame

	Unit of analysis						Time frame					
	Individual	Firm	Team	Country	Industry	Region	Up to 1998	1999–2003	2004–2008	2009–Current		
Method											Count	Percent
Some form of regression*	75	21	8	4	3	2	12	11	27	50	100	73.5%
Factor analysis	8	1	1						3	6	9	6.6%
t-tests	7	2	1				3	1	2	1	7	5.1%
GMM; HLM; SEM	3	2							3	2	5	3.7%
Descriptive analysis only	2	1		1			2		1	1	4	2.9%
Qualitative	3		1							3	3	2.2%
ANOVA	3						1		1	1	3	2.2%
Formal modeling	3	1								3	3	2.2%
Meta-analysis	2	2								2	2	1.5%
Total	106	30	11	5	3	2	18	12	37	69	136	100%
% of total	67.5%	19.1%	7.0%	3.2%	1.9%	1.3%	13.2%	8.8%	27.2%	50.7%		

* Some form of bivariate or probit regression was used in 44 out of 104 empirical articles examined.

in comparison to traditional organizational research, many entrepreneurial objectives are more easily assessed as categorical rather than continuous (e.g., survival, start-up, new product creation, entry/exit, etc.). Thus, this area of research lends itself to more categorical analyses, and researchers appear to have adapted to these constraints.

While regression has been the primary foundation of empirical investigation, our analysis also illustrates the infrequency of other methodological approaches in human capital entrepreneurship research. In fact, while the next two most commonly used methods are factor analysis (9) and *t*-tests (7), in all 16 of these studies the *t*-tests and factor analyses were used in tandem with a form of regression. Accounting for the remaining methods used are multilevel modeling procedures (5), qualitative analysis (3), analysis of variance (3), formal modeling (3), meta-analysis procedures (2), and a single descriptive analysis (1). Table 2 provides a breakdown of the methods used across studies, across units of analysis, and over time.

Since the initiation of this research stream, studies have increasingly relied on regression and have recently begun applying more complex methods such as formal modeling and meta-analysis as seen in Table 2. This may be due, in part, to the advancement and maturation of the field of entrepreneurship (Busenitz et al., 2003). As the state of knowledge within a research stream moves from descriptive to explanatory, with an increased emphasis on testing theory, we can expect more explanatory methods to be applied. However, qualitative studies have also increased since 2009, indicating continued theory development as well within this stream. The increase overall in methodological approaches in recent years suggests the diversity of approaches is growing, although a dominance of regression and other explanatory modeling remains prevalent.

We took inventory of the types of analysis by investigating direct effects compared to mediation or moderation effects. We find that the majority of empirical research in this area has focused solely on direct effects relationships (66%) between human capital and various dependent variables. However, several moderators have been examined in relation to their interactive effects with human capital. For example, some moderators examined have included social capital (Bhagavatula et al., 2010), gender (Manolova, Carter, Manev, & Gyoshev, 2007), and corporate entrepreneurship (Simsek & Heavey, 2011). Of note, only a handful of studies have examined the moderating influence of human capital on some other relationship of interest such as Corbett's (2007) study examining the moderating role of human capital on aspects of learning. This highlights a potential area for future research as there is much room for examining the interactive role that human capital plays in various relationships. In addition, we only identified one study using human capital as a dependent variable. Future research may benefit from examinations of the accrual of human capital important to entrepreneurship.

Levels of Analysis

An overview of the units of analysis within the human capital entrepreneurship research stream is depicted in Table 2. Studies of human capital have been carried out at varying levels of analysis with the most common level being at the individual level, accounting for 106 of the 157 analyses (67.5%). This finding is fairly consistent with prior research describing the broader field of entrepreneurship research as dominated by the micro-unit of analysis and focusing on the individual entrepreneur (Ireland, Reutzel, & Webb, 2005). Analysis at the firm level has also been somewhat common (19.1%). Other levels of analysis studied have included teams, industries, regions, and countries. However, these other categories account for less than 15% of the analyses. While the human capital construct is naturally conducive to study at the individual and firm level,

this highlights a potential opportunity for creative studies willing to explore data sources for greater macro-level research. We elaborate on this point in the coming sections.

Human Capital Constructs

Early human capital research emphasized core constructs of the theory that included knowledge and skills (Schultz, 1961) as well as higher order constructs including general and specific human capital (Becker, 1964). When applied to the domain of entrepreneurship research, varying human capital constructs more specific or tertiary to the original conceptualization have been theorized as important. Thus, we take inventory of the human capital constructs employed within this stream of research to assess the development.

To organize the human capital constructs employed, we first identified each construct within the studies meeting our criteria. There were a total of 344 human capital constructs included in the analyzed studies, although many constructs were identical. The average number of human capital constructs employed in empirical studies was 3.3 but ranged from 1 to 10. We analyzed the pool of constructs to identify those most commonly employed. The counts and frequencies of the most common constructs are depicted in Table 3.

The most common human capital construct investigated was work experience, representing 39.9% of the constructs. This was followed by education, representing 26.6% of the human capital constructs. Consistent with past findings, investments in education and experience were clearly the most pervasive types of constructs employed (Reuber & Fischer, 1994). Examples of typical education measures include years of education or completion of a university or technical degree. Examples of experience-based measures include past work in an industry or the number of previous management positions held. The third most common measure was entrepreneurial experience (19.8%), such as past start-up experience or prior business ownership, which reflects a specific type of human capital from the entrepreneurial context. Less commonly assessed measures included demographics such as age, whether family members were entrepreneurs, or gender. A handful of studies included cognitive and/or psychological measures as key aspects of human capital. For example, locus of control and achievement orientation were both included as human capital constructs, which suggests the blurring of boundaries among human capital and psychological constructs.

We next investigate the level at which human capital constructs have been assessed in terms of both individual and firm. Assessment of the human capital construct has been

Table 3

Common Human Capital Constructs

Construct type	Count	Percent
Work experience	105	39.9%
Education	70	26.6%
ENT experience	52	19.8%
Demographics	23	8.7%
Cognition/Psychological	13	4.9%
Total	263	100%

carried out at the individual level in 86% of studies, compared to 14% that assess it at the firm level. This disproportionate finding may be due, in part, to the ease of access to individual data such as years of experience or depth of education. However, this concentration of study at the individual level highlights a lack of operationalization of firm-level human capital in an entrepreneurial setting. Considering the need and emphasis on the firm's entrepreneurial orientation (Lumpkin & Dess, 1996), future research may benefit from exploring how firm-level human capital impacts entrepreneurship. We expand on this notion in the Discussion section.

A distinguishing characteristic of human capital is the practical utility in regard to the task at hand. For example, the usefulness of human capital may be fully dependent on the quality or type of human capital more so than its mere presence. Unger et al. (2011) highlighted the importance of two varying human capital dimensions including (1) high versus low task relatedness and (2) human capital outcomes versus investments. We first discuss task related human capital before turning our attention to human capital investments versus outcomes.

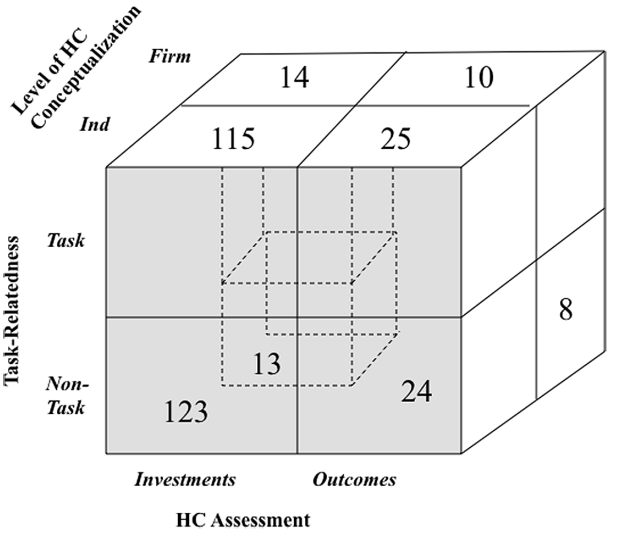
Human capital has been argued to be of higher utility when it applies to the specific task that needs to be performed. For example, the transfer of education and experience works best if old and new activities share common situation–response elements. Thus, it may be helpful to distinguish between constructs that are task related and non-task related (Cooper et al., 1994). Task-related human capital includes those types of human capital that relate to the current task of the venture (e.g., start-up experience, industry experience, business skills). Conversely, non-task-related human capital includes types of human capital that do not directly relate to venture tasks (e.g., formal education, employment experience). Given the described importance of task relatedness, the human capital constructs from our sample were categorized as task related or non-task related. Our analysis revealed that 49% of the human capital constructs were task related compared to 51% that were non-task related. While this investigation of task and non-task human capital suggests their use is relatively proportionate, other evidence suggests task-specific human capital may be of greater benefit to understanding entrepreneurship (Unger et al., 2011).

In this vein, another distinctive characteristic of human capital is the division between human capital investments versus human capital outcomes. Becker (1964) theorized that knowledge and skills are the result of investments in education and work experience. Thus, most studies have used education or experience to assess human capital. However, these represent investments in human capital rather than fully realized knowledge and/or skills (i.e., outcomes). Past research has provided evidence that outcome-based human capital constructs are better direct indicators of human capital, whereas investment-based indicators are viewed as indirect predictors of human capital (Davidsson, 2004). For example, Unger et al. (2011) suggest the entrepreneurship–success relationship is higher for outcomes of human capital than for investments alone because investments are indirect indicators and thus one step removed. While some entrepreneurs may have the same education or highly similar work experience, the readily available knowledge or skills possessed may be dramatically different (Keith & Frese, 2005).

Considering the distinction and potential value of human capital outcomes versus investments, we categorized the human capital constructs accordingly. Our assessment indicates that 80% of constructs analyzed were investments compared to 20% that were outcomes. A potential cause for this disparity and bias toward investment constructs is the ease of access to this data in comparison to the difficulty of assessing outcome-based constructs. Given the potential of human capital outcome constructs, future research should more fully explore this form of human capital to yield consistent and stronger relationships with entrepreneurship.

Figure 2

Focus of Past Research



To further analyze the trends and gaps in human capital constructs employed, we develop a three-dimensional conceptualization by integrating levels of analysis, task relatedness, and investment versus outcome assessment. Figure 2 illustrates the number of human capital constructs examined relative to each dimension. This classification results in eight combinations and provides some insights as to the biases toward particular construct dimensions as well as those that have received little attention. To date, entrepreneurship research has heavily favored the combination of dimensions of investments at the individual level. These groupings of human capital constructs have been relatively split in their task relatedness (115) versus non-task relatedness (123). Of the eight possible combinations, these two categorizations account for 72% of the conceptualizations and may reflect the tendency to use traditional individual-level constructs such as education and industry experience. There is a clear and noticeable drop off in the extent of construct examinations after these two categories.

A second grouping of categorizations, which have received moderate attention, focuses on individual-level human capital outcomes that are both task related (25) and non-task related (24). For example, individual business skills is a task-related outcome construct compared to previous earnings, which fits as an individual non-task-related outcome construct. Together, these two categories account for 15% of the conceptualizations analyzed. As shown in the figure, there is a clear bias in the literature toward the conceptualization of human capital at the individual level. Firm-level human capital conceptualizations using outcome dimensions has received the least amount of attention.

Focus of Research Stream

Identifying dependent variables is critical for the development of theory within a stream of research (Chua, Chrisman, & Steier, 2003). Unless dependent variables are set forth and the entrepreneurial outcome that human capital will impact specified, theory

Table 4

Dependent Construct and Entrepreneurial Process

Construct type	Nascent-launch	Post-launch	Count	Percent
Financial performance	2	46	48	27.7%
Individual decision/action	18	14	32	18.5%
Operational performance	1	28	29	16.8%
Individual characteristics	6	19	25	14.5%
Venture characteristics	4	19	23	13.3%
Other	1	15	16	9.2%
Total	32	141	173	
Percent	18.5%	81.5%		

development will be limited. To examine the focus of human capital entrepreneurship research, the dependent variable of each study was examined in terms of the construct type and the phase within the entrepreneurial process. As shown in Table 4, there were 157 dependent variables identified within this research stream that could be appropriately categorized (16 additional dependent variables did not fit within any category). Here, we adopted a categorization of firm performance used by Crook, Todd, Combs, Woehr, and Ketchen (2011) and distinguish between financial performance (e.g., profit, earnings, or sales) and operational performance (e.g., corporate venturing, product innovativeness, or opportunity recognition). The third category is venture characteristics, which includes venture size or age. Fourth, at the individual level, is decision/action, which includes entrepreneurial activities such as the decision to persist with an underperforming business or nascent entrepreneurship activities. The final category is individual characteristics, which includes constructs specific to the entrepreneur such as their status as a habitual entrepreneur or psychological attributes. In sum, the dependent construct categories include financial performance, operational performance, venture characteristics, decision/action, and individual characteristics.

We considered the focus of each dependent construct in terms of the process nature of entrepreneurship. Scholars have theorized about the entrepreneurial process beginning with individual action or opportunity identification and proceeding to venture creation and firm outcomes (Ardichvili et al., 2003; Lumpkin et al., 2004; Shane & Venkataraman, 2000). Entrepreneurial action prior to venture creation is nascent entrepreneurship and involves individuals acting alone, or with others, in efforts to start a venture (Gartner, Shaver, Carter, & Reynolds, 2004). To identify the focus of human capital entrepreneurship within the process, we categorized each dependent construct in terms of nascent to venture launch, or as a post-launch dependent construct.

Our analysis of the dependent constructs with a process perspective is presented in Table 4. Dependent variables categorized as firm performance are clearly the most common focus of human capital entrepreneurship research with 44.5% of dependent variables represented. Variables measuring firm financial performance accounted for 27.7%, while variables measuring firm operational performance accounted for 16.8%. This emphasis on firm financial performance may reflect the influence of strategic management within this stream as financial performance is a defining construct in strategy research (e.g., Ketchen, Thomas, & McDaniel, 1996; Nag, Hambrick, & Chen, 2007). When comparing the amount of studies focused on nascent-launch compared to

post-launch, the latter has attracted the most attention, comprising 141 of the 173 dependent variables. Only 18.5% of the studies focused on the nascent-launch phase. This finding may be expected, to a certain extent, since post-launch firm data is both more accessible and consistent with traditional management research. Public information is available for many existing businesses, making it possible to construct data sets or contact entrepreneurs for inclusion in primary data collection efforts. However, venture emergence is a defining phenomenon, and opportunity identification is regarded as central to entrepreneurship (e.g., Busenitz et al., 2003; Short, Ketchen, Shook, & Ireland, 2010). Both of these (i.e., opportunity identification and venture emergence) are best examined in the early stages of the process, and our analysis suggests a need for increased efforts on nascent phases as we elaborate on in the following sections.

Discussion and Future Directions

Our review of the human capital entrepreneurship research reveals abundant opportunities for future inquiry. Following the structure of the above review, we organize our discussion of future directions with respect to (1) multi-theory approaches, (2) study context, (3) methods and analyses, (4) multilevel research, (5) human capital constructs, and (6) focus.

Multi-Theory Approaches

Studies that integrate multiple theories in entrepreneurship are needed as the entrepreneurial process is a complex phenomenon, whereby a variety of lenses can benefit our understanding. While human capital is vital to understanding entrepreneurship, we propose a deeper understanding is possible through the increased integration of a number of theories. For example, despite the rich history of human capital within the economics literature, very few studies within this stream have integrated human capital, entrepreneurship, and additional economic theories. Agency theory (Eisenhardt, 1989) and transaction cost economics (Williamson, 1991) help us to understand how entrepreneurs without resources can marshal the means to launch ventures. Industrial organization economics and game theory provide insights into why some industries are simply more promising than others for new ventures (Minniti & Lévesque, 2008). Investigations that leverage human capital theory in conjunction with other economic theories are underresearched despite a great variety of theories to draw on.

To date, theoretical perspectives from strategic management have dominated much of the conversation in the human capital entrepreneurship literature, consistent with other areas of entrepreneurship research. While the resource-based view has been a particularly beneficial theory in entrepreneurship (Alvarez & Busenitz, 2001), human capital entrepreneurship research could benefit from integrating cognitive, learning, network tie, and motivational perspectives. Learning theories often emphasize the cumulative nature of human capital and the importance of knowledge acquisition, but very few empirical studies are available that examine learning in entrepreneurship. Similarly, the promise of the cognitive perspective has been lauded in entrepreneurship (Grégoire, Corbett, McMullen, 2011). For instance, cognition research often emphasizes that founders and entrepreneurs "think" differently than other individuals or business executives (e.g., Busenitz & Barney, 1997). However, it is far less clear whether this "cognitive difference" originates from idiosyncratic human capital, cognitive styles, or from the newly acquired

human capital derived from the experience of entrepreneurship (Foo, Uy, & Baron, 2009; Sarasvathy, 2008). Multi-theory approaches that explore varying aspects of human capital in conjunction with cognition and learning are needed.

Another promising area for multi-theory approaches in this stream is social capital, alliances, or network tie theories (Kang & Snell, 2009). These approaches emphasize the benefits of ties that can impact the access and utilization of human capital. Research on interfirm ties and alliances suggests that they provide a myriad of advantages associated with direct or indirect access to complementary resources. Ties among organizations provide for shared knowledge and may include contacts for collaboration with other firms or universities that provide complementary human capital and enhanced learning. Recent research has emphasized the benefit of networks in entrepreneurship (Slotte-Kock & Coviello, 2010), and human capital acquired from network ties can be of greater benefit than individually developed knowledge (Sullivan & Marvel, 2011). Future research could benefit from stronger integration with theories that emphasize sources and qualities of complementary human capital. Theories of motivation should also be applied with human capital as all action is the result of the integration of motivation and knowledge (Locke, 2000). Motivation helps the entrepreneur to acquire necessary human capital and provides the impetus and energy to implement needed actions.

Study Context

The premise of human capital entrepreneurship research is that human capital can substantially influence entrepreneurship. However, it is not possible to fully understand how aspects of human capital impact the process without consideration of the conditions and circumstances that are relevant to an event or situation—thus making study context an important consideration. To illustrate, studies of opportunity identification have drawn on samples of students (DeTienne & Chandler, 2007), owners of private firms (Ucbasaran, Lockett, Wright, & Westhead, 2003), and technology professionals (Corbett, 2007), among others. Within these, evidence suggests that entrepreneurs frame problems in different ways compared to students (Dew, Read, Sarasvathy, & Wiltbank, 2009), highlighting the need for future studies to explore how varying samples leverage human capital to identify and exploit opportunity and what explains these differences. It may be helpful to consider comparative samples from high- and low-technology contexts to better understand how contextual conditions along with aspects of human capital impact entrepreneurship.

Considering the defining importance of entrepreneurial opportunity to the field of entrepreneurship, human capital researchers should conduct studies across opportunity discovery and opportunity creation contexts (Alvarez & Barney, 2014). The act of opportunity discovery is the result of competitive imperfections in the context in which an industry or market exists. Changes in technology, regulation, and society disrupt the status quo, whereby entrepreneurs leverage human capital to discover and exploit opportunity. Conversely, opportunity creation is brought about by the knowledge, actions, and learning of ways to produce new products or services (Baker & Nelson, 2005). In this context, entrepreneurs do not search for opportunities to discover—they create them. Examinations of human capital across opportunity discovery versus opportunity creation contexts may provide for insights into the knowledge and skills pertinent to these processes.

While much of the research in this stream is specific to high-technology or broad-industry samples, much could be gained from examining comparative samples across regions or economies. To better understand the implications of economic contexts, future research may benefit from resources such as the World Economic Forum. The World

Economic Forum divides countries into three economic stages of development that include factor-driven, efficiency-driven, and innovation-driven economies, with each stage representing an increased degree of complexity (Schwab, 2010). The human capital associated with varying phases of economic growth is considerably different (Galor & Tsiddon, 1997), and future research would benefit from exploring the types of knowledge and skills that can benefit entrepreneurship across differing economic contexts. Future examinations of human capital would also benefit from incorporating the corporate entrepreneurship context—such as start-ups compared to established high-growth firms within the same industry. The human capital that enables effective discovery and exploitation activities within a start-up may be of unequal value to larger established firms.

Methods and Analyses

While the human capital perspective is becoming more appreciated and applied in entrepreneurship research, the usefulness of this theory is tied to the ability of researchers to identify patterns of causality. Early reviews within the entrepreneurship literature called for hypothesis testing and regression analyses to distinguish among factors related to new firm survival (Low & MacMillan, 1988). Formal hypotheses and regression analyses have become the norm within this stream. Consequently, research could benefit from establishing causal linkages among variables through the use of longitudinal studies. In addition, triangulating *post hoc* methods with real-time techniques, including protocol analysis (e.g., Sarasvathy, 2001) and conjoint analysis (e.g., Shepherd, 1999), will advance understanding of underlying knowledge structures. Given the varied and complex domain of entrepreneurship as a field, a diversity of methods is to be encouraged to yield a deeper understanding of the phenomenon under study.

An additional area that is ripe for investigation is the contingency relationship among human capital and entrepreneurial outcomes. The majority of empirical examinations focused on direct relationships without consideration of moderating constructs. While human capital impacts entrepreneurial outcomes, the ability to acquire appropriate human capital and the turbulence of the environment are important considerations. For example, absorptive capacity refers to the ability to recognize, value, assimilate, and apply knowledge that is acquired to achieve commercial ends (Cohen & Levinthal, 1990). A lack of knowledge in an area may preclude an individual or firm from effectively acquiring subsequent knowledge in that domain. In such cases, effective knowledge acquisition may not occur without assistance from others who can "translate" the knowledge into a form that is understandable to them (Reagans & McEvily, 2003). Thus, the source of acquired new knowledge may also impact the relationship among human capital and entrepreneurial outcomes. As entrepreneurs or firms direct their actions to acquire human capital, they may pursue solo (i.e., internally generated) knowledge acquisition such as self-directed learning, internal R&D, experimentation, and problem solving, or they may acquire knowledge from the external environment via their network ties (Kaish & Gilad, 1991).

A number of differences have been identified in the knowledge possessed, or acquired, such as the accuracy, quality, and/or interpretability. For example, in the start-up environment, autonomous knowledge acquisition may be of limited value in terms of aiding in venture development, particularly for new firms, which are often characterized as knowledge deficient (Collinson & Gregson, 2003). Just as the quality of human capital may vary, so can the degree of environmental dynamism (Dess & Beard, 1984). Due to high levels of uncertainty, decision makers working in dynamic environments tend to suffer from

human capital shortcomings or information processing burdens. For example, Gruber (2007) showed that firm founding environments associated with high levels of dynamism diminish the value of business planning. We encourage future research to consider sources of human capital as well as environmental conditions as potential contingencies among human capital and successful venturing. Specifically, we suspect these factors moderate the human capital—entrepreneurship relationship.

Multilevel Research

Ployhart and Moliterno (2011) noted the lack of multilevel research in the human capital arena, and our findings illustrate a strong bias toward the individual level. While this provides a foundation, it also highlights an opportunity and need for future research. Research at the firm, industry, region, and country levels could each prove to be fertile areas for inquiry, in addition to the simultaneous analysis of the individual level. For example, do investments in training and development programs at the country level impact individual entrepreneurship? Or can we identify regional investment failures and investigate whether a lack of human capital is the cause or if it is a broader political/regulative issue? In short, multilevel analysis is a lucrative next step as human capital constructs are particularly well suited for analysis due to the high level of consistency in operationalization across varying levels.

The high level of consistency in operationalization is also one of the primary concerns related to human capital research. We find that firm-level human capital has been treated as an extension of individual-level human capital. Most firm-level research within this stream has assumed that human capital within the firm is a direct function of individual human capital—such as the founder. Some studies assessing firm-level human capital have used similar, if not the exact same, measures as those assessing individual-level human capital and then summed the presence of that individual level to represent that of the organization (e.g., Cassar, 2006; Eddleston, Kellermanns, & Zellweger, 2012). These approaches leave room for innovative measures that could more accurately represent the aggregate of the firm or recognize the potential for synergies, such as combinative effects of human capital.

As an illustration, "competencies" has been of particular interest in the human resources and strategy literatures and is considered essential to building firm-level strategic human resource management practices and competitive advantage (Lado & Wilson, 1994). Some human resources and entrepreneurship literature has also emphasized competencies as focused at the individual level, which represents the knowledge, skills, and personality characteristics required to motivate the implementation of these into desired outcomes (Hayton & Kelley, 2006; Man, Lau, & Chan, 2002). To assist with these conceptual challenges, we draw from Ployhart and Moliterno (2011) who define human capital as residing at the individual and firm level. However, competencies manifest at the firm level and are ultimately comprised of knowledge, skills, and other resources embedded in the organization's people, structure, processes, and relationships that enable value-enhancing strategies (De Carolis, 2003). This approach emphasizes the importance of both individual and firm-level human capital while also considering that aspects of human capital may be of unequal value to organizational competencies or competitive advantage—thus representing important relationships across levels.

A multilevel lens can be of particular value to understanding the linkages among individual human capital and organizational competencies in the corporate entrepreneurship setting. Corporate entrepreneurship is of increasing interest and allows a firm to exploit competitive advantage while also exploring tomorrow's opportunities and

developing the competencies required to pursue them (Kuratko, Ireland, Covin, & Hornsby, 2005). Firm-level competencies are a way to create new business for an existing organization through the development of new products, markets, and strategic renewal (Sharma & Chrisman, 1999). Research that explores the antecedents and consequences of individual human capital relative to organizational competencies for corporate entrepreneurship is needed.

Human Capital Constructs

Human capital was traditionally conceptualized as knowledge, skills, and on-the-job training that have economic value (Becker, 1964). However, this stream of research has developed to include the skills and abilities of value to entrepreneurship. Notably, the theory of human capital has been extended within the entrepreneurship literature to include constructs outside the purview of the original theory, including judgment, decision making, and insight.

Our review of the human capital constructs revealed the common measures employed in this research stream. Of particular note, we call attention to the fact that most research has relied on very coarse measures, and there is a clear need for finer-grained approaches that reflect more precise variance among aspects of human capital. For example, investments in education are commonly operationalized by years of education or completion of a university degree. While this operationalization is a way to leverage archival data, there is clear room for improvement. We agree that the length or completion of formal education is appropriate, but encourage future studies to consider other approaches, such as the discipline (i.e., type) or diversity of human capital investments (i.e., engineering, liberal arts, natural science, or social science degrees). Our findings also indicate that work experience is commonly assessed by the years of industry experience. To more fully explore investments in experience, the types and diversity of work experience should be considered. For example, experience in R&D, marketing and sales, or previous leadership roles may have varying implications. In many cases, studies have applied dichotomous approaches to human capital such as prior business ownership or task versus non-task. We believe these operationalizations oversimplify human capital and limit our understanding. As an example, the degree to which previous business ownership experience applies to an entrepreneurs' future situation will likely be impacted by how similar the opportunity, industry, market, or product was to the previous venture experience. Similarly, previous research has taken an approach of task versus non-task human capital and considered formal education and employment as non-task because they do not directly relate to venture activities. However, this simplification ignores the possibility that the formal education may be a bachelor degree of entrepreneurship or the work experience is within a start-up organization. These examples illustrate a gray area in terms of prior start-up experience, education, and employment experience that dichotomous approaches fail to capture. Future research should employ finer grained measures that reflect more precise degrees of variance. We also observed that some studies operationalized human capital with measures that include demographics such as age, whether family members were entrepreneurs, or gender. While these operationalizations represent attempts to leverage archival data and proxy the latent construct, we discourage this approach and suggest more direct and valid assessments of human capital.

Much of the early work within human capital entrepreneurship research emphasized educational investments and assumed these investments translate to useful outcomes (i.e., skills of economic value). However, there is a clear need for greater exploration of

Figure 3

Typology of Human Capital

	Investments	Outcomes
Impart	Education – investments in learning activities of explicit knowledge. ▪ Vary from general to specific types of education. ▪ Vary in cost, diversity, and length of investment.	Knowledge – understanding of principles, facts, and processes. ▪ Clustered within domains such as those learned through formal education. ▪ Vary from generic to specific.
Develop	Training/experience – investments in learning by doing activities. ▪ General or specific to context (e.g., industry) or task (e.g., prototype development). ▪ Vary in terms of cost, amount, time, and type.	Skills – observable application of knowledge to create solutions to problems or complete specific task. ▪ Specialized or domain specific skills (e.g., industry or task-specific). ▪ Vary in type from novice to expert.
Acquire	Recruitment – Investments in recruitment activities to acquire abilities. ▪ Sources may include venture team, firm alliances, network ties, external R&D, etc. ▪ Vary in cost, form, and quality.	Abilities – Enduring, trait-like characteristics useful to range of tasks. ▪ More general with implications to wide range of contexts and tasks. ▪ Difficult to internally develop compared to knowledge or skills.

outcome-based measures of human capital (Hayton & Zahra, 2005). While investments in work experience may translate to higher income or task performance, this approach fails to capture the outcomes of human capital investments that are believed to be of greater value to entrepreneurship. Future research would benefit from parsing specific types of investments and outcomes, or realized human capital from such investments, to provide an understanding of the interrelations among these and their unique impact on entrepreneurship. To aid in this endeavor and deconstruct the complexity of human capital, we put forward a typology presented in Figure 3. We draw from theoretical work in this research stream and the human resources literature to detail promising dimensions of human capital outcomes—specifically knowledge, skills, and abilities (KSAs).

Knowledge is the possession and understanding of principles, facts, processes, and the interactions among them. Knowledge tends to be of greater value when it is specific to a particular domain and when related to specific entrepreneurial activities (Markman & Baron, 2003). Enterprising individuals or firms must have knowledge, especially of the market and any relevant technology that is critical to success. Knowledge can range from generic to specific areas in terms of task, job, organization, or industry. It is usually clustered within domains such as those learned through formal education (e.g., accounting, marketing, information systems, electrical engineering). A few studies have called attention to domains of knowledge within entrepreneurship. For example, Shane (2000)

demonstrated how knowledge of customer problems, markets, and ways to serve markets impacts the discovery of opportunities. In a related study, Dimov (2007) illustrated how domains of market and technology knowledge impact the development of opportunities. Such knowledge outcomes can be gained through investments in education, training, experience, or the recruitment of key individuals.

Skills are also human capital outcomes but refer to observable applications or know-how. Skills are not necessarily enduring characteristics and depend on experience or practice. These are usually task specific or closely related to a set of tasks. For example, Heneman, Judge, and Kammeyer-Mueller (2009) identified varying job-related skills that range from basic (e.g., public speaking, mathematics, active learning) to cross-functional (e.g., social skills, problem-solving skills, technical skills). Skills that apply specifically to an entrepreneurial task may provide advantages within the entrepreneurship process. A variety of skills can be developed through investments in training or experience and can also be developed in combination with education and practice. Of particular interest is how skills specific to the entrepreneurial process can be developed.

Ability is the third human capital outcome and is an underlying or enduring characteristic useful to performing a range of tasks. At the individual level, ability is often associated with general traits such as the ability to reason inductively. Abilities differ from skills in that they are less likely to change over time and they are applicable across a wide set of tasks that may be encountered in many different contexts (Nyberg, Moliterno, Hale, & Lepak, 2014). While abilities cannot be developed in the same manner as knowledge or skills, entrepreneurs and firms can acquire abilities via investments in team members, alliances, and organizations.

The necessary KSAs (i.e., human capital outcomes) will depend on the circumstances of the entrepreneurship process, but may include such factors as domain knowledge, selling and negotiating, planning, prototyping, decision making, problem solving, teamwork, and communication. We assert that future efforts can benefit from exploring the quality of human capital outcomes and specific-ness of domains of human capital to the entrepreneurial task at hand. For example, each of these human capital outcomes can vary in quality as represented along a continuum. At the low end, an individual or firm may be incompetent in terms of marketing skills, which can impact the task of selling a product to a qualified customer. At the other end of the continuum, possession of high-quality skills in marketing may be associated with generating initial sales or market penetration. In particular, future research would benefit from an increased understanding of domain-specific knowledge, skills, and how these develop.

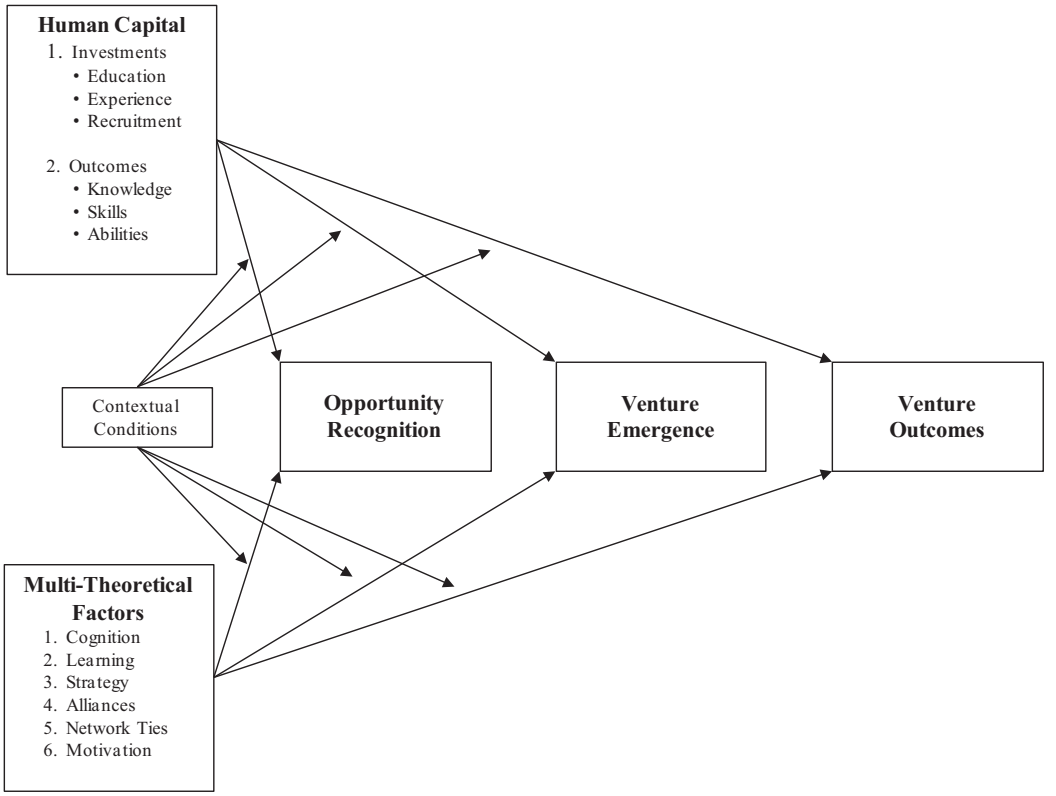
Individuals, firms, and nations can invest in human capital, but creating viable and sustainable ventures likely depends on a balance between appropriate KSAs. Some types of human capital investment may lead to an overemphasis on particular KSAs that may not ensure the firm's development of future products or revenue. Conversely, other aspects of human capital investments may result in benefiting multiple types of KSAs. We encourage future efforts to parse types of human capital investments, outcomes, and their application to milestones within the entrepreneurial process, as we describe next.

Focus of Research Stream

The primary focus of the reviewed studies was venture outcomes in the post-launch phase of the entrepreneurship process—particularly firm performance. Our findings show there are relatively few examinations of the early stages of the entrepreneurship process

Figure 4

Model of Human Capital and the Entrepreneurship Process



within this stream. This is rather surprising considering the theoretical emphasis on opportunity discovery and venture creation in the field of entrepreneurship. Thus far, the major conceptualizations of opportunity recognition assume that entrepreneurs either search and discover opportunities or create opportunities without a deliberate search (e.g., Alvarez & Barney, 2007; Lumpkin et al., 2004). Both opportunity discovery and opportunity creation theories highlight knowledge and experience as critical to the process (Fiet, 1996; Sarasvathy, 2008), and we encourage future human capital approaches to enhance our understanding of the antecedents and consequences of opportunity. We assert that human capital is critical throughout the entrepreneurial process and encourage future research to more fully explore varying dimensions of human capital across specific stages within the process. We turn our attention to Figure 4 as an example of a research agenda for human capital entrepreneurship research.

We begin with our human capital typology of investments and outcomes and emphasize their unequal value relative to the process. We propose that entrepreneurship is a process that begins with an entrepreneurial opportunity, is followed by venture emergence activities, and results in varying venture performance outcomes. Opportunity recognition is triggered by insight (Gaglio & Taub, 1992), which is the conscious realization that an idea may be transformed into a business concept that adds value or creates revenue. For ideas to progress into venture opportunities, there are important cognitive phases of

evaluation and elaboration that impact the entrepreneurial process (Lumpkin & Lichtenstein, 2005). Evaluation entails analyzing whether concepts are sufficiently valuable and worthwhile to pursue, whereas elaboration involves tedious work such as problem resolution, organizing resources, feedback, and testing.

Another basic phase within the entrepreneurship process is venture emergence (Dimov, 2010), which has not received adequate attention from human capital entrepreneurship research. Studies have begun to take an important milestone approach to assessing the accumulation of venture emergence accomplishments. For example, assessing the amount of time from entrepreneurial action to establishing a legal entity, prototype development, testing prototypes with potential customers, or securing financing, each represents significant development and progress (Delmar & Shane, 2004; Morse & Mitchell, 2005). Recent research has called for greater goal specificity when examining milestones along the process of entrepreneurship such as achievements of initial sales and establishment of an operating business (McMullen & Dimov, 2013). These specific milestones represent criteria for entrepreneurship scholars to more fully consider the impact of human capital relative to venture emergence. We conclude our process model of human capital and entrepreneurship with traditional venture outcomes that include survival, innovation, and growth in sales, profitability, or employment among others.

Aspects of human capital influence the transition from one stage of the entrepreneurial process to another. However, a particular type of human capital may be essential to accomplishing a milestone, while the same human capital may be less important, or even disadvantageous, to other milestones within the process. For example, using conceptualizations of general versus specific human capital, research has shown that specific human capital investments are beneficial to nascent entrepreneurs and venture development—whereas general human capital investments did not have an effect (Davidsson & Honig, 2003). Conversely, other research has shown that general types of human capital investment are helpful for the achievement of initial public offerings, but specific human capital was of little value (Dimov & Shepherd, 2005). This evidence suggests that indeed the effects of human capital are of unequal value when considering different phases, or milestones, along the entrepreneurial process. It is quite plausible that human capital central to explaining one phase of the process may have little influence on later stages in the process. Another possibility is that although the vast majority of studies assume more human capital is universally better, some findings suggest that aspects of human capital can also hinder venture milestones such as opportunity discovery and product innovation (Marvel, 2013; Marvel & Lumpkin, 2007). This illustrates the need for more carefully constructed studies that fully investigate dimensions of human capital specific to milestones along the process. This research stream can also benefit from considering contextual conditions in which human capital is applied to a particular phase or milestone. Varying economic contexts or uncertain environments will likely impact the types or effectiveness of human capital relative to opportunity recognition, venture emergence, or traditional firm outcomes. To aid in this research agenda, we encourage a diversity of theoretical approaches to complement and enhance our understanding of the human capital implications to entrepreneurship. For example, motivational and cognitive approaches will surely be of value in conjunction with human capital for opportunity recognition-focused studies. However, strategic management approaches, in conjunction with human capital, may be of particular value when considering performance outcomes. We encourage future studies to explore the human capital taxonomy presented here, in conjunction with other theories and contexts, and focus on specific venture milestones within the process of entrepreneurship.

Conclusion

Our systematic review of the human capital entrepreneurship research stream identifies the progress to date, promising research gaps, and a path for future exploration. We find that this stream has grown considerably and pinpoint promising areas for future exploration across multi-theoretical perspectives, contexts, methods, and multilevel approaches. In particular, we call special attention to the need for more precise conceptualizations and believe much can be gained from more sophisticated measures of human capital. To guide future scholarship, we deconstructed the human capital construct and set forth a typology of human capital investments (i.e., education, training/experience, and recruitment) and human capital outcomes (i.e., knowledge, skills, and abilities) providing a more detailed lens than previously available. Perhaps most importantly, we propose a research agenda for human capital along the entrepreneurial process to enhance and guide the development of this stream. We encourage scholars to more fully explore human capital, in conjunction with other theories, and focus on specific venture milestones along the process. We believe the pursuit and development of this stream represents fertile ground for meaningful contributions to entrepreneurship theory and practice. We hope this undertaking spurs scholarship and insights into future human capital entrepreneurship research.

Appendix

Academy of Management Journal
Florin et al., 2003

Administrative Science Quarterly
Gimeno et al., 1997
Hallen, 2008
Sine & Lee, 2009

Entrepreneurship and Regional Development
Honig, 1998
Hinz & Jungbauer-Gans, 1999
Ucbasaran et al., 2003
Meccheri & Pelloni, 2006
Vinogradov & Kolvereid, 2007
Kariv et al., 2009
Malo & Norus, 2009
Collins & Low, 2010
Jones et al., 2010
Kloosterman, 2010
Marchisio et al., 2010
Dana & Light, 2011
Jayawarna et al., 2011
Cetindamar et al., 2012
Robson et al., 2013

Entrepreneurship Theory & Practice
Dolinsky et al., 1993
Chaganti et al., 1995
Honig, 2001
Ucbasaran et al., 2003
Audretsch & Keilback, 2004
Rauch et al., 2005
Allen et al., 2007
Corbett et al., 2007
DeTienne & Chandler, 2007
Majumdar, 2007
Manolova et al., 2007
Marvel & Lumpkin, 2007
Mosey & Wright, 2007
Shrader & Siegel, 2007
Bruns et al., 2008
Wiklund & Shepherd, 2008
Wright et al., 2008
Zhang et al., 2008
Arthurs et al., 2009
Audretsch et al., 2009
Patel & Fiet, 2011
Eddleston et al., 2012
Block et al., 2013
Marvel, 2013
Rauch & Rijsdijk, 2013
Zhao et al., 2013
Alvarez & Barney, 2014

Human Resource Management Review
Markman & Baron, 2003

Journal of Business Venturing
Cooper et al., 1994
Michael, 1996
Carter et al., 1997
Lerner et al., 1997
Chandler & Hanks, 1998
Honig, 1998
Boden & Nucci, 2000
Majumdar, 2000
Honig, 2001
Lerner & Haber, 2001
Westhead et al., 2001
Daviddson & Honig, 2003
Watson et al., 2003
Baum & Silverman, 2004
Dimov & Shepherd, 2005
Powers & McDougall, 2005
Cassar, 2006
Aidis & Praag, 2007
Beckman et al., 2007
Corbett, 2007
Haber & Reichel, 2007
DeTienne et al., 2008
Bhagavatula et al., 2010
Colombo & Grilli, 2010
Wennberg et al., 2010
Zarutskie, 2010
Eckhardt & Shane, 2011
Parker, 2011
Unger et al., 2011
Kotha & George, 2012
Parker & Praag, 2012
Martin et al., 2013
Cassar, 2014
Grichnik et al., 2014
Kim & Li, 2014
Lofstrom et al., 2014

Journal of International Business Studies
Ganotakis & Love, 2012

Journal of Management
Kor & Sundaramurthy, 2009
Gruber, 2010
Hermann & Priem, 2011
Ndofor & Priem, 2011
Gruber et al., 2012

Journal of Management Studies
Bradley et al., 2012
Dimov, 2012

Journal of Small Business Management
Caputo & Dolinksy, 1998
Van Gelder et al., 2007
Seghers et al., 2012

Management Science
Toole & Czarnitzki, 2009
Elfenbein et al., 2010
Campbell, 2013

Organization Science
Dencker et al., 2009
Petkova et al., 2013

Strategic Entrepreneurship Journal
Matusik et al., 2008
Pollock et al., 2009
Autio & Acs, 2010
Simsek & Heavey, 2011
Fuller & Rothaermel, 2012

Strategic Management Journal
Forbes, 2005
Agarwal et al., 2009
Campbell et al., 2012
Carnahan et al., 2012
Neffke & Henning, 2013

REFERENCES

Alvarez, S.A. & Barney, J.B. (2007). Discovery and creation: Alternative theories of entrepreneurial action. *Strategic Entrepreneurship Journal*, *1*(1), 11–26.

Alvarez, S.A. & Barney, J.B. (2014). Entrepreneurial opportunities and poverty alleviation. *Entrepreneurship Theory and Practice*, *38*(1), 159–184.

Alvarez, S.A. & Busenitz, L.W. (2001). The entrepreneurship of resource-based theory. *Journal of Management*, *27*(6), 755–775.

Ardichvili, A., Cardozo, R., & Ray, S. (2003). A theory of entrepreneurial opportunity identification and development. *Journal of Business Venturing*, *18*(1), 105–123.

Baker, T. & Nelson, R.E. (2005). Creating something from nothing: Resource construction through entrepreneurial bricolage. *Administrative Science Quarterly*, *50*(3), 329–366.

Becker, G.S. (1964). *Human capital: A theoretical analysis with special reference to education*. New York: National Bureau for Economic Research, Columbia University Press.

Bhagavatula, S., Elfring, T., van Tilburg, A., & van de Bunt, G.G. (2010). How social and human capital influence opportunity recognition and resource mobilization in India's handloom industry. *Journal of Business Venturing*, *25*(3), 245–260.

Boden, R.J. Jr. & Nucci, A.R. (2000). On the survival prospects of men's and women's new business ventures. *Journal of Business Venturing*, *15*(4), 347–362.

Bradley, S.W., McMullen, J.S., Artz, K., & Simiyu, E.M. (2012). Capital is not enough: Innovation in developing economies. *Journal of Management Studies*, *49*(4), 684–717.

Bruns, V., Holland, D.V., Shepherd, D.A., & Wiklund, J. (2008). The role of human capital in loan officers' decision policies. *Entrepreneurship Theory and Practice*, *32*(3), 485–506.

Busenitz, L.W. & Barney, J.B. (1997). Differences between entrepreneurs and managers in large organizations: Biases and heuristics in strategic decision-making. *Journal of Business Venturing*, *12*(1), 9–30.

Busenitz, L.W., West, III, G.P., Shepherd, D., Nelson, T.C.G.N., & Zacharakis, A. (2003). Entrepreneurship research in emergence: Past trends and future directions. *Journal of Management*, *29*(3), 285–308.

Cassar, G. (2006). Entrepreneur opportunity costs and intended venture growth. *Journal of Business Venturing*, *21*(5), 610–632.

Chua, J.H., Chrisman, J.J., & Steier, L.P. (2003). Extending the theoretical horizons of family business research. *Entrepreneurship Theory and Practice*, *27*(4), 331–338.

Cohen, W.M. & Levinthal, D.A. (1990). Absorptive capacity: A new perspective on learning and innovation. *Administrative Science Quarterly*, *35*(1), 128–152.

Collinson, S. & Gregson, G. (2003). Knowledge networks for new technology-based firms: An international comparison of local entrepreneurship promotion. *R&D Management*, *33*(2), 189–208.

Cooper, A.C., Gimeno-Gascon, F.J., & Woo, C.Y. (1994). Initial human and financial capital as predictors of new venture performance. *Journal of Business Venturing*, *9*(5), 371–395.

Corbett, A.C. (2007). Learning asymmetries and the discovery of entrepreneurial opportunities. *Journal of Business Venturing*, *22*(1), 97–118.

Corbett, A.C., Neck, H.M., & DeTienne, D.R. (2007). How corporate entrepreneurs learn from fledgling innovation initiatives: Cognition and the development of a termination script. *Entrepreneurship Theory and Practice*, *31*(6), 829–852.

Crook, T.R., Todd, S.Y., Combs, J.G., Woehr, D.J., & Ketchen, D.J. (2011). Does human capital matter? A meta-analysis of the relationship between human capital and firm performance. *Journal of Applied Psychology*, *96*(3), 443–456.

Dana, L.P. & Light, I. (2011). Two forms of community entrepreneurship in Finland: Are there differences between Finnish and Sámi reindeer husbandry entrepreneurs? *Entrepreneurship & Regional Development*, *23*(5–6), 331–352.

Davidsson, P. (2004). Role models and perceived social support. In W., Gartner, K., Shaver, N., Carter, & P., Reynolds (Eds.), *Handbook of entrepreneurial dynamics: The process of business creation* (pp. 179–186). Thousand Oaks, CA: SAGE Publications.

Davidsson, P. & Honig, B. (2003). The role of social and human capital among nascent entrepreneurs. *Journal of Business Venturing*, *18*(3), 301–331.

De Carolis, D.M. (2003). Competencies and imitability in the pharmaceutical industry: An analysis of their relationship with firm performance. *Journal of Management*, *29*(1), 27–50.

Delmar, F. & Shane, S. (2003). Does business planning facilitate the development of new ventures? *Strategic Management Journal*, *24*(12), 1165–1185.

Delmar, F. & Shane, S. (2004). Legitimating first: Organizing activities and the survival of new ventures. *Journal of Business Venturing*, *19*(3), 385–410.

Dencker, J.C., Gruber, M., & Shah, S.K. (2009). Pre-entry knowledge, learning, and the survival of new firms. *Organization Science*, *20*(3), 516–537.

Dess, G.G. & Beard, D.W. (1984). Dimensions of organizational task environments. *Administrative Science Quarterly*, *29*(1), 52–73.

DeTienne, D.R. & Chandler, G.N. (2007). The role of gender in opportunity identification. *Entrepreneurship Theory and Practice*, *31*(3), 365–386.

Dew, N., Read, S., Sarasvathy, S.D., & Wiltbank, R. (2009). Effectual versus predictive logics in entrepreneurial decision-making: Differences between experts and novices. *Journal of Business Venturing*, *24*(4), 287–309.

Dimov, D. (2007). From opportunity insight to opportunity intention: The importance of person-situation learning match. *Entrepreneurship Theory and Practice*, *31*(4), 561–583.

Dimov, D. (2010). Nascent entrepreneurs and venture emergence: Opportunity confidence, human capital, and early planning. *Journal of Management Studies*, *47*(6), 1123–1153.

Dimov, D.P. & Shepherd, D.A. (2005). Human capital theory and venture capital firms: Exploring "home runs" and "strike outs." *Journal of Business Venturing*, *20*(1), 1–21.

Dolinsky, A., Caputo, R., Pasumarty, K., & Quazi, H. (1993). The effects of education on business ownership: A longitudinal study of women. *Entrepreneurship Theory and Practice*, *18*(1), 43–53.

Eddleston, K.A., Kellermanns, F.W., & Zellweger, T.M. (2012). Exploring the entrepreneurial behavior of family firms: Does the stewardship perspective explain differences? *Entrepreneurship Theory and Practice*, *36*(2), 347–367.

Eisenhardt, K.M. (1989). Agency theory: An assessment and review. *Academy of Management Review*, *14*(1), 57–74.

Fiet, J.O. (1996). The informational basis of entrepreneurial discovery. *Small Business Economics*, *8*(6), 419–430.

Foo, M.D., Uy, M.A., & Baron, R.A. (2009). How do feelings influence effort? An empirical study of entrepreneurs' affect and venture effort. *Journal of Applied Psychology*, *94*(4), 1086–1094.

Gaglio, C.M. & Taub, R.P. (1992). Entrepreneurs and opportunity recognition. *Frontiers of Entrepreneurship Research*, *12*, 136–147.

Galor, O. & Tsiddon, D. (1997). The distribution of human capital and economic growth. *Journal of Economic Growth*, *2*(1), 93–124.

Gartner, W.B., Shaver, K.G., Carter, N.M., & Reynolds, P.D. (Eds.). (2004). *Handbook of entrepreneurial dynamics: The process of business creation*. Thousand Oaks, CA: Sage.

Grégoire, D.A., Corbett, A.C., & McMullen, J.S. (2011). The cognitive perspective in entrepreneurship: An agenda for future research. *Journal of Management Studies*, *48*(6), 1443–1477.

Gruber, M. (2007). Uncovering the value of planning in new venture creation: A process and contingency perspective. *Journal of Business Venturing*, *22*(6), 782–807.

Hayton, J.C. & Kelley, D.J. (2006). A competency-based framework for promoting corporate entrepreneurship. *Human Resource Management*, *45*(3), 407–427.

Hayton, J.C. & Zahra, S.A. (2005). Venture team human capital and absorptive capacity in high technology new ventures. *International Journal of Technology Management*, *31*(3), 256–274.

Heneman, H.G., Judge, T.A., & Kammeyer-Mueller, J.D. (2009). *Staffing organizations*. Mendota House.

Honig, B. (1998). Who gets the goodies? An examination of microenterprise credit in Jamaica. *Entrepreneurship and Regional Development*, *10*(4), 313–334.

Ireland, R.D., Reutzel, C.R., & Webb, J.W. (2005). Entrepreneurship research in AMJ: What has been published, and what might the future hold? *Academy of Management Journal*, *48*(4), 556–564.

Kaish, S. & Gilad, B. (1991). Characteristics of opportunities search of entrepreneurs versus executives: Sources, interests, general alertness. *Journal of Business Venturing*, *6*(1), 45–61.

Kang, S.C. & Snell, S.A. (2009). Intellectual capital architectures and ambidextrous learning: A framework for human resource management. *Journal of Management Studies*, *46*(1), 65–92.

Keith, N. & Frese, M. (2005). Self-regulation in error management training: Emotion control and metacognition as mediators of performance effects. *Journal of Applied Psychology*, *90*(4), 677–691.

Ketchen, D.J., Thomas, J.B., & McDaniel, R.R. (1996). Process, content and context: Synergistic effects on organizational performance. *Journal of Management*, *22*(2), 231–257.

Kuratko, D.F., Ireland, R.D., Covin, J.G., & Hornsby, J.S. (2005). A model of middle-level managers' entrepreneurial behavior. *Entrepreneurship Theory and Practice*, *29*(6), 699–716.

Lado, A.A. & Wilson, M.C. (1994). Human resource systems and sustained competitive advantage: A competency-based perspective. *Academy of Management Review*, *19*(4), 699–727.

Locke, E. (2000). Motivation, cognition, and action: An analysis of studies of task goals and knowledge. *Applied Psychology*, *49*(3), 408–429.

Low, M.B. & MacMillan, I.C. (1988). Entrepreneurship: Past research and future challenges. *Journal of Management*, *14*(2), 139–161.

Lumpkin, G.T. & Dess, G.G. (1996). Clarifying the entrepreneurial orientation construct and linking it to performance. *Academy of Management Review*, *21*(1), 135–172.

Lumpkin, G.T., Hills, G.E., & Shrader, R.C. (2004). Opportunity recognition. In H.P. Welsch (Ed.), *Entrepreneurship: The way ahead* (pp. 73–90). New York: Routledge.

Lumpkin, G.T. & Lichtenstein, B.B. (2005). The role of organizational learning in the opportunity-recognition process. *Entrepreneurship Theory and Practice*, *29*(4), 451–472.

Man, T.W., Lau, T., & Chan, K.F. (2002). The competitiveness of small and medium enterprises: A conceptualization with focus on entrepreneurial competencies. *Journal of Business Venturing*, *17*(2), 123–142.

Manolova, T.S., Carter, N.M., Manev, I.M., & Gyoshev, B.S. (2007). The differential effect of men and women entrepreneurs' human capital and networking on growth expectancies in Bulgaria. *Entrepreneurship Theory and Practice*, *31*(3), 407–426.

Marchisio, G., Mazzola, P., Sciascia, S., Miles, M., & Astrachan, J. (2010). Corporate venturing in family business: The effects on the family and its members. *Entrepreneurship and Regional Development*, *22*(3–4), 349–377.

Markman, G.D. & Baron, R.A. (2003). Person-entrepreneurship fit: Why some people are more successful as entrepreneurs than others. *Human Resource Management Review*, *13*(2), 281–301.

Martin, B.C., McNally, J.J., & Kay, M.J. (2013). Examining the formation of human capital in entrepreneurship: A meta-analysis of entrepreneurship education outcomes. *Journal of Business Venturing*, *28*(2), 211–224.

Marvel, M.R. (2013). Human capital and search-based discovery: A study of high-tech entrepreneurship. *Entrepreneurship Theory and Practice*, *37*(2), 403–419.

Marvel, M.R. & Lumpkin, G.T. (2007). Technology entrepreneurs' human capital and its effects on innovation radicalness. *Entrepreneurship Theory and Practice*, *31*(6), 807–828.

McMullen, J.S. & Dimov, D. (2013). Time and the entrepreneurial journey: The problems and promise of studying entrepreneurship as a process. *Journal of Management Studies*, *50*(8), 1481–1512.

Mincer, J. (1958). Investment in human capital and personal income distribution. *Journal of Political Economy*, *66*(4), 281–302.

Minniti, M. & Lévesque, M. (2008). Recent developments in the economics of entrepreneurship. *Journal of Business Venturing*, *23*(6), 603–612.

Morse, E. & Mitchell, R.K. (2005). *Cases in entrepreneurship: The venture creation process*. Thousand Oaks, CA: Sage.

Nag, R., Hambrick, D.C., & Chen, M.J. (2007). What is strategic management, really? Inductive derivation of a consensus definition of the field. *Strategic Management Journal*, *28*(9), 935–955.

Nyberg, A.J., Moliterno, T.P., Hale, D., & Lepak, D.P. (2014). Resource-based perspectives on unit-level human capital a review and integration. *Journal of Management*, *40*(1), 316–346.

Payne, G.T., Moore, C.B., Griffis, S.E., & Autry, C.W. (2011). Multilevel challenges and opportunities in social capital research. *Journal of Management*, *37*(2), 491–520.

Ployhart, R.E. & Moliterno, T.P. (2011). Emergence of the human capital resource: A multilevel model. *Academy of Management Review*, *36*(1), 127–150.

Reagans, R. & McEvily, B. (2003). Network structure and knowledge transfer: The effects of cohesion and range. *Administrative Science Quarterly*, *48*(2), 240–267.

Reuber, A.R. & Fischer, E.M. (1994). Entrepreneurs' experience, expertise, and the performance of technology-based firms. *IEEE Transactions on Engineering Management*, *41*(4), 365–374.

Sarasvathy, S.D. (2001). Causation and effectuation: Toward a theoretical shift from economic inevitability to entrepreneurial contingency. *Academy of Management Review*, *26*(2), 243–263.

Sarasvathy, S.D. (2008). *Effectuation: Elements of entrepreneurial expertise*. Cheltenham, UK: Edward Elgar.

Schultz, T.W. (1961). Investment in human capital. *The American Economic Review*, *51*(1), 1–17.

Schwab, K. (2010). The global competitiveness report 2010–2011. Geneva, Switzerland: World Economic Forum.

Shane, S. (2000). Prior knowledge and the discovery of entrepreneurial opportunities. *Organization Science*, *11*(4), 448–469.

Shane, S. & Venkataraman, S. (2000). The promise of entrepreneurship as a field of research. *Academy of Management Review*, *25*(1), 217–226.

Sharma, P. & Chrisman, J.J. (1999). Toward a reconciliation of the definitional issues in the field of corporate entrepreneurship. *Entrepreneurship Theory and Practice*, *23*(3), 11–28.

Shepherd, D.A. (1999). Venture capitalists' assessment of new venture survival. *Management Science*, *45*(5), 621–632.

Short, J.C., Ketchen, D.J., Shook, C.L., & Ireland, R.D. (2010). The concept of "opportunity" in entrepreneurship research: Past accomplishments and future challenges. *Journal of Management*, *36*(1), 40–65.

Simsek, Z. & Heavey, C. (2011). The mediating role of knowledge-based capital for corporate entrepreneurship effects on performance: A study of small-to medium-sized firms. *Strategic Entrepreneurship Journal*, *5*(1), 81–100.

Slotte-Kock, S. & Coviello, N. (2010). Entrepreneurship research on network processes: A review and ways forward. *Entrepreneurship Theory and Practice*, *34*(1), 31–57.

Sullivan, D.M. & Marvel, M.R. (2011). Knowledge acquisition, network reliance, and early-stage technology venture outcomes. *Journal of Management Studies*, *48*(6), 1169–1193.

Ucbasaran, D., Lockett, A., Wright, M., & Westhead, P. (2003). Entrepreneurial founder teams: Factors associated with member entry and exit. *Entrepreneurship Theory and Practice*, *28*(2), 107–128.

Unger, J.M., Rauch, A., Frese, M., & Rosenbusch, N. (2011). Human capital and entrepreneurial success: A meta-analytical review. *Journal of Business Venturing*, *26*(3), 341–358.

Williamson, O.E. (1991). Comparative economic organization: The analysis of discrete structural alternatives. *Administrative Science Quarterly*, *36*(2), 269–296.

Zacharakis, A.L. & Meyer, G.D. (2000). The potential of actuarial decision models: Can they improve the venture capital investment decision? *Journal of Business Venturing*, *15*(4), 323–346.

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