The Benefits of Benefits: A Dynamic Approach to Motivation-Enhancing HR Practices and Entrepreneurial Survival

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ABSTRACT

A pressing but understudied issue is the high incidence of new venture failure. We propose a model of how motivation-enhancing HR (MHR) practices mediate the effects of initial human and financial resources of a founding team on firms’ decisions to remain in operation. In this model, we also propose that MHR practices have effects on firm survival that change over time. We test our model with a sample of 1,100 firms tracked for seven years. We found support for a model where MHR practices partially mediate the effects of initial firm resources and human capital on firm survival. We also found that the effects of MHR practices change over time such that their positive effects on survival become stronger. We conclude with a research agenda and recommendations for how nascent firms can promote survival.

Keywords: entrepreneurship, strategic HRM (division and organizational level), organizational life cycle, multi-level model
THE BENEFITS OF BENEFITS: A DYNAMIC APPROACH TO MOTIVATION-ENHANCING HR PRACTICES AND ENTREPRENEURIAL SURVIVAL

Each year between 750,000 and 800,000 new firms enter the U.S. market, and half of these ventures will fail in their first five years (Small Business Administration, 2012). Although past studies have investigated the strategic Human Resources (HR) practices that successful, established firms use (e.g., Becker & Gerhart, 1996; Combs, Liu, Hall, & Ketchen, 2006; Ferguson & Reio Jr, 2010), there is far less understanding of how HR practices relate to new venture outcomes. Further, while many HR practices are requisite (e.g., selecting employees), others are optional, employee-focused HR practices that ventures can implement to motivate or attract employees, such as flextime, bonuses, employee stock options, and healthcare programs (Gavino, Wayne, & Edrogan, 2012; Hayton, 2003). Consistent with prior literature (Kehoe & Wright, 2013), we define such practices as motivation-enhancing HR (MHR) practices. These types of practices have demonstrated value for large and established firms (e.g., Combs et al., 2006); however, the antecedents of firm success in established firms likely differ from the antecedents of survival in new ventures (Short, Ketchen, Palmer, & Hult, 2007). When and how new ventures use HR practices is a question research has only begun to address (e.g., Kotha, Zheng, & George, 2011; Wright & Haggerty, 2005).

There is a growing interest in new venture survival, or the ability of new ventures to successfully start and maintain their operations (Cefis & Marsili, 2006; Geroski, Mata, & Portugal, 2010; Gimmon & Levie, 2010; Helfat & Lieberman, 2002; Klapper & Richmond, 2011; Mata & Portugal, 1994). Although scholars have employed a variety of theories to examine how and why firms choose to remain in the market or exit (e.g., Arribas & Vila, 2007; Audretsch, 1995; Barney, 1991; Dencker, Gruber, & Shah, 2009; Wang & Ahmed, 2007), the dominant
paradigm is the Resource Based View (RBV; Barney, 1991; Wernerfelt, 1984). According to the RBV, competitive advantage derives from physical, human, and organizational capital that are valuable, rare, inimitable, and non-substitutable. In the case of new firms, before competitive advantage can be developed, a firm must develop competitive parity, or the ability to meet market rents, and legitimacy, external perceptions of firm’s capacity to meet its goals (Lounsbury & Glen, 2001). Past RBV research on new firm survival has most often focused on the value of physical capital such as financial resources (e.g., Geroski et al., 2010; Mata & Portugal, 1994), and the value of human capital such as founder knowledge and experience (e.g., Dencker et al., 2009; Hitt, Bierman, Shimizu, & Kochhar, 2001; Kotha & George, 2012).

While past RBV research has made contributions to understanding what, when, and how firms’ resources influence survival, significant questions about how entrepreneurs can make the most of their resources remain unanswered. For example, less research has examined the processes and decisions through which a firm’s resources create competitive parity and ensure survival (Priem & Butler, 2001). MHR practices are an example of resource-management behavior that has the capacity to optimize activation of human capital to channel resources into competitive parity (Cardon & Stevens, 2004; Hayton, 2003). Further, while past literature has made clear the value of managerial experience and financial resources (Carter, Williams, & Reynolds, 1997), relatively little is known about how managerial decisions, such as the use of HR, may convey the benefits of initial resources into firm processes and practices that lead to survival. Such research could address the black-box of the RBV and provide a model of when, why, and how a firm’s resources impact its outcomes (Kraaijenbrink, Spender, & Groen, 2010).

The current work seeks to answer questions about how MHR practices impact new ventures. At what point does implementation of HR practices increase the odds of survival?
Should resources be devoted to early routinization of compensation and benefit packages or should new ventures devote initial resources more exclusively to other organizational needs? The answers to these questions are important for two reasons. First, there has been a repeated call in studies of entrepreneurship (Rutherford, Kuratko, & Holt, 2008) and management (Edwards & Berry, 2010; Leavitt, Mitchell, & Peterson, 2010; Mitchell & James, 2001) to thin or prune back the rapidly expanding theoretical landscape by establishing boundary conditions of dominant paradigms such as the RBV. Second, as an applied field, entrepreneurship research must be able to make meaningful and helpful recommendations to practitioners. Unlike physical and human capital, which may be less malleable in new ventures, recommendations about MHR practices are more actionable and under the purview of nascent business owners. MHR practices can also be more cost-effective than the procurement of new human or financial resources because they provide a way to motivate a firm’s extant workforce and increase its competitive parity and advantage.

Thus, the purpose of this manuscript is to address the questions of (1) whether the survival benefits to a firm of instituting HR programs increase or decrease over time; and (2) whether these HR programs mediate the effects of entrepreneurial firms’ initial financial resources and human capital on survival. We develop and test specific hypotheses with a 7-year longitudinal data set of 1,100 new ventures.

OVERVIEW OF THE MODEL OF MHR PRACTICES

Drawing from the RBV, we developed a model to explain the dynamic relationship between the initial financial resources, human capital of the firm’s owners, and MHR practices. Figure 1 depicts this model. The RBV identifies the forms of capital likely to increase survival, with resource orchestration helping to define the causal pathways, time-dependent conditions,
and changes in goals through which different forms of resources influence survival (Sapienza, Autio, George, & Zahra, 2006; Singh, Tucker, & House, 1986; Zott, 2003). In this case, the initial human and financial capital of the founding members confer absorptive capacity and slack, increasing the firm’s ability to adapt and respond both to a firm’s changing internal needs and its external environment (George, 2005; Zahra & George, 2002), including the implementation of MHR practices.

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Insert Figure 1 about here
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Figure 1 shows the relationships between the firm’s initial financial resources, human capital, MHR practices, and time as they relate to survival. The center of Figure 1 shows that MHR practices are a mechanism through which initial financial and human capital affect firm survival. MHR practices are dynamic resources through which founders channel their initial capital into competitive parity and survival. The firm’s initial human and financial capital resources matter because these initial resources confer slack, opportunities (Gimeno, Folta, Cooper & Woo, 1997; George, 2005; Pennings, Lee & Van Witteloostuijn, 1998), and planning capacity (Dencker et al., 2009; Haber & Reichel, 2007) to firms as they adapt and respond to changing conditions (Greve, 2008). As a result, these initial conditions influence the subsequent behaviors of the firm and its survival.

**Initial Financial Resources**

The persistent influence of initial firm resources when channeled through operational capital and firm practices such as MHR is central to the creation of competitive parity (Sirmon & Hitt, 2003). Past research within the RBV perspective notes that access to initial financial
resources can provide a firm with competitive resources (Brush, Greene, & Hart, 2001), which it can channel towards survival. However, not all financial resources are created equal. Past research in the RBV domain has noted that different types of resources have different effects on survival (Hoopes, Madsen, & Walker, 2003), and the effects of those initial resources are likely to influence the firm for years after its founding as firms adapt, change, and grow (Box, 2008; Helfat & Peteraf, 2003). The initial financial resources of a firm consist of a combination of equity capital and debt capital, and firms with access to high-quality financial resources tend to survive longer (Bates, 1990; Cooper, Gimeno-Gascon & Woo, 1994; Mata & Portugal, 1994).

While a small number of firms have access to private equity markets and equity investors, the vast majority of firms must focus on a few sources of external financing: bank loans or personal loans from family and friends (Berger & Udell, 1995). Past research has indicated that funding sources such as private equity investments and angel investors account for less than 5% of the total amount of financing for small businesses, while debt and equity financing from banks and personal contacts account for the vast majority of external financing firms (Berger & Udell, 1998; Ou & Haynes, 2006). Because only a very small percentage of all new ventures have opportunities to seek out or acquire funding from private equity or angel investors, our study focuses on external financing sources other than private equity and angel investors.

Two key issues define the relationship between access to initial financial resources and firm survival: the time horizon of the payback of loans and the vetting of the initial resource. Access to loans with longer payback horizons, such as personal or business bank loans, can aid a new venture in growing by giving the new venture more time to use those financial resources to gain competitive advantage (Alvarez & Barney, 2000). In contrast, short-term loans with high interest rates can create toxic debt (Cassar, 2004; Shane & Cable, 2002; Tornikoski & Newbert,
2007) and hinder the development of a stable resource base (Ebben & Johnson, 2006; Winborg & Landström, 2001) by limiting the ability of the new venture to take advantage of the resources they can gather during the payback window (Ebben, 2009). Therefore, we anticipate that, in general, access to resources with longer payback horizons (i.e., loans) will generally confer a positive survival value to firms, while access to financial resources with shorter payback horizons (i.e., credit cards), are likely to have too short a payback horizon, limiting their value to a new venture in developing resources and competitive parity.

In addition to the payback time horizon, the degree of scrutiny required by the lending institution in order for the firm to acquire the financial resource is likely related to firm survival. New firms have access to different types of loans: they can acquire loans from sanctioned financial institutions as well as personal loans from family and friends. New ventures often lack legitimacy, so they are denied loans and lines of credit from banks and instead use personal loans as forms of startup capital (Ebben & Johnson, 2006; Tornikoski & Newbert, 2007). These “bootstrap financing” techniques used in the pre-legitimacy stages of the business may provide necessary external financing but are deleterious to survival because they may indicate that a firm lacks the ability to establish its legitimacy to sanctioned financial institutions. In addition, the lack of vetted financing (i.e., bank loans) may also signal that a new venture lacks high-quality plans, products, or services that can meet its customers’ needs. So, while personal loans have a long payback horizon, their use also indicates a firm may be on shakier financial ground than a firm with vetted loans from an established financial institution. Therefore, we hypothesize the following:
H1a: Access to initial financial resources that are vetted with long financial payback horizons (i.e., personal bank loans, business bank loans) will be positively related to survival.

H1b: Access to initial financial resources that are vetted with short financial payback horizons (i.e., personal credit cards, business credit cards) will be negatively related to survival.

H1c: Access to initial financial resources that are not vetted with long financial payback horizons (i.e., personal loans) will be negatively related to survival.

Founder Human Capital

From the RBV perspective, the founders’ human capital (i.e., their accumulated knowledge and skill), has lasting effects on a firm’s performance and survival (Agarwal, Echambadi, Franco, & Sarkar, 2004; Delmar & Shane, 2006; Evans & Leighton, 1989; Franco & Filson, 2006; Kotha & George, 2012; Mitchell, 1989), sometimes via the implementation of firm practices such as MHR. Past research on the RBV has identified two broad forms of human capital (Wright, McMahan, & McWilliams, 1994): specific human capital, which refers to human capital that is more valuable in the current context than in the best alternative context, and general human capital, which refers to human capital equivalently valuable in the current context and in the best alternative (Hatch & Dyer, 2004; Lepak & Snell, 1999). Past research has indicated that both forms of human capital are linked to survival. Gimeno et al. (1997) found a positive relationship between several forms of experience (i.e., entrepreneurial, management, industry) and firm survival, but the relationship between entrepreneurial experience and survival was not significant after controlling for other founders’ experience. In summary, the limited research available supports a positive relation between specific human capital and firm survival.
In addition to experience, the education of a firm’s owners can impact firm survival. Higher levels of educational attainment indicate an absorptive capacity to retain and gather large and complex forms of information (Cohen & Levinthal, 1990; Zahra & George, 2002). The education of the founders indicates a stock of high-quality, well-trained human capital, which can serve as a key resource for a firm (Brüderl, Preisendörfer, & Ziegler, 1992; Cooper et al., 1994; Dencker et al., 2009; Gimeno et al., 1997). Therefore, we hypothesize the following:

_Hypothesis 2a: Specific human capital of the founders will have a positive relationship with survival._

_Hypothesis 2b: General human capital of the founders will have a positive relationship with survival._

**MHR Practices**

In the second stage of our model, the initial human and financial capital of the firm influences its subsequent implementation of MHR practices. MHR practices differ from other types of HR practices because they are designed to direct the effort and persistence of employees’ actions by aligning their goals with those of the organization (Appelbaum, Bailey, Berg, & Kalleberg, 2000; Gardner, Wright, and Moynihan, 2011; Huselid, 1995; Subramony, 2009; Wright & Snell, 1991). MHR practices accomplish this through the use of incentives, such as stock options and bonuses, that reward individual performance that furthers organizational goals (Jiang, Lepak, Han, Hong, Kim, & Winkler, 2012; Lepak, Liao, Chung, & Harden, 2006); and by building organizational commitment through the distribution of attractive benefits, such as healthcare plans and flextime, that build a sense of reciprocity between the organization and the individual (Gerhart, 2007; Whitener, 2001). From a social exchange perspective (Blau, 1964), HR practices that demonstrate the organization’s support of their employees, such as MHR,
foster employees’ commitment to the organization (Kehoe & Wright, 2013; Tsui, Pearce, Porter, & Tripoli, 1997; Whitener, 2001), because these practices create an environment of reciprocity between the individual and the organization that motivates individuals to perform (Eisenberger, Fasolo, & Davis-LaMastro, 1990; Eisenberger, Huntington, Hutchison, & Sowa, 1986; Rousseau & McLean Parks, 1993).

Despite a number of research efforts, the exact number and nature of MHR practices has remained elusive, and many different typologies exist, which vary in part due to the suitability of certain HR practices for the strategy and environment of specific organizations (Gerhart, 2007). Our intent is not to debate which HR practices fall under what rubric; rather, as per recommendations in the literature (e.g., Gerhart, 2007), we focus on a set of motivational practices that are specifically relevant to the entrepreneurial context. These include performance contingent compensation practices that offer entrepreneurial firms a flexible way to motivate their employees. This flexibility is particularly important in the entrepreneurial context, because it allows firms to direct their resources strategically during the early years of the business. These practices also have the advantage of enhancing employee commitment by shaping climate perceptions based on reciprocity (Lepak et al, 2006; Levinson, 1965; Whitener, 2001), which is particularly important in the entrepreneurial context where retention of skilled employees proves challenging (Mayson & Barrett, 2006). Specifically, we examine bonus programs (e.g., Chung & Vickery, 1976; Lee, 1988; Yukl & Latham, 1975), employee stock options (e.g., Chingos & Engel, 1998; Lawler, Mohrman, & Ledford, 1995), flextime programs (e.g., Baltes, Briggs, Huff, Wright & Neuman, 1999; Combs et al., 2006), and healthcare plans (e.g., Bundorf, 2002). We deliberately chose MHR practices that vary in prevalence from common (e.g., flexible working
arrangements; SHRM, 2009) to relatively uncommon, (e.g., employee stock options; NCEO, 2014) and are relevant to the entrepreneurial context.

MHR practices contribute to firm survival when they strategically maximize resources. According to the literature on resource orchestration, firms first acquire resources, then develop processes to effectively leverage those resources (Sirmon, Hitt, Ireland & Gilbert, 2011). Examples of these types of orchestration can include knowing when and how to deploy and motivate employees in an organization. These processes can develop into organizational routines that allow a firm to respond and adapt to its environment (Argote & Greve, 2007). For example, Eisenhardt and Martin (2000) reported that the routines that organizations develop create a competitive edge when they are dynamic and allow organizations to respond to changing resource availability and environmental conditions. MHR practices are a standardized internal process that firms use to adapt to environmental conditions (Wright, Dunford & Snell, 2001).

Past empirical research has established that MHR practices impact firm-level turnover, operational outcomes, and financial performance (Combs et al., 2006; Jiang, Lepak, Hu, & Baer, 2012), but there is evidence that these effects are contingent on contextual factors (Batt & Colvin, 2011; Gardner et al., 2011; Gong, Law, Song & Xin, 2009; Shaw, Dineen, Fang & Vellella, 2009; Subramony, 2009).

We also note that time-based contextual factors may influence the survival value of MHR practices. In the formative years of a firm, HR practices can serve as a resource that contributes to the survival of the firm (He, 2008; Welbourne & Andrews, 1996). Because most research on pay for performance programs focuses on established firms (e.g., Dierdorff & Surface, 2008), how bonuses and employee stock options relate to new venture outcomes is largely unknown. However, these kinds of compensation are likely to be attractive to new ventures because they
allow owners to offer more compensation and share risk with employees (Graham, Murray, & Amuso, 2002). For instance, Hand (2008) found that entrepreneurial companies that provide stock options do so to retain key experts and incentivize preferred behaviors.

MHR practices may also support survival in new firms because the beneficial motivational effects of these practices allow team members to engage in more collaborative work, facilitating the development of exploratory ideas that improve performance (Kehoe & Collins, 2008). The use of bonus and stock option programs can provide incentives for employees to support each other, increase productivity, and reduce turnover, attracting and retaining talent in an organization (Collins & Smith, 2006; Datta, Guthrie, & Wright, 2005; Gelade & Ivery, 2003; Huselid, 1995). Similarly, flexible scheduling or flextime may improve survival through motivational mechanisms including increased perceived organizational support and employee motivation (Jiang, Lepak, Hu, et al., 2012; Muse & Wadsworth, 2012). In short, MHR practices serve as a tool to achieve effective competitive parity when the benefits of these programs in productivity exceed their costs. Therefore, we hypothesize:

_Hypothesis 3a: MHR practices will have a positive relationship with survival._

Although MHR practices are likely to positively impact firm survival, the age of a firm serves as a contextual factor that influences their value. The effective ability of a manager to realize competitive parity from resources has time-dependent contingencies based on the life-cycle of a firm (Sirmon et al., 2011) as well as a new firm’s ability to develop dynamic capabilities (Kotha et al., 2011). We posit that as firms grow and develop, their goals are likely to change (Dew, Read, Sarasvathy, & Wiltbank, 2008; Greve, 2008). These changes can be linked to two stages from the literature on life cycle effects in research orchestration: a viability stage and a growth stage. Because these goals change, the value of different organizational
practices change. In the start-up viability stage, firms must stay viable by accumulating resources to acquire legitimacy (Miller & Friesen, 1984; Webb, Tihanyi, Ireland, & Sirmon, 2009). To meet viability goals, a firm’s leaders focus on resource structuring behaviors, such as obtaining financing (Jawahar & McLaughlin, 2001). Using formal MHR programs in firms in the viability stage is likely an unnecessary leveraging of resources because the firms’ goals are not oriented toward developing the human resources available to the firm but in creating maximum flexibility for the firm, developing economies of scale, and creating inter-firm alliances that allow a firm to meet its initial financial goals (Jawhar & McLaughlin, 2001; Rutherford, Buller, & McMullen, 2003; Zahra, Filatotchev, & Wright, 2009). MHR practices are not likely to contribute to any of these factors; in fact, implementing these practices too early, when they do not confer an advantage to the firm in meeting its viability goals, can leverage resources away from needed activities, reducing a firm’s likelihood of survival. Therefore, we expect that MHR practices will have negative effects for firms in this stage.

As new firms transition out of the viability stage, they must acquire or develop enhanced skills to support and spur growth (Gilbert, McDougall & Audretsch, 2006; Lumpkin & Dess, 2001; Sirmon et al., 2011). Firms that have left the viability stage have entered the growth stage. Large-scale growth requires an entrepreneur or team of entrepreneurs to structure the organization with increasingly formalized procedures and a stronger managerial hierarchy in order to meet their goals and to gain legitimacy (Sirmon et al., 2011). In this stage, employment growth requires formalized training and retention strategies (Rutherford et al., 2003). Although not all firms seek to become high-growth firms nor do all firms exit the viability stage at the same moment, stage models of entrepreneurship imply that the transition from viability to growth stages occur at roughly the same time for firms (Zahra, Sapienza, & Davidsson, 2006).
MHR practices serve as a valuable tool that allows firms to provide resources to employees that can spur the growth of talent within the firm and retain that talent by offering them opportunities to share in the firm’s success. Therefore, MHR practices are more likely to provide an established, growing firm the ability to mobilize and leverage its human capital to create competitive parity (Sirmon et al., 2011), increasing survival. Therefore, we hypothesize the following:

*Hypothesis 3b: MHR practices will have a negative relationship with firm survival for firms in a viability stage and a positive relationship on survival for firms in a growth stage.*

**MHR Practices Partially Mediate the Effects of Initial Resources**

Above, we developed hypotheses for the time-dependent effects of MHR practices on firm survival as well as the effects of the initial financial and human capital of a firm’s founders on firm survival. We argue for a link between the initial resources of the firm and the implementation of the MHR practices. Specifically, MHR practices will partially mediate the effects of the firms’ initial capital resources on survival. To develop support for these hypotheses, we focus on the literature on organizational slack (Argote & Greve, 2007). Organizational slack refers to a cushion of actual or potential resources that allows an organization to adapt successfully to internal or external pressure for changes in organizational policy, as well as to initiate changes in strategy in response to the external environment (Bourgeois, 1981). For an organization to implement MHR practices, there must be organizational slack (George, 2005). One form of organizational slack invaluable to new ventures is the founders’ access to initial financial resources. Initial financial resources constitute organizational slack because they safeguard the firm against premature closure, allowing the firm to pursue innovation and
development (Greve, 2003; Nohria & Gulati, 1996; Singh, 1986). These resources also allow managers to develop routines and capacities that can help the firm to achieve its goals (Greve, 2008). We note that while we made differential predictions regarding the effects of initial financial resources on survival, we do not make such predictions regarding MHR. Instead, we note that access to resources, even resources with short-term payback horizons, grant a firm a resource base that grants slack it can use to develop and implement MHR practices. Ultimately, access to initial financial resources has a positive effect on the implementation of MHR practices, which partially mediate the effects of initial financial resources on firm survival. We focus on partial mediation because in addition to the effects of HR, other types of decision-making and policy implementations (i.e., resource allocation decisions, marketing decisions, budgeting planning, and strategic alliance formation) are also linked to firms’ initial resources and also likely to influence survival.

_Hypothesis 4a: Initial financial resources will have a positive effect on the implementation of MHR practices._

_Hypothesis 4b: MHR practices partially mediate the effects of initial financial resources on firm survival._

We also propose that MHR practices partially mediate the effects of human capital on firm survival for two reasons. First, firms with greater amounts of human capital will have access to greater depths of knowledge and experience that they can, in part, transform into organizational practices and policies that support effective performance (Dimov & Shepherd, 2005; Ployhart, Van Iddekinge, & MacKenzie, 2011) and subsequent survival (Pennings et al., 1998). These practices and policies include HR. Thus, the founders’ human capital is more general knowledge and experience that can
guide the effective implementation of HR systems and allow the organization to leverage its human capital more effectively (Wright et al., 2001). Second, the human capital of the leadership team can contribute to a new, young, or small firm’s survival and performance (Gimeno et al., 1997; Hitt et al., 2001; Pennings et al., 1998). One way that firms can leverage their initial human capital into more specific human capital and motivation for their employees is via the effective use of HR systems that partially transmit the efforts of the entrepreneurial founding team to attract and retain high-quality employees (Dimov & Shepherd, 2005; Kraaijenbrink et al., 2010). This relationship between the experience of the founders and the implementation of HR systems is consistent with previous research by Baron, Burton, and Hannan (1996) which found that firm founders tended to have a plan for the implementation of HR practices from the moment they founded their firms, but did not implement these plans until three or more years into the firm’s life. Although they did not formalize HR practices in the first two years, distinctions between firms in implementation of HR practices emerged as firms aged. Firms in industries where the human capital of the employees was more important, such as the high-tech sector, were more likely to place a high priority on offering attractive compensation and benefits packages to their employees. This suggests that the human capital of the firm at the time of its founding influences decisions that managers make about the implementation of MHR programs as the firm grows, and that employers use these practices to recruit talent. Much like the previous argument, we note that access to human capital provides slack resources to in part develop effective MHR practices that influence the firms’ development of competitive parity, leading to firm survival.
Hypothesis 5a: The founders’ human capital will have a positive effect on implementation of MHR practices, and this effect will increase over time.

Hypothesis 5b: Human resource practices partially mediate the effects of human capital on survival.

Taken together, our hypotheses suggest a moderated mediation model in which the effects of the initial resources of a firm manifest via the time-conditioned effects of MHR practices. More specifically, our first set of hypotheses point to the direct effects of initial resources on both the survival of the firm and the adoption of HR practices. Our second set of hypotheses focuses on the moderating effect of time on the relationship between MHR and survival as well as the mediating effect of MHR practices on the relationship between initial resources and firm survival. These hypotheses collectively suggest a second-stage mediated moderation model in which a firm’s initial resources have an indirect relationship with firm survival through the mediating relationship of MHR practices, which are conditioned on the age of the firm.

H6a: The relationship between initial financial resources and firm survival is moderated by time through the mediating effects of MHR practices, such that initial financial resources will have null effects on survival during the viability stage (via MHR practices), and a positive relationship with survival (via MHR practices) during the growth stage.

H6b: The relationship between initial founder human capital and firm survival is moderated by time through the mediating effects of MHR practices, such that initial founder human capital will have null effects on survival during the viability stage (via MHR practices), and a positive relationship with survival (via MHR practices) during the growth stage.
METHOD

Sample

We used the Kauffman Firm Survey (KFS) data for the period 2004-2010. The KFS is a panel study of new ventures in the United States that began operations in 2004. The survey collected data from 4,928 firms in 2004 and has followed those firms on an annual basis. One of the benefits of the KFS data is that even firms that failed relatively quickly were still included in the sample, reducing selection and survival biases. This data set includes detailed information on the firm and up to ten owners including firm level information such as net income and number of employees. Information on the owners includes items such as gender, race, education, and work experience. Because the development of innovative knowledge often relies on the development of human capital (Anand, Gardner, & Morris, 2007), we focused on firms with a basis in the knowledge economy. Thus, we selected two industry codes: information (i.e. publishing, software, telecom; IC=51); and professional, scientific, and technical services (IC=54). We excluded firms that did not report necessary information on the study variables as well as firms that had zero employees. The final sample included 1,100 firms with 6,961 observations over seven years. We include more detailed information about changes in the firms over time and their access to financial resources in Supplemental Tables 1 and 2.

Measures

Survival. Survival is a dichotomous outcome and was coded as a “1” for each year the firm actively maintained operations and with a “0” if the firm suspended operations or closed permanently. By Year 6, approximately one-third of firms had left the sample due to firm exit.3

Initial Financial Capital. Owners were asked whether or not they obtained or used the following sources of financing for their new business: business credit card, business bank loan,
personal credit card, personal loans from a bank, or personal loans from friends and family (0 = no, 1 = yes). Owners were also asked to report the number of business credit cards that were used to finance the operation of the business in the previous year. This variable was collected only at Time 0.

**Human capital.** We used two indicators of each form of human capital. To model specific, venture-related human capital, we calculated the average number of businesses the founding team had previously started and the average number of years the founding team had worked in the industry. These are typical variables used to model specific human capital and consistent with past literature (Unger, Rauch, Frese, & Rosenbusch, 2011). To model general human capital, we examined the total number of founding members of the organization as well as the average years of education for the founding team. These variables were all collected at Time 0.

**MHR Practices.** From the selection of HR practices included in the KFS, we focused on four practices that met the following criteria: (1) they had been cited in past literature as practices that helped organizations attract and retain talent, (2) they were practices that were feasible for a new venture with limited resources to implement, and (3) they were practices that had a reasonable frequency of use in the sample of organizations we focused on from the Kaufmann Foundation Survey. Four HR practices met these criteria: the use of a flextime program, the use of an employee stock option program, a bonus plan program, and a health insurance plan through the firm or an association. To operationalize this, owners were asked each year whether they offered each of the following for their full-time employees: a flextime program; an employee stock option program; a bonus plan program; or a health insurance plan through either the business or an association. Answers were coded 0 = no or 1 = yes. To determine the net effects
of the use of these HR practices, we then created a composite sum of the practices. Reliability of this measure was high (KR-20 = .82), indicating that firms in this sample tended to use these HR practices together. This variable was measured every year, from Time 0 to Time 6. Other HR practices were also measured in these data but were not included in our construct of MHR. These included employees being provided paid sick leave, employees being provided paid vacation, employees being provided tuition reimbursement, and employees being offered a retirement plan. We did not include these items in our measure because of their low frequency (i.e., tuition reimbursement, retirement plans were used by less than 1% of firms in our sample) or because we did not perceive them as germane to the construct of interest (i.e., paid sick leave and vacation).

**Time and Firm Stage.** The data was collected from the KFS cohort, meaning that we operationalized time for each firm as the year (0 = 2004) that data from each time period was collected. Based on Sirmon et al.’s (2011) theory of resource orchestration and the role of RBV in stage and life cycle effects (Barney, Ketchen & Wright, 2011), we identified the viability and growth stages at one year after firm formation and five years after formation, respectively. These times conform to one standard deviation below (one year after firm formation) and above (five years after firm formation) the mid-point of time (three years after firm formation) in our sample. We then analyzed our stage effects by using multilevel moderator analysis as recommended for MDEHA (Singer & Willet, 1993; Skrondal & Habe-Hesketh, 2004).

**Controls.** In our models, we controlled for the effects of race (operationalized as the percentage of individuals on the ownership team who are not white, measured at Time 0) and gender (operationalized as the percentage of individuals on the ownership team who are female and measured at Time 0) because past research on entrepreneurship has shown that these
variables are related to firm outcomes (Cooper et al., 1994; Klapper & Parker, 2011). Firms in the study came from two NAICS industries, so we also controlled for industry, measured at Time 0. We also controlled for the number of employees (both the main effect and the squared terms) because past research has indicated the firm size in terms of the number of employees affects survival (Cooper et al., 1994) and may in fact have non-linear effects on that survival (Evans, 1987; Hall, 1987). We also controlled for the dollar amount of profit. Both profit and employees were measures each year from Time 0 to Time 6. As an additional note, we also ran our models controlling for the effects of the other HR practiced used in these firms. These practices included paid sick leave and vacation, retirement programs, and tuition reimbursement. We found these practices had no relationship to survival and did not relate to the other HR practices in the model, and that most had an extremely low base rate. Therefore, we did not include them in our final analyses.

Analysis

The longitudinal nature of the data and the decision to remain in operation are interdependent, because they are linked to both the current and past state of a venture. To address this interdependence, we analyzed the data with multilevel discrete-time event history analysis (MDEHA; Barber, Murphy, Axinn & Maples, 2000; Steele, Kallis, & Goldstein, 2005). The main difference between MDEHA and more common event history analysis or hazard analysis is that MDEHA allows for and takes into account the nesting created when there are multiple occurrences of an event of interest. This is important in the current work because when repeated events or decisions occur, estimates may be biased if the multilevel (i.e., nested) nature of the data is not taken into account (Steele et al., 2005). Additional benefits of MDEHA are that it accounts for non-independence among higher-level (between-firm) predictor variables and
because it is a type of multilevel logistic regression, normally distributed outcomes and error terms are not required (Singer & Willet, 1993; Skrondal & Rabe-Hesketh, 2004). This methodology has been used to study multilevel predictors across a wide range of binary outcomes, including completing college, marriages and divorces, declaring bankruptcy, and contraceptive use (see Barber et al., 2000). Ultimately, MDEHA models are ideal to test whether effects are due to differences between firms or within-firm changes over time.

To test our mediation hypotheses, we used Tofighi and MacKinnon’s (2011) R Mediation program to calculate asymmetric 95% confidence intervals with the distribution of products of coefficients method (PRODCLIN). PRODCLIN allows for the calculation of indirect effects of mediation at different levels of a moderator effect (MacKinnon, Lockwood, Hoffman, West, & Sheets, 2002; MacKinnon, Lockwood, & Williams, 2004). In this case, the indirect effect is how time moderated HR practices influence firm survival. In order to calculate the effect of MHR practices on survival at different stages for a firm, we estimated the effect of MHR practices for firms in a viability stage after approximately one year (one standard deviation below the mean) and for the growth stage at year five (one standard deviation above the mean).

RESULTS

Table 1 displays the zero-order correlation matrix for each variable at Time 0, which was the point of founding for all of the firms in this study. Table 2 provides estimates of whether the effects of the study variables on survival change over time. For each variable, two models are presented. The first model is a static model and speaks to the likelihood of survival: positive $\beta$ values indicate greater survival likelihood while negative values indicate increased likelihood of failure. The second model includes the interaction between the variable and time on survival. If
the interaction term and deviance statistic are statistically significant, then the relationship between the variable and survival changes over time.

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Insert Tables 1 and 2 about here
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**Effect of Initial Firm Resources on Survival (H1 and H2)**

The results for Hypotheses 1 and 2 are found in Table 3, Model 1. Hypothesis 1a states that the access to vetted financial resources with a long payback horizon (personal bank loans and business bank loans) will have a positive effect on survival. We found that while the use of business bank loans had a positive effect on survival ($\beta = .74, p < .05$), the use of personal bank loans did not ($\beta = -.12, ns$). This provides partial support for Hypothesis 1a. Hypothesis 1b states that access to vetted financial resources with short payback horizons (personal credit cards and number of business credit cards) will have a negative effect on firm survival. Results show that the use of personal credit cards was not significant ($\beta = -.06, ns$), whereas access to business credit cards was significant but in the opposite direction of the hypothesis ($\beta = .24, p < .05$). Therefore, Hypothesis 1b was not supported. Finally, Hypothesis 1c states that access to unvetted, long-horizon financial resources (i.e., personal loans) will be negatively related to survival and we found this to be the case ($\beta = -.37, p < .05$). In summary, Hypothesis 1 is partially supported, and these variables have a statistically significant effect on survival over and above the controls, human capital, and MHR variables in our model ($\Delta R^2 = .08; p < .05$).

Hypothesis 2a states that specific human capital will increase the likelihood of firm survival. We found that neither industry experience ($\beta = .00, ns$) nor startup experience ($\beta = .02, ns$) improved firm survival. Hypothesis 2b states that general human capital will have a positive
relationship with survival. We found that having more owners ($\beta = .10, p < .05$), and having owners with more education ($\beta = .18, p < .05$) increased the likelihood of survival, thus supporting H2b. We also ran tests to determine if the direct effect of these variables changed over time. Table 2 shows that the effect of education on survival increases over time. As such, in further analyses, we controlled for the interactive effect of education and time. In summary, Hypothesis 2 is partially supported, and these variables have a statistically significant effect on survival over and above the controls, human capital, and MHR variables in our model ($\Delta R^2 = .03; p < .05$).

Changing Effects of Human Resource Practices over Time (H3)

Hypothesis 3a states MHR practices will have a positive relationship with firm survival. Results are presented in Table 3, Model 3. Supporting H3a, we found that MHR has a positive, direct effect on survival ($\beta = .29, p < .05$), indicating that the use of these practices increases the likelihood of survival. Hypothesis 3b states that time will moderate the relationship of MHR practices with firm survival such that MHR practices will have a negative relationship with firm survival for firms in a viability stage and positive effect on survival for firms in a growth stage. Results in Table 3, Model 4 show that the interaction between MHR practices and time also has a statistically significant relationship with survival ($\beta = .38; \Delta R^2 = .02; p < .05$). Figure 2 displays the interaction and shows that while MHR practices had a negative relationship with firm survival when firms were in viability stage ($\beta = -.51, p < .05$), they had a positive relationship
with firm survival when firms were in a growth stage ($\beta = .25, p < .05$). Given these results, H3 is fully supported.

\[ \text{------------} \]

Insert Figure 2 about here

\[ \text{------------} \]

The Mediating Effects MHR between Firm Resources and Firm Survival (H4 and H5)

Hypothesis 4a states that initial financial resources will have a relationship with MHR practices. Results are in Table 3, Model 2. We found that personal bank loans ($\beta = .18, p < .05$), other personal loans ($\beta = .18, p < .05$), and the number of business credit cards ($\beta = .09, p < .05$) all have statistically significant relationships with MHR practices. However, personal credit cards ($\beta = -.02, ns$) and business bank loans ($\beta = .06, ns$) do not. Given these results, H4a is partially supported.

\[ \text{------------} \]

Insert Table 4 about here

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Hypothesis 4b states that HR practices mediate the effects of initial financial resources on firm survival. To test this, we calculated the indirect effect (defined as $\alpha\beta$) for each initial capital variable for firms in the viability stage and in the growth stage. Once these values were assessed, we used the PRODCLIN program (Tofighi & MacKinnon, 2011) to bootstrap the confidence intervals for the indirect effect. Results are presented in Table 4. In the viability stage, personal credit cards ($\alpha\beta = .01, ns$) did not have a statistically significant indirect effect, but personal bank loans ($\alpha\beta = -.10, p < .05$), the number of business credit cards ($\alpha\beta = -.04, p < .05$), and business
bank loans did \( \alpha \beta = -.03, p < .05 \). Similarly, in the growth stage, personal credit cards \( \alpha \beta = -.01, ns \) did not have a statistically significant indirect effect, but personal bank loans \( \alpha \beta = .05, p < .05 \), the number of business credit cards \( \alpha \beta = .02, p < .05 \), and business bank loans did \( \alpha \beta = .02, p < .05 \). These results suggest that many of these resources have a small but negative indirect effect on firm survival if firms invest in MHR practices too early. Given these results, H4b is partially supported.

Hypothesis 5a states that initial human capital is related to MHR practices. Results are in Table 3, Model 2. Results show that the number of owners \( \beta = .30, p < .05 \) and owners’ mean education \( \beta = .07, p < .05 \) are related to MHR practices; however, industry experience \( \beta = -.00, ns \), and startup experience \( \beta = .02, ns \) are not. Given these results, H5a is partially supported.

Hypothesis 5b states that MHR practices mediate the effects of human capital on firm survival. Results are in Table 4. In the viability stage, the number of owners \( \alpha \beta = -.15, p < .05 \) and owners’ education \( \alpha \beta = -.04, p < .05 \) have statistically significant indirect effects, but industry experience \( \alpha \beta = .00, ns \) and startup experience \( \alpha \beta = -.01, ns \) do not. Similarly, in the growth stage, the number of owners \( \alpha \beta = .08, p < .05 \) and owners’ education \( \alpha \beta = .02, p < .05 \) have statistically significant indirect effects, but industry experience \( \alpha \beta = .00, ns \) and startup experience \( \alpha \beta = .01, ns \) do not. We find partial support for H5b.

**Conditional Indirect Effects (H6)**

Hypothesis 6a states that there will be a relationship between initial financial resources and firm survival such that the indirect effect will be null in the viability stage and positive in the growth stage. Results show that these relationships differed significantly\(^4\) for personal bank loans \( d = .15, p < .05 \), personal loans \( d = .15, p < .05 \), business credit cards \( d = .09, p < .05 \), and
the number of credit cards ($d = .06, p < .05$), and business bank loans ($d = .05, p < .05$), but not for personal credit cards ($d = .02, ns$). This hypothesis is partially supported.

Hypothesis 6b states that there will be a relationship between initial financial resources and firm survival such that the indirect effect will be null in the viability stage and positive in the growth stage. Results show that these relationships differed significantly for the number of owners ($d = .22, p < .05$) and owners’ education ($d = .06, p < .05$) but not for industry experience ($d = .00, ns$) or for startup experience ($d = .02, ns$). In all, Hypothesis 6 is partially supported.

**Summary of Results.** In general, we found partial support for our hypotheses that initial human and financial capital had effects on firm survival. We found full support for our hypothesis that MHR practices have a direct, positive effect on firm survival conditioned by time. Finally, we found partial support for our hypotheses that MHR practices mediate the effect of initial financial and human capital on firm survival. In this regard, we found a unique pattern of results, which showed that the indirect relationship of financial resources can change because the effect of MHR practices changes over time. Specifically, we found that personal financial resources can have positive effects on firm survival. Conversely, we found that business-related financial resources have negative effects on firm survival when firms invest in MHR practices too early. Overall, these results provide support for the model in Figure 1.

**DISCUSSION**

We examined the relationship of firm resources with firm survival, how that relationship changes over time, and how the use of MHR practices by firms can partially explain the relationship between survival and a firm’s initial human and financial capital. By focusing on the RBV, we developed a model to describe how different forms of firm capital relate to survival over time. Using multilevel discrete-time event history analysis, we fully or partially supported
all our hypotheses. Access to financial resources with longer payback horizon generally had a positive effect on firm survival, while financial resources with shorter horizons or that came from unsanctioned sources (i.e. personal loans) were negatively related to survival. We also found that initial human capital of the founding team also positively influenced survival. Although MHR practices had an overall positive relationship with survival, this relationship changed over time such that MHR practices were negatively related to survival when firms were newer and positively related to survival once they were more established. Finally, we found that MHR practices partially mediated the relationship between initial firm capital and firm survival, or that access to initial capital in resources is related to use of MHR practices, which in turn relate to firm survival.

**Implications for Research**

The present research contributes to our understanding of the role of HR in new ventures, advances the field’s ability to analyze firm data over time, and integrates existing theories to explain nascent firm survival. First, the demonstration of the importance of MHR practices to new firm survival provides new information about how entrepreneurs’ decisions about resource allocation in the early years of the firm’s life relate to survival. Past research has noted that the possession of valuable, rare, inimitable, and non-substitutable resources is not sufficient to generate competitive advantage or even parity (Makadok, 2001; Peteraf & Barney, 2003; Powell, 2003); rather, it is the ability to develop these resources or use them effectively that can influence outcomes (Foss, Foss, Klein, & Klein, 2007; Foss, Klein, Kor, & Mahoney, 2008; Foss & Knudsen, 2003; Mahoney, 1995; Teece, 2007). Our results integrate an understanding of when and how the initial financial resources of the firm help ensure survival. This process model of
how a firm’s initial resources lead to decisions that influence survival addresses one of the key shortcomings of the RBV regarding how a firm’s resources influence outcomes.

Second, the use of a large, longitudinal dataset allowed us to demonstrate that the benefits of implementing MHR practices are time dependent, becoming more important to survival as firms mature. Our study offers a typology of resources, differentiating between forms of capital, which have static, time-stable effects (i.e., initial financial and human capital) and those which have dynamic effects that change over time (i.e., MHR practices). Given these results, our study supports a dynamic, changing model of survival over time.

Third, we applied MDEHA to the question of firm survival in order to account for the nesting created when there are multiple occurrences of an event of interest. This approach is more appropriate for the entrepreneurial context than previously used techniques such as common event history or hazard analysis because it allowed us to identify both within- and between-firm effects. This technique has the potential for a number of applications in entrepreneurial research such as repeated acquisition decisions of a firm over time or investigating founder tenure, dismissals, and succession.

Finally, we addressed some gaps in the RBV literature to explain the joint effects of resource availability and managerial decision-making on nascent firm survival. Past research has documented the RBV’s inability to explain how firms behave in unpredictable environments (Barney, 2002; Kraaijenbrink et al., 2010) and the difficulties of creating sustainable competitive advantage or parity in a dynamic market environment using static resources or combinations of resources (D’Aveni, 1994; Eisenhardt & Martin, 2000; Fiol, 2001). Our study’s context is entrepreneurial firms, widely regarded as a chaotic and unpredictable environment. However, we demonstrated support for the RBV by showing how RBV-defined resources influence firm
outcomes in a dynamic, unstable environment. By testing RBV-derived hypotheses in a longitudinal dataset, we were able to mitigate some of these problems and address how different types of resources impact a firm’s competitive advantage or parity (Barney & Clark, 2007; Eisenhardt & Martin, 2000; Makadok, 2001; Winter, 2003).

This integration also speaks to the degree to which entrepreneurs can make choices that influence the survival of a firm, such as choices regarding how to provide the initial financing for a new venture as well as how to make choices regarding HR practices over time. Prior research has shown that while a firm’s short-term performance is largely determined by industry-level variance, a firm’s durability and longevity are more likely influenced by firm-level factors (Short et al., 2007). Therefore, our results also contribute to the literature on strategic choices and organizational ecology (e.g., Hrebiniak & Joyce, 1985). To the extent that MHR practices are products of managerial decisions, our results suggest that these decisions influence firm survival.

Implications for Practitioners

Our study offers multiple insights for practitioners. A variety of perspectives exist regarding firm characteristics and survival. The RBV perspective stresses the role of resources on a firm’s survival, and the resource orchestration perspective complements this idea by asserting that when and how resources are used is equally important. Our results suggest that the when and how of resource use matters, so both perspectives have merits. Specifically, owners of entrepreneurial ventures should focus their attention not only on what resources are available to them, but also on how to deploy and use those resources over time.

Another insight is that firms are sensitive to their initial financial resources, and that these initial resources influence outcomes because they relate to subsequent choices. In particular, financial capital had consistent, strong relationships to the use of MHR practices. This can serve
as a double-edged sword: access to financial resources may encourage firms to use MHR practices, but \textit{when} these practices are used matters. The use of certain financial resources compared to others does not doom a firm to a path-dependent future regarding survival; rather, entrepreneurs can make strategic decisions that can help the growth of their organization and promote survival. Our results showed a unique pattern of relationships such that risky financial resources (unvetted and short-horizon payback sources) have a generally negative effect on survival. However, these resources can also have positive effects if firms use them to invest in policies and procedures positively linked to survival (such as MHR). This finding implies that these risky resources have moderators that can link them to both positive and negative processes that contribute to firm survival. These considerations are important from a practical perspective because they answer questions about how firm leaders should invest their resources in policies and procedures, but it also has implications for the RBV about resources that can potentially have both positive and negative effects on firm outcomes.

Founders of new ventures should also take into account the human capital of their founding team. Although having a larger, more educated team increased the likelihood of survival for these firms, the general and specific experience of the founding team appeared to have little impact on the firm’s survival or its development of HR practices. The founding team’s experience and knowledge may be less likely to influence firm survival but more likely to influence outcomes such as growth or performance (Hitt et al., 2001). Similarly, human capital may modify the effectiveness of other firm characteristics (Dencker et al., 2009; Hitt et al., 2001). In this sense, combining the RBV with the results of this study may provide a useful conceptual framework to think about the differential ways in which specific and general human capital influence firm outcomes. Our model suggests that general human capital mattered more to these
processes and outcomes than specific human capital; however, specific human capital, such as relevant experience, likely influences other processes and outcomes. Firms can also take into account not only the “what” but the “when” of implementing MHR practices. Our results suggest that allocating resources to developing effective MHR before it is necessary can negatively affect survival; however, allocation of resources to MHR later can confer a significant survival advantage. A post-hoc analysis of our results shows that the indirect effects of human capital and financial resources on survival increase over time, meaning that these initial resources of a firm can continue to impact and influence a firm for a number of years after its initial founding. More detailed information on this point can be obtained by contacting the first author.

Some hypotheses received mixed support. For example, we found only limited support for our hypotheses regarding financial resources with MHR and firm survival. This may be due to the relative granularity of the measures of financial resources. However, these types of resources are volatile and risky, meaning that contextual factors for the firm, such as regional munificence, opportunity quality, industry-level characteristics, or firms’ decisions about how to use these financial resources have powerful moderating influences on their relationship to outcomes. Future research on the RBV could highlight how these contextual factors influence when and how firms make use of their resources (Wu, 2010; Zahra, Hayton, & Salvato, 2004).

Limitations and Future Directions for Research

Our results should be viewed in light of their limitations. First, the frequency of data collection for these firms was only once per year, limiting the sensitivity from the exact point of failure to the year of firm failure. Were firms to report on the exact date of their survival decision or the implementation of MHR practices, we could develop more precise empirical estimates. Second, in regards to the new ventures’ initial financial resources, firms only reported on
whether or not they had used the particular resources, as opposed to the amount of each type of resource used. This imprecision in the data limits our ability to draw conclusions about how the amount of funding from different sources might influence survival or the adoption of MHR practices. Future research could study how the relative amount of financing obtained from personal resources as opposed to financial resources directly tied to the business may influence performance. Future research could also focus on whether interactions between human and financial capital might predict outcomes such as survival or performance. Based on a recommendation from an anonymous reviewer, we tested for such possibilities in our data but found no consistent results. Third, we focused on industries located within the knowledge economy. Future research may wish to determine if these results replicate in more traditional 20th century industries where financial resources or HR practices may play a different role.

As with many studies in the entrepreneurial literature, endogeneity may be influencing results. An underlying factor, such as quality of opportunity, may be influencing access to capital, resources available to implement MHR practices and subsequent survival. We have taken several precautions against this issue by controlling for firm size and profit in our analyses, and by using a dataset in which there should be minimal selection bias, reducing our concerns that endogeneity may be influencing our results. In addition, we have modeled the effects of MHR implementation on survival, but we have not addressed how these relate to other performance outcomes such as firm revenue or profit. Future research that involves data collection beyond the growth stage should study the effects of MHR implementation of a broader range of firm performance outcomes. Another limitation in our study is the relative granularity of our human capital variables. We do not directly assess the specific resources that characteristics such as the number of founders afford a firm, so there are multiple explanations of how these factors can add
strategic resources for a firm. For example, a larger group of founding members with more education or experience may afford new ventures more powerful social networks that allow them to gather resources. Future research can and should determine the degree to which factors like social networks of founders mediate or moderate the resource-survival relationships observed in this study. In addition, time may also moderate the relationship of different resources with different types of financial decisions or different uses of resources.

Other limitations in this study have to do with time and longitudinal analysis. Our theory and results suggest that MHR drives survival, and our measurement of MHR in this sample cohort of firms temporally precedes survival. However, temporal precedence is only one way to establish causality, and some might argue that survival is what enables a firm to enact effective MHR. This line of argument assumes that survival leads firms to acquire resources (e.g., revenue, profit, staff) that they can use to create and develop effective HR programs and policies. The analyses in this paper control for these effects, showing that even after controlling for the potential increases in resources (profit and staff), the relationship between MHR and survival holds. In addition, we note that this question of causality as it relates to survival is a difficult issue to address empirically because non-survival means firms leave a sample, meaning that one cannot examine data over multiple time periods and use cross-lagged analysis to test the direction of causality in the way same that one might be able to do this kind of analysis for employee attitudes and business unit performance (e.g., Harter, Schmidt, Asplund, Killham, & Agrawal, 2010). In addition, our analysis of the effects of MHR at different stages in the firms’ life cycle assumed that all firms were in the same stage at approximately the same time, which is an imprecision common to research on life cycle effects in entrepreneurship (Phelps, Adams & Bessant, 2007). The difficulty of longitudinal analysis and causal direction both for survival and
for HRM practices warrants future research and innovative research designs that can tease out these complexities.

A final concern is that the present research considers a limited scope of MHR practices and does not consider issues such as the level of the compensation package as a whole. Future research could investigate not only the effects of base pay, but also the effects of the level of each of the components of the compensation package. Does the value of MHR practices on survival differ if firms offer cursory or poorly implemented MHR practices? Another avenue for future research would be to expand the model to include other HR practices such as recruiting, performance appraisal, training, and employee development. Investigating the role that each of these practices has in entrepreneurial firms over time may reveal useful information to entrepreneurs as they consider how to implement MHR practices. As with the MHR practices included in this study, other practices are likely to become more important over time as relatively flat ventures grow and develop. Finally, while we make arguments regarding why HR practices should influence firm survival (i.e., the ability to attract and retain human capital), we do not directly model these intermediary processes. For example, MHR practices may have positive effects on employee growth, leading to firm survival.

Conclusion

MHR practices matter to firm survival. As firms age, these practices appear to play an increasingly important role in survival. In addition, they serve as a mechanism to describe how the initial resources of a new venture determine its strategic decision-making process. Our results have theoretical and practical implications for research in entrepreneurship as well as more generally in strategic management. Our study provides benefits in understanding how a new venture’s survival is not a static state of survival but a dynamic process that unfolds over time.
REFERENCES


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FOOTNOTES

1. In this study, we focus on human capital possessed by the owners and not the acquired KSAs of the workers. In this way, we differ from other human capital models (e.g., Jiang, Lepak, Hu, et al., 2012; Ployhart et al., 2011) that have proposed that employee human capital mediates the relation between strategic HR practices and firm level outcomes. Our interest is how the initial human capital of a firm’s founding team influences a firm’s adoption of HR practices, as opposed to how HR practices generate human capital from the employees of the firm (Jiang, Lepak, Hu, et al., 2012; Chuang & Liao, 2010; Gelade & Ivery, 2003).

2. Detailed information about the KFS can be found at:


3. Firms that left the sample because they were acquired or sold were not included in the final sample because they may represent a lack of survival that is not indicative of sub-par or ineffective use of initial firm resources or organizational capital. In addition, some firms took “temporary breaks” in which they temporarily discontinued operations and then re-started operations. These firms were included in the sample. Our correlation table shows a mean value of .85 for survival because many firms survived several years before failing.

4. The $d$ value refers to the difference between the conditional indirect effects (Edwards & Lambert, 2007; Tepper, Henle, Lambert, Giacalone, & Duffy, 2008).
Table 1

Correlation Matrix

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<td>2. Pers. Credit Card</td>
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<td>3. Personal Bank Loan</td>
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<td>5. Business Credit Cards</td>
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<td>6. Business Bank Loans</td>
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<td>7. Number of Owners</td>
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<td>8. Education</td>
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<td>9. Industry Experience</td>
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</table>

Notes: N = 1,100 firms with 6,961 observations. Correlations with a magnitude greater than .03 are statistically significant at the p <.05 level. <sup>a</sup>This refers to the percentage of owners that are non-white or female, respectively. NAICS Code refers to the North American industry code. For the NAICS variable, IC 51 was coded as “0” and IC 54 was coded as “1”. Table 1 reports on the descriptive statistics and correlation between all of the variables measured at Time 0 with survival in the final time period (after seven years).
Table 2
Time-Dependent Survival Effects for Variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>Model 1 (Static Model)</th>
<th>Model 2 (Time-Dependency)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Intercept</td>
<td>β</td>
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<td>Controls</td>
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<tr>
<td>Gender</td>
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<td>.15**</td>
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<tr>
<td>Other Personal Loans</td>
<td>1.81**</td>
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<td></td>
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<tr>
<td>Number of Owners</td>
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<tr>
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<td>Startup Experience</td>
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<td>HR Practices</td>
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<tr>
<td>MHR</td>
<td>2.89**</td>
<td>2.66**</td>
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</table>

* p < .05.
** p < .01.
Notes: N = 1,100 firms with 6,961 observations. Values in table are log odds ratios. This table provides information about variables change in their effect on survival over time. In Model 1, the effect of each variable does not change over time; in Model 2, each variable can change its effect over time. A statistically significant interaction implies that the effect of this variable on survival changes over time. Intercept = Model Intercept. Interaction refers to the interaction between the variable listed and the time variable. Deviance = comparison of the log-likelihood ratio of the two models, whereby a significant value indicates the model with the interaction term is a better fit to the data than a static model that does not take into account the variable’s interaction with time.
## Table 3
The Effect of Financial and Human Capital and MHR on Survival

<table>
<thead>
<tr>
<th>Model 1</th>
<th>Model 2</th>
<th>Model 3</th>
<th>Model 4</th>
</tr>
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<tbody>
<tr>
<td><strong>DV: Survival</strong></td>
<td><strong>DV: MHR</strong></td>
<td><strong>DV: Survival</strong></td>
<td><strong>DV: Survival</strong></td>
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<tr>
<td><strong>Exp(β)</strong></td>
<td><strong>Exp(β)</strong></td>
<td><strong>Exp(β)</strong></td>
<td><strong>Exp(β)</strong></td>
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<td><strong>Level 2</strong></td>
<td><strong>Level 2</strong></td>
<td><strong>Level 2</strong></td>
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<td>-.34**</td>
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<td>-.26*</td>
</tr>
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<td>.18*</td>
<td>-.33**</td>
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<td>.24**</td>
<td>.09*</td>
<td>.25**</td>
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<td>.07*</td>
<td>.18*</td>
</tr>
<tr>
<td>Industry Experience</td>
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<td>.00</td>
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<tr>
<td>Startup Experience</td>
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<td>.01</td>
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<td><strong>Level 1</strong></td>
<td><strong>Level 1</strong></td>
<td><strong>Level 1</strong></td>
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<td>Employees²</td>
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<td>.26**</td>
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<tr>
<td>Profit</td>
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<td>.12**</td>
<td>.42**</td>
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<tr>
<td>MHR</td>
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<td>.38*</td>
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<td><strong>Interaction</strong></td>
<td><strong>Interaction</strong></td>
<td><strong>Interaction</strong></td>
</tr>
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<td>MHR x Time</td>
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<td>.04*</td>
<td>.04*</td>
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<tr>
<td>Owner Education x Time</td>
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<td>.29**</td>
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</table>

* p < .05
** p < .01

Notes: N = 1,100 firms with 6,961 observations. Values are log-odds ratios. AIC = Akaike Information Criterion. This table provides models that test the main effects and one interaction effect for our study variables on survival. Model 2 provides the test of the initial capital variables, while Models 3 and 4 provide estimates of the main and interactive effects of MHR on survival.
TABLE 4.
Conditional Indirect Effect of Financial and Human Capital via MHR Practices

<table>
<thead>
<tr>
<th>Variable</th>
<th>Capital $\rightarrow$ MHR</th>
<th>MHR $\rightarrow$ Survival (-1SD/+1SD of Time)</th>
<th>Indirect Effect</th>
<th>95% CI</th>
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<td></td>
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<td>[-.02, .01]</td>
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<tr>
<td>Personal Bank Loan</td>
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<td>-.10*</td>
<td>[-.12, -.08]</td>
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<td></td>
<td></td>
<td>.25*</td>
<td>.05*</td>
<td>[.03, .07]</td>
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<tr>
<td>Personal Loans</td>
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<td>-.51*</td>
<td>-.10*</td>
<td>[-.12, -.08]</td>
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<td>.05*</td>
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<td>-.04*</td>
<td>[-.06, -.02]</td>
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<td>.25*</td>
<td>.02*</td>
<td>[.01, .03]</td>
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<tr>
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<td>-.51*</td>
<td>-.03*</td>
<td>[-.06, .00]</td>
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<tr>
<td>Number of Owners</td>
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<td>[.05, .10]</td>
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<tr>
<td>Owners’ Education</td>
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<td>-.51*</td>
<td>-.04*</td>
<td>[-.06, -.02]</td>
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<td>.25*</td>
<td>.02*</td>
<td>[.01, .03]</td>
</tr>
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<td>.00</td>
<td>[-.03, .03]</td>
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<td>.00</td>
<td>[-.03, .03]</td>
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<tr>
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<td>[-.04, .02]</td>
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<td></td>
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<td>.01</td>
<td>[-.01, .02]</td>
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</tbody>
</table>

* $p < .05$

Notes: This table provides estimates of the indirect effect for the initial human and financial capital variables at differing points in time via MHR practices. These indirect effects via MHR change at different points in time because the effect of MHR practices on survival change over time. The third column presents the changing effect of MHR practices over time, with the first line of third column showing the estimate of the effect of MHR practices for firms in a viability stage (-1SD of the time variable) and the second line showing the estimate of the effect of MHR practices on firm survival for firms in a growth stage (+1SD of the time variable).
Figure 1
The Effects of Firm Capital and MHR Practices on Firm Survival

**Initial Financial Resources:**
- Personal Credit Card
- Personal Bank Loans
- Other Personal Loans
- Business Credit Cards
- Business Bank Loan

**Motivation-Enhancing HR Practices:**
- Bonus Programs
- Stock Options
- Healthcare Plans
- Flex Time

**Human Capital:**
- Number of Owner-Operators
- Owners’ Education
- Industry Experience
- Startup Experience

**Time**

H1 a (+), b (-), c (-)
H4 a (+), b (+)
H5 a (+), b (+)
H2 a (+), b (+)
H3a (+)
H3b (+)
Figure 2

The Effect of MHR Practices on Survival over Time

![Graph showing the effect of MHR practices on survival over time. The graph compares low MHR and high MHR, with viability stage and growth stage shown.]
Supplemental Table 1

Percentage of Firms with Access to Each Financial Resource Type

<table>
<thead>
<tr>
<th>Initial Financial Resources</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Personal Credit Cards</td>
<td>47%</td>
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<td>Personal Bank Loan</td>
<td>9%</td>
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<tr>
<td>Other Personal Loans</td>
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<tr>
<td>Business Credit Card</td>
<td>31%</td>
</tr>
<tr>
<td>Business Bank Loan</td>
<td>4%</td>
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</table>
Supplemental Table 2

Firm Survival, Use of MHR, Median Firm Size, and Change in Firm Size over Time

<table>
<thead>
<tr>
<th>Year of Study</th>
<th>Number of Firms that survived through end of year</th>
<th>Average number of MHR Practices in Use</th>
<th>Median Firm Size</th>
<th>Change in Median Firm Size</th>
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</thead>
<tbody>
<tr>
<td>0</td>
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</table>

Firm Size refers to number of full-time employees.