2018

Effective Strategies for Venture Capital Evaluations of Organizations' Drug Development Capabilities

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This is to certify that the doctoral study by

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MBA, Australian Institute of Business Administration, 2010

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Doctoral Study Submitted in Partial Fulfillment

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Abstract

Undercapitalization is a major impediment for the growth and survival of Canadian life sciences firms. Proficient management teams are the "*sine qua non"* criteria in the venture capital decision-making processes. The purpose of this multicase study was to explore strategies successful venture capitalists use to improve their evaluation processes of life sciences management teams' drug development capabilities. The conceptual framework for this study was based on business process management. The purposeful sample consisted of 10 venture capitalists located in the United States and Canada who had expertise evaluating life sciences management teams. The data were triangulated from semistructured interviews, annual reports, company websites, and articles. Collected data were coded to identify underlying themes. Several themes emerged from the analysis process: begin with the exit in mind, collapse learning timelines, conduct systematic due diligence, and cultivate and critique one's drug development expertise. The findings may provide venture capitalists and other investors such as angel investors with a refined framework for improving investment decisions. Life sciences management teams may also attract more private equity financing by understanding the vicissitudes of investor expectations. Increased investment and venture capital support for life sciences companies may revitalize the development of new therapies and effect social change by improving patient lives and investment outcomes.

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Acknowledgments

First, I wish to thank my chair, Dr. James Glenn. Dr. Glenn's demands for excellence and synthesis led to the fruition of the final draft. Additionally, I thank my committee Dr Edward Paluch, Dr Al Endres, and Dr Carol-Anne Faint for devotedly reviewing this manuscript from its infancy to completion. I incorporated their helpful suggestions throughout.

Second, I was fortunate to have interviewed several fine venture capitalists. While I shall respect their confidentiality and privacy by not naming them, their accommodation and wealth of experience in venture capital investing have been instrumental in the completion of this dissertation. I am indebted and grateful to Mahendra Ramsinghani (Author and Managing Director for Secure Octane) for assisting me during the recruiting process. Mahendra, I shall always remember your random acts of kindness and generosity.

Third, I fondly acknowledge Stig Brodersen and Preston Pysh for entertaining and educating me with their investing podcast during my self-imposed exile while I wrote this dissertation. Finally, I thank the investors, entrepreneurs, academic scholars, and authors who indulge my curiosity. They delight me with their written word each day.

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Section 1: Foundation of the Study

Venture capitalists (VCs) invest in early-stage life sciences (LS) firms under conditions of information asymmetry. The significant applied business problem is that uncertainty about the management team leads VCs to either refrain from investing or to make poor investment decisions. One reason is that some VCs lack strategies to improve their evaluation processes of LS management teams' drug development capabilities. In this study, I seek to add to the literature and business practice on successful VC evaluation strategies of LS management teams.

Background of the Problem

Venture capital is a form of private equity investment where VCs commit financial resources to high-risk, early-stage companies that have the potential to develop into significant competitors in a market (Feld & Mendelson, 2014; Ramsinghani, 2014). VCs help develop their investee firms for several years until they can exit the investment via a merger and acquisition (M&A) or initial public offering (IPO; Feld & Mendelson, 2014; Ramsinghani, 2014). The overarching goal for VCs is to exit their investments profitably (Lehoux, Miller, & Daudelin, 2016) and to create value for their portfolio's limited partners. Further, a VC's investment track record impacts his reputation and his ability to raise future funds. Investments in LS companies with nascent drug technologies have the potential to simultaneously produce lucrative returns for venture capital portfolios and to address human health conditions. Drug development is a complex, multifaceted, and expensive process, taking on average 10 to 15 years to complete (Bratic, Blok, & Gostola, 2014). Regulatory approval by the United States

Food and Drug Administration (FDA) or the European Medicines Agency (EMA) represents the culmination of the drug development process and increases firm value (Lehoux, Miller, Daudelin, & Urbach, 2015). VCs perceive that early-stage LS management teams lack the know-how for executing drug development while building their LS firm into a successful venture (Lehoux, et al., 2015; Moustakbal, 2014). A paucity of venture capital investment in early-stage LS firms is a major impediment to their survival and growth (Fleming, 2015) and a barrier for developing new and innovative therapies. My research objective was to identify what processes VCs use for evaluating LS management teams' drug development capabilities.

Problem Statement

Scarce venture capital investment is a major impediment for the growth of Canadian LS firms (Fleming, 2015). Although early-stage Canadian LS firms primarily favor venture capital financing (Veilleux, 2014), in 2016, the LS sector accounted for only 23% ($730 million) of overall venture capital investment in Canada (Canadian Venture Capital Association, 2017). The general business problem is that the VCs deficient evaluation processes of management teams result in fewer investments and portfolio losses. The specific business problem is that some VCs lack strategies to improve their evaluation processes of LS management teams' drug development capabilities.

Purpose Statement

The purpose of this qualitative multicase study was to explore strategies successful VCs use to improve their evaluation processes of LS management teams' drug

development capabilities. The target population included American and Canadian venture capital firm partners who successfully improved their evaluation processes of at least one LS management teams' drug development capabilities in the past 10 years. The implications for positive social change included improving investment decisions and stakeholder returns, which can enhance investments in LS firms, ultimately enabling development of innovative therapies to treat illnesses in areas of unmet medical needs to improve patient lives.

Nature of the Study

The problem statement, purpose statement, and research question(s) determine the ideal method of scientific inquiry for a problem (Burton, 2014). I reviewed qualitative, quantitative, and mixed methods approaches. Sarma (2015) highlighted the misunderstood paradigmatic differences between qualitative and quantitative research. A fundamentally postpositivist perspective, the quantitative approach employs deductive reasoning and hypothesis generation to determine the relationship between independent and dependent variables (Barnham, 2015). Conversely, in qualitative studies, scholars employ inductive, constructivist reasoning, while preserving robust scientific standards (Morse, 2015). Since using inductive approaches generates novel insights that are challenging to measure quantitatively, the explorative nature of my inquiry, namely, VC evaluation of LS senior executives, the qualitative method is appropriate for my study. Finally, while some researchers use the mixed method, which is a combination of qualitative and quantitative data collection (Alavi & Habek, 2016), the additional time and complexity make it unsuitable for my study.

After determining that a qualitative approach was most appropriate, I looked at five designs commonly used in qualitative research: phenomenology, grounded theory, narrative, ethnography, and case study (Lewis, 2015). The phenomenological approach involves interviews to describe the lived experiences of individuals about a phenomenon (Lewis, 2015). Phenomenology was not optimal because my research question involves analyzing VCs actions and not the personal meanings of events or phenomena they experienced. Grounded theory is suitable for researchers seeking to generate theory from a phenomenon (Cho & Lee, 2014). I rejected a grounded theory design because the purpose of a doctoral study is to address a business problem and not to generate theory. Narrative design and ethnographic design were not fitting to address how VCs evaluate LS executives. Using the narrative design enables researchers to identify and explore the meanings of participants' life stories (Fletcher, De Massis, & Nordqvist, 2015) and using an ethnographic design requires studying groups' cultural behavior through predominately observation (Segelström & Holmlid, 2015). Case study researchers conduct an in-depth analysis of a case bound by time and activity (Ketoviki & Choi, 2014). Therefore, the use of a multicase study design was appropriate to explore the decision-making processes VCs used for actual LS investments.

Research Question

What strategies do successful VCs use to improve their evaluation processes of LS management teams' drug development capabilities?

Interview Questions

The following questions guided the interview process.

1. How do you determine a LS management teams' capability for developing a drug through to commercialization (e.g., discovery, pre-clinical, clinical research, and post marketing)?

2. Please describe the process your organization uses to assess the drug development capabilities of a LS management team.

3. What were the key challenges to implementing the process of assessing LS management teams?

4. How did you address the key challenges to implementing the process for assessing LS management teams?

5. How does your organization assess the effectiveness of your process for evaluating LS management teams?

6. How, if at all, has your organization improved the effectiveness of your process for evaluating LS management teams?

7. What other information would you like to share about evaluating LS management teams' capabilities that I did not ask?

Conceptual Framework

A conceptual framework is a deliberately constructed means for exploring and interpreting phenomena in a research study (Green, 2014). Business process management (BPM) is the conceptual framework for this study. BPM is an iterative method developed to assist organizations to continually manage and improve their key business processes (Koryl & Mazur, 2017). In 1911, Frederick Winslow Taylor pioneered the scientific study of work and standardization of processes, and BPM

continued to evolve in the information era with improving efficiency, workflows, and processes (Margherita, 2014). Specific BPM processes include (a) discovery, (b) analysis, (c) redesign, (d) implementation, and (e) controlling (Mendling, Baesens, Bernstein, & Fellmann, 2017). BPM provided me with a foundation to investigate, analyze, and interpret the evaluation processes VCs use to determine management teams' drug development capabilities.

Operational Definitions

Due diligence: Due diligence is the process where a VC comprehensively researches aspects of a prospective investee company prior to making an investment decision (Blum, 2015).

Early-stage company: Early-stage companies follow the seed stage and are an innovative stage of a firm's development focused on product and business development (Lahr & Mina, 2014).

Life sciences industry: Life sciences industry is an umbrella term including research, development and manufacturing in diagnostics, biopharmaceuticals, pharmaceuticals, and medical devices for human health (Government of Canada, 2017).

Limited partnership vehicle: A limited partnership vehicle is the fund VCs raise from limited partners (e.g., government, pension funds, and large corporations) for investing in new ventures (Kollmann, Kuckertz, & Middelberg, 2014).

Venture capital: Venture capital is a high-risk private investment during the seed, early-stage, or late-stages high technology or life sciences companies made in exchange for equity, governance, and control (dos Santos Dias & Alvaroda Silva Macedo, 2016).

Assumptions, Limitations, and Delimitations

Assumptions

Assumptions in scholarly research are underlying thoughts and beliefs about the topic that are not overtly articulated (Gardner & Johnson, 2015). I made several assumptions during this doctoral study. First, VCs wish to increase investment in LS firms. Second, BPM is a suitable framework to investigate, analyze, and interpret VC evaluation processes for LS executives. Third, some VCs lack strategies to evaluate LS senior management capabilities. Fourth, participants will comprehensively and honestly respond to the interview questions. Fifth, interviewing VCs will satisfactorily answer the research question.

Limitations

Studies have limitations because the researcher cannot control all aspects affecting the study (O'Brien, Harris, Beckman, Reed, & Cook, 2014). First, I relied on VCs to accurately recall LS investments they assessed in the past 10 years. Second, VC interview responses may have been affected by their geographic location, thereby limiting the generalizability of results. Third, VCs had different levels of experience with LS investing.

Delimitations

A researcher defines the study boundaries that may influence study results (O'Brien et al., 2014). First, I limited this study to VC evaluation of senior management drug development capabilities and not to other pertinent factors in VC investment criteria, such as LS firm assets, competitors, the economy, or firm valuation. Second, my

intent was to conduct the interviews with VC partners or managing directors and not VC analysts or associates. Third, I only interviewed VC's based in Canada and the United States and solely consider business process management as the conceptual framework.

Significance of the Study

A VC who invested in a LS company must have been confident in the capabilities of the management team. The LS management team demonstrated characteristics amenable to leading and commercializing a drug. Understanding and modeling the strategies VCs used to evaluate executives may help increase investments in LS firms.

Contribution to Business Practice

The results from the study may contribute to effective business practice and solutions regarding venture capital investment strategies in LS firms. The LS sector is an important contributor to the Canadian economy. In 2014, the sector contributed $117 billion to the gross domestic product (GDP) and constituted 41%, 24%, 12%, and 13% of Ontario, Quebec, British Columbia, and Alberta's GDP, respectively (PricewaterhouseCoopers, 2015). Despite the contributions to the economy, early-stage Canadian LS companies have encountered difficulties developing and commercializing their products due to lack of investment capital (Government of Canada, 2014). Furthermore, the Government of Canada (2014) warned the problematic LS market dynamics in Canada may result in increasing attrition rates and relocation to other markets, such as the United States or Europe.

Venture capital support could be instrumental for the LS challenges in Canada. Along with capital funding, experienced VC's support management teams with business

coaching and wider networks, which can lead to signaling a firms' quality to the broader investment community (Colombo, Cumming, Mohammadi, Rossi-Lamastra, & Wadhwa, 2016). Formalization and elucidation of the process may lead to more interest in LS research and development (R&D) and investment. Additionally, findings from this study may be valuable to nascent LS organizations whose leaders are seeking to raise venture capital funds for their companies.

Implications for Social Change

The implications for positive social change are manifold. As the world population is expected to increase to nearly 10 billion by 2050 (United Nations, 2017) and chronic disease prevalence is expected to rise by 57% by the year 2020 (World Health Organization, 2016), innovative new treatments are needed. Health care innovation saves and improves lives (Pitts, 2015) and LS firms are instrumental in delivering pioneering R&D. The results of this study may lead to new investments in LS firms, enhanced growth and new employment for the sector. New investments may also lead to treatments for diseases, sustainable food sources, and clean energy innovation. Additionally, LS firms may help address the significant unmet needs in rare diseases research.

Rare diseases are devastating for patients, frustrating for health care providers, and a growing concern for health insurance companies. The National Institutes of Health (2016) estimated that out of the approximately 7,000 rare diseases affecting 25 million Americans, only a few hundred have available treatments. Notably, since the passage of the Orphan Drug Act of 1983 by the FDA, treatments became available to treat rare and

undertreated diseases (Herder, 2017). VCs can help identify and invest in LS firms with rare disease drug development. Consequently, a better understanding of VC evaluation processes may eventually lead to new and efficacious treatments for addressing rare diseases.

A Review of the Professional and Academic Literature

The purpose of this literature review is to summarize, compare, and contrast sources related to strategies for VCs to improve their evaluation processes of LS management teams' drug development capabilities. BPM served as a framework for how VCs can improve their evaluation processes. I divided the literature review into three categories: (a) business process management, (b) venture capital, and (c) life sciences. I selected peer-reviewed articles from Business Source Complete, Academic Source Complete, Google Scholar, ProQuest Central, ABI/Inform, Science Direct, and Emerald Management Journal. Keywords for the searches included *venture capital, venture capital investment process, venture capital decision-making process, venture capital fundraising, venture capital exits, life sciences, drug development, and business process management*.

Additionally, I collected information from world health organizations, government health websites, and venture capital associations. I developed the literature review using 92% peer-reviewed journals (210 articles) and 95% sources published within 5 years of 2018. In total, I cited 229 sources in the literature review, representing recency of the data presented (Table 1).

Table 1

Frequency of the Study Sources

Sources	Within 5 years	Older than 5 years	Total.
Peer-reviewed journals	202	8	210
Books	6	3	9
Websites	0	1	1

Business Process Management

The conceptual framework for this study is BPM. BPM emerged during the 20th century. Jeston and Nelis (2014) credited BPM's origins to Taylor Frederick, who explored methods to improve industrial processes and reduce waste in the early 1900s. Hammer (2015) illustrated BPM as business process improvement life cycles presented by Shewart, Deming, and Juran, who advocated using performance metrics and consistency measures for continuous quality improvement, such as the plan-do-check-act cycle. Later, Hammer introduced business process reengineering in 1990, distinguishing it as designing processes to achieve business objectives and to abandon nonyielding processes. Processes misaligned with corporate aims contribute to inefficiencies and financial losses (Hammer, 2015).

BPM is a management discipline about deliberately, collaboratively, and systematically improving business processes to accomplish organizational objectives

(Hammer, 2015; Jeston & Nelis, 2015). Continuous business process improvement differentiates BPM from one off business process improvement initiatives as seen in Six Sigma, Lean, and Total Quality Management (Hammer, 2015; Jeston & Nelis, 2014). BPM requires the ability to apply 360-degree, outside-in perspective for business process improvement (Kohlborn, Mueller, Poeppelbuss, & Roeglinger, 2014; Müller, Schmiedel, Gorbacheva, & vom Brocke, 2016). Hammer (2015) illustrated that a customer-centric approach includes customers, results, and outputs in an interdependent triad. Customers and stakeholders demand results and results are a function of its processes. Likewise, portfolio fund investors value high returns and high returns depend on continuous improvement of investment processes.

Continuous, iterative improvement underpins BPM. Berman (2014) articulated that processes are the group of activities that convert resources, such as time or a commodity, into a quantifiable output or result. Hammer (2015) offered that in BPM, processes include end-to-end workflows across the organization which creates customer value. Further, Hammer (2015) argued that consistently executed processes and their subsequent outputs are not beneficial if they do not contribute towards organizational goals. Panagacos (2012) highlighted that dissecting an organization's processes helps illustrate gaps and opportunities towards achieving strategic objectives. Designing complex business processes requires extensive domain knowledge and intimate knowledge of the company's operations and strategic direction (Deng et al., 2017; Loarne-Lemaire & Maalaoui, 2015). The VCs overarching objective is to ensure every investment is profitable for their portfolio's limited partners. The *living-dead*

(Ramsinghani, 2014) or written-off investments because of flawed investment practices extract value from portfolio investors. Extensive domain knowledge about their prospective investments, such as in drug development, will help decrease uncertainty in VC investments. The interplay between the venture capital firm's objectives, the portfolio objectives, and the drug development process affect the VCs evaluation process of LS management teams.

Business process management life cycle. In BPM, all processes must align with the organization's strategic goals. BPMlife cycle includes continuous improvements. The BPM life cycle begins with the design and modeling phase. The process design and modeling stage involves identifying, analyzing, and conceptualizing current and future processes (Mendling et al., 2017; Rosemann & Brocke, 2015). Organizations aiming for process improvement must scrutinize every step in the process (Nadarajah & Syed Kadir, 2016). Brocke et al. (2014) argued that simple processes are often best. Further, management must consider the financial implications of process changes (Bolsinger, 2015; Borch & Batalden, 2015). Trkman, Mertens, Viaene, and Gemmel (2015) posited that any process redesign must begin with customer requirements. Process modeling is for reconfiguring, scrutinizing workflows and inefficiencies, often in visual form (Jeston & Nelis, 2014; Lahajnar & Rožanec, 2016). The remodeled and redesigned process must align with business strategy (Sikdar & Payyazhi, 2014).

The remaining phases of the BPM lifecycle are execution, control, and optimization. During process execution, the redesigned process users are first trained on the new procedures, including the adoption of any new technologies (Mendling et al.,

2017). Posttraining, end users perform the new processes (Rosemann & Brocke, 2015). Process control is a monitoring stage to ensure that the process is followed according to design (Mendling et al., 2017). This stage also encompasses measuring process outcomes according to plans (Mendling et al., 2017). Data analysis may include risk assessment, identifying inefficiencies, and other performance indicators, such as budgets and resource allocation (Rosemann & Brocke, 2015). Finally, in process optimization, deficiencies or errors identified during data analysis are addressed (Rosemann & Brocke, 2015). Procedures or sequences that were not practical or unyielding during the execution phase are reevaluated and redesigned (Mendling et al., 2017). Optimization is essential for continuous improvement, a core feature in BPM.

Hammer (2015) argued that most business situations are not unique and can adopt generic processes. Instead of mimicking others' processes, Brocke, Zelt, and Schmeidel (2016) suggested that managers should customize BPM initiatives depending on the business environment, culture, and objectives. Ignoring the unique context of any process and forcing a standardized approach may lead to additional problems (Brocke et al., 2014). Contingency theory is a complementary mindset. Contingency theorists posited that the best decision is unique to the situation, environment, and decision makers (Tarter & Hoy, 1998). Further, when a decision includes information asymmetry, the decision makers should consider a flexible, trial and error based strategy contingent upon the situation (Tarter & Hoy, 1998). VCs applying BPM to their investment processes should test whether standardized or customized improvement processes provide better outcomes.

The research question is what strategies successful VC partners used to evaluate LS management teams' drug development capabilities to increase investments and minimize portfolio losses. Minimizing portfolio losses requires selecting the right investments and evaluating management teams under conditions of uncertainty and information asymmetry. Every VC has a process to follow when vetting a LS management team, which can be a standard evaluation process or a unique process contingent upon the situation. From a BPM perspective, the VCs should consider their portfolio objectives when evaluating LS management teams. Based on the declining venture capital investment in Canadian early-stage LS firms, VCs have reason to analyze, redesign, remodel, and continuously improve their end-to-end investment decision making processes.

Applications of business process management. Researchers have not previously applied the BPM framework to venture capital evaluation of entrepreneurs or the venture capital investment process. Information technology (IT) applications for BPM dominate the extant literature. Several researchers interpreted BPM predominately as a technology platform (Del Giudice, 2016; Krumeich, Weis, Werth, & Loos, 2014) Pourmirza, Peters, Dijkman, and Grefen (2017) suggested that BPM techniques will be imperative for user adoption and acceptance for the Internet of Things applications. Others claimed that process management professionals and IT professionals are the most important actors in BPM initiatives (Paiano, Caione, Guido, Martella, & Pandurino, 2015; Rahimi, Møller, & Hvam, 2016). Wong, Tseng, and Tan, (2014) suggested that stronger managerial BPM capabilities were associated with enhanced organizational

technical BPM applications. Krstić, Kahrović, and Stanišića (2015) reported that BPM improved Serbian hotel operations such as increasing efficiencies in housekeeping, guest arrivals and departures, and food services. In a study of Czech manufacturing companies, Tucek (2017) found that problems arising from significant inefficiencies were the primary precursors for process change. Son and Kim (2014) asserted that BPM systems improved a Korean ship hull production design. Pradabwong, Braziotis, Tannock, and Pawar (2017) reported that manufacturing firms which adopted BPM improved their firms' performance and supply chains.

BPM applications to improve process efficiencies and improve company profitability are chronicled predominately in service, manufacturing, and operations establishments. The BPM approach is about improving end-to-end business processes to accomplish organizational goals. Venture capital investment evaluations are a process which warrants scholarly inquiry in a BPM context: continuous process improvement and refinement to meet its portfolio objectives.

Business process management and the theory of constraints. A supporting theory to BPM is the theory of constraints. The theory of constraints is based on the idea that a process constraint hinders maximum performance, and that recognizing and improving these constraints can increase effectiveness (Izamailov, 2014). Pretorius (2014) suggested users should not discard system constraints but rather should maximize them as much as possible. For example, if the major element lacking in an investment proposal is the management team, VCs could consider how they can help improve the management teams' drug development capabilities instead of rejecting the deal. Cox

Robinson, and Maxwell (2014) applied the theory of constraints to a fledgling family medicine practice. In the improved medical practice, physicians focused on patient care with minimal interruptions from support staff, leading to better and more efficient care (Cox et al., 2014). Huang, Chen, Chiu, and Chen (2014) applied the theory of constraints by reallocating a manufacturing company's limited resources towards the main operations bottleneck to improve process effectiveness. Based on Huang et al.'s findings, VCs could redirect more resources on evaluating management teams during deal screening.

VCs allocate significant time to screening deals (Nanda, Samila, & Sorenson, 2017). The theory of constraints could provide an alternative conceptual framework for describing how VCs can improve their evaluation processes of LS management teams. The theory of constraints would include assessing the constraints (e.g., specific management team capabilities) in the context of the entire investment decision making process. VCs who identify the management team characteristics that are a major constraint, when considered in combination with other investment criteria, can help improve the investment process and create value for the portfolio.

Alternative theories. Investment theories and behavioral theories could provide alternative perspectives for investigating strategies VCs use to improve their evaluation processes of management teams. I considered applying two investment theories, the modern portfolio theory (MPT) and the capital asset pricing model, to address the research question. MPT is based on the premise that investors could construct an *efficient frontier* of diversified investments to maximize returns based on a certain level

of risk (Loviscek, 2015). Biswas (2015) explained that diversifying a portfolio to include investments in different industries and different sized companies will decrease overall risks and improve portfolio returns. MPT has been applied in many different industries. Aerts, Botzen, and Werners (2015) leveraged MPT principles to reduce risks in water management by diversifying flood management investments. Leingang (2017) applied MPT to weigh different criteria in personnel selection, thereby mitigating risks and uncertainty in hiring decisions. In the nonprofit sector, Grasse, Whaley, and Ihrke (2015) articulated that although non-profits could pursue more than one revenue stream to reduce dependency on one income source, a diversification strategy could be inefficient under conditions of limited resources.

The capital asset pricing model (CAPM) builds on the diversification strategy proposed in MPT. In the CAPM, investors measure the required rate of return of individual investments in relation to the other investments in the portfolio and not in isolation (Elbannan, 2015). Dai and Lan (2014) applied the CAPM by selecting a portfolio with diverse betas in technology, manufacturing, real estate, and miscellaneous industries to reduce the investment risk of a single stock. Kuehn, Simutin, and Wang (2016) applied the CAPM for valuing companies based on their capacity to fill employment vacancies. Companies who filled their employment vacancies faster reported higher equity returns (Kuehn et al., 2016). Other scholars applied the CAPM to value forestry assets (Yao & Mei, 2015) and gold exchange traded funds (Aravind, 2015).

Applying MPT and the CAPM principles to the present study, VCs would evaluate the management team of one prospective LS investment in relation to other

management teams in the portfolio. Specifically, VCs would evaluate LS management teams' drug development capabilities based on how different or similar they are to other LS management teams' drug development capabilities in the portfolio. The VC's evaluation of management teams would be relational to other portfolio members instead of as individual investments.

Another theory to explore VC strategies in evaluating management teams is social judgement theory. Social judgement theorists suggest people make evaluations about a situation based on their past experiences, and that people are anchored to their pre-existing judgements (Behrens, 2016). Using a social judgement theoretical framework, Behrens (2016) demonstrated that managers' actual decision-making processes differed from their self-reported decision-making processes. Gonzalez-Vallejo and Lavins (2015) applied the social judgment theory to measure the accuracy of consumers' judgements of nutrition facts relative to a gold standard. Akhul and Gupta (2014) contended that recruiters focused on different cues to evaluate one job candidate, which led to different hiring recommendations. Based on social judgement theory, VCs who evaluate management teams and make investment decisions will have different anchors, different investment histories, and different worldviews about a management teams' drug development capabilities. Consequently, the social judgement theory could illuminate why some VCs have successful evaluation processes. Overall, despite the availability of complementary and alternative theories, I selected BPM as the conceptual framework for this study.

Venture Capital

Venture capital is a subasset class of private equity and traditional alternative investments (Morrisette & Hines, 2015; Ramsinghani, 2014). Following World War II, the first venture capital firm, the American Research and Development Corporation (ARDC), invested $30 million USD in 87 nascent technology companies from 1946-1966 (Rotch, 1968) in exchange for equity (Feld & Mendelson, 2016; Gompers & Lerner, 2001). VCs purchase substantial equity stakes in seed, early and late stage companies for a period of 5 to 10 years (Ramsinghani, 2014; Rotch, 1968) with high risk, high information asymmetry (Gompers & Lerner, 2001), and expectations of substantial gains (Kryzanowski & Giraldeau, 1977). Because of the equity holding mechanism, venture capital investments are highly illiquid. Importantly, investments with a longer time to maturity necessitate larger capital gains per year, that is, 150% to 200% above cost (Rotch, 1968). Consequently, expediting the time to exit is critical for venture capital success.

Types of venture capital firms. The types of professionally managed venture capital firms are heterogeneous, namely, independent venture capital (IVC), government-owned venture capital (GVC), or corporation-owned venture capital (CVC). Although more than one venture capital firm can invest in a portfolio company, Colombo and Murtinu (2017) discovered that more than one type of venture capital investment in a company does not necessarily lead to better firm outcomes. Bertoni and Tykvová (2015) reported that while GVC does not independently increase innovation in firms, GVC

investments complement IVC investments. The differing overarching goals for IVC, CVC, and GVC may explain Colombo et al.'s and Bertoni et al.'s varying findings.

Some large corporations house a venture capital division to make investments in nascent start-up companies. Chemmanur, Loutskina and Tian (2014) argued that CVCs and IVCs objectives are fundamentally divergent. One parent corporation typically funds the CVC, as opposed to several limited partners funding the IVC (Souitaris & Zerbinati, 2014). Organizations such as Google and Microsoft leverage their CVC programs to advance their R&D programs, build new capabilities, and enhance their market competitiveness (Da Gbadji, Gailly, & Schwienbacher, 2015). CVC firms particularly concentrate on innovation-creation and strategic alliance objectives that exploit synergies (Asel, Park, & Velamuri, 2015), even if it causes them to retain their investments for longer than 10 years (Guo, Lou, & Pérez-Castrillo, 2015). Conversely, the IVC firms' predominant objective is a rapid and profitable exit (Galloway, Miller, Sahaym, & Arthurs, 2017).

Publicly funded investments, namely government-managed venture capital (GVC) can support new businesses. Bertoni, Colombo, and Quas (2015) discovered that GVCs invested in seed or early stage companies when other VCs refrained from investing GVC supports start-up and early-stage firms similar to IVC and CVC in regions such Europe, Canada, Australia, and the UK (Guerini & Quas, 2016). Government venture capital backed firms in Europe are better positioned to receive IVC in subsequent funding founds (Guerini & Quas, 2016). Contrarily, emerging countries show an inverse relationship between GVC and IVC funding for firms (Herrera-Echeverri, Haar, & Estevez-Bretón

(2014), indicating fewer opportunities for private equity investors when government intervenes. Colombo, Cumming, and Vismara (2016) concurred, suggesting that while GVC (e.g., Canadian Venture Capital Action Plan) helps close the financing gap for nascent firms, public funding may discourage private investments.

Despite belonging to venture capital enterprises, CVC, GVC, and IVC have different investment objectives. Consequently, their investment processes and LS management evaluation processes do not align. A CVC firm may value a prospective LS management team's collaboration and partnership potential over their drug development capabilities. Similarly, government policies for stimulating the economy influence GVC investment objectives. For example, early-stage firms could have more luck soliciting GVCs during economic downturns. Moreover, GVCs may not emphasize the management evaluation process. Finally, because the IVC firm's main aim is a profitable investment exit and value creation for the portfolio, VCs working in IVC firms can apply a BPM approach to improve processes, such as scrutinizing the LS management teams' drug development capabilities. VCs employed in IVC firms can continuously improve their evaluation processes of LS management teams by analyzing, redesigning, and optimizing their investment processes to create value for the portfolio.

Venture Capital Funds

Venture capital fundraising in IVC firms is delineated as follows. First, VCs (e.g., managing directors or general partners) raise one or more closed ended limited partnership funds (entities) from limited partners such as pension funds, corporations, funds of funds, high net worth investors (Feld & Mendelson, 2016; Ramsinghani, 2014),

and endowments (Bermiss, Hallen, McDonald, & Pahnke, 2017). Second, the VCs invest the funds into several portfolio companies over 2 to 5 years (Feld & Mendelson, 2016; Ramsinghani, 2014) in a series of stages or rounds (Bhagat, 2014). Third, after holding the investments for up to 10 years, VCs harvest the investment via an exit opportunity, and calculate the internal rate of return, which is a function of the capital invested and the holding period (Bhagat, 2014). A longer holding period requires higher returns to account for risk and the time value of money. The venture capital firm charges a management fee (approximately 15% of committed capital) and a percentage (e.g., 20 to 30%) of the profits per fund (Ramsinghani, 2014). The combined investments constitute the portfolio. In short, VCs are stewards of the resources entrusted to them by portfolio investors.

Venture Capital Exits

A vital consideration for VCs is determining the likelihood of profitably exiting an investment and minimizing chances of investment abandonment or write-offs (Arcot, 2014). VCs capitalize on their portfolio firm investments through an IPO equity sale or by making a trade sale to a buyer via M&A (Ragozzino & Blevins, 2016; Teker, Teker, & Teraman, 2016). Cannice, Allen, and Tarrazo (2016) conducted a Delphi study with Silicon Valley VCs to report that the dynamic venture capital environment necessitates more scholarly research on exit strategies. VCs create value for portfolio investors when they exceed investment return expectations. The probability of profitable LS investment exits may increase when VCs apply BPM principles. VCs can continuously improve

their processes to achieve the end-to-end portfolio objective, namely, high investment returns.

Initial public offering. An IPO is a process for publicly issuing a private company's shares (Graham, 2006). Key intermediaries in the IPO process include the firm's management, investment banks, underwriters, VCs, and analysts (Lowry, Michaely, & Volkova, 2017). For the founder, an IPO represents selling partial ownership of a company to investors in exchange for capital. For intermediaries, individual investors and institutional investors, an IPO represents an opportunity to capitalize on a promising company (Anderson & Zastawniak, 2017). An oversupply of new IPO listings results in corrections in subsequent years (Satta, Notteboom, Parola, & Persico, 2017), implying IPO listing volumes is cyclical in nature, with corresponding peaks and valleys.

A successful IPO represents an important milestone for a portfolio firm and the VC. Ragozzino and Blevins (2016) advised that shorter venture capital investment duration in a portfolio firm leads to a higher probability of exit via IPO. The portfolio firm allocates the additional capital towards advancing R&D, attracting new talent, expanding operations, and promoting the firm's image and profile (Kumar, 2017). Notably, the portfolio firm did not consider debt reduction and interest payments as important reasons for a public equity offering (Meluzin & Zinecker, 2014). From the VC's vantage point, an IPO improves liquidity and is the most lucrative departure route post lock-up period, which is a restricted trading period (Pennachio, 2014).

In the United States, Megginson, Meles, Sampagnaro, and Verdoliva (2016) reported that VCs tangible and intangible resources led to higher post-IPO stability for VC-backed firms. Similarly, VC-backed Indian portfolio firms reported higher compound annual growth rates post-IPO (Raghupathy & Thillairajan, 2015). Liao, Lu, and Wang (2014) reported Taiwanese portfolio firms were more financially stable for an average of 7 years post-IPO. Taken together, the evidence from several countries suggests the VCs capital, screening, monitoring, and coaching value-add contributes to the superior post-IPO performance of their portfolio firms.

Foreign VC-backing. VCs are not limited to investing in their country of origin and are often successful in foreign markets. Based on an international IPO analysis, Cumming, Knill, and Syvrud (2016) conveyed that foreign VCs had more IPOs and relatively more lucrative exits. Hearn, Oxelheim, and Randøy (2016) added that foreign VCs in Africa continued to foster and coach their portfolio firms for a significant time post-IPO, leading to enhanced long-term performance. Foreign VCs were also more likely to pursue IPOs on foreign stock exchanges versus local VCs (Cheng & Schwienbacher, 2016). Kong, Nitani, and Riding (2016) concluded that foreign VC IPOs in Canada were faster, more lucrative, and occurred more frequently than local VCs. Faster time-to-IPO may have important implications for the portfolio firm.

Grandstanding. Grandstanding is a significant feature in VC-backed IPOs. The grandstanding phenomena in venture capital, proposed by Gompers (1996), occurs when younger venture capital firms seek IPOs for their investee firms earlier than more established venture capital firms. Gompers (1996) collected data from 433VC-backed

IPOs in the United States between 1978 and 1987 and compared it with IPO data from 62 venture capital funds between 1983 and 1993, to discover that younger venture capital firms averaged 8 months faster to IPO versus more established firms (e.g., 16 months for younger firms and 24 months for established firms). Additionally, time-to-IPO speed and higher fundraising for future funds were positively correlated (Gompers, 1996).

Several authors conducted an empirical analysis of longitudinal data from global stock exchanges (Jia, 2014; Jiang, Cai, Keasey, Wright, & Zhang, 2014; Michala, 2016;), continuing the grandstanding phenomena debate nearly two decades after Gompers. Michala (2016) stated that while younger venture capital firms had more IPOs, established venture capital firms' IPOs were more prominent and profitable. Jiang et al. (2014) discovered foreign VCs did not exhibit grandstanding behavior, while Chinese VCs brought portfolio firms faster to market to bolster their reputations and subsequent fundraising. The authors did not state if the foreign VCs were either younger or from more established firms. Likewise, Jia (2014) highlighted that Chinese venture capital funds mature within 5 to 7 years versus the average 10 to 12 years in developed markets. Kong, Nitani, and Riding (2016) reported United States VC-backed firms in Canada were more than twice as likely to reach an exit and had shorter time-to-IPO than local VC-backed firms. These data suggest grandstanding differs between venture capital firms in developed and emerging markets. Further, U.S. VCs may increase the probability and speed of Canadian LS firms' listing on a foreign stock exchange.

Mergers and acquisitions. Mergers and acquisitions or trade sales are a highly preferable route for VCs to exit their portfolio companies. VCs in the UK predominately

preferred M&A exits and exhibited no signs of grandstanding tactics during their albeit, less frequent IPOs (Espenlaub, Khurshed, & Mohamed, 2015). Bertoni and Groh (2014) suggested that the proximity of adjacent countries in the European region encouraged subsequent M&A over IPOs for portfolio companies. Despite the more frequent M&A exit route aforementioned, Cumming et al. (2016) argued private portfolio companies benefit more from IPOs than M&A because of the added costs of cross country deals. Nonetheless, geographical proximity appears to connect stakeholders, increases network size, and present new business opportunities. The proximity effect of U.S. VCs investing in Canadian LS firms may encourage M&A exits even if the Canadian LS firm prefers an IPO.

Venture capital portfolio maturity may influence the exit timing and exit route preference. Bhattacharyaa and Inceb (2015) opined that VCs encounter greater pressure to exit portfolio companies when the fund nears maturation. As such, VCs with funds nearing expiration tend to choose M&As over IPOs because the former boasts faster completion timelines. Bhattacharyaa and Inceb did not discuss how VCs persuaded or pressured management to sell their companies. Raggozzino et al. (2014) filled this gap by empirically demonstrating that VCs with more oversight in their portfolio companies and portfolio companies with higher numbers of VCs had a higher likelihood of exiting via M&A.

Mergers and acquisitions are a popular exit route for Canadian portfolio firms. Kong et al. (2016) and Moustakbal (2014) reported Canadian biotechnology firms with VC-backing were significantly more likely to exit via M&A than IPO. The Canadian

M&A exit preference is similar to Espenlaub et al.'s (2015) assertion about UK VC-backed firms M&A exit preference. Moustakbal (2014) studied Canadian biotechnology firm listings from 1996 and 2010 to find that over 50% were not listed a few years later. Nearly 30% of the missing firms were attributed to VC-backed M&As and 16% because of insolvency (Moustakbal, 2014). Notably, foreign VCs and highly syndicated VCs lowered the potential returns for the participating Canadian VCs during M&A exits.

Foreign VC investments in Canadian LS firms may provide greater oversight and faster exits than local VCs. While cross-border investments create new investment opportunities for U.S. VCs, the political and geographical distance somewhat increases investment risk. Consequently, U.S. VCs must carefully evaluate whether a Canadian LS management team can successfully develop and commercialize a drug. Based on a BPM framework, all VCs will continuously improve their evaluation processes in their subsequent deals based on the outcomes of their current LS investments.

Both the IPO and M&A exit route require the LS firm to become a viable commercial business or demonstrate significant drug development progress. Although VC-backed firms are faster to IPO, their post IPO performance impacts the VC's reputation. The VC must select a capable LS management team to develop the drug and function independently post exit. Hence, the management evaluation process ultimately impacts the VCs future portfolio fundraising activities and future IPOs. The LS management team evaluation process affects the entire VC investment process and the exit potential. In sum, a successful exit depends on a successful start.

Venture Capital Investment Process

VCs engage in extensive information collection and evaluation to make sound investment decisions. Venture capital investments include both ex-ante and ex-post activities. Xi and Su-Sheng (2016) described that life sciences investors and entrepreneurs typically use the overall strategic direction of the portfolio fund to guide the searching, screening, due diligence, monitoring, and harvesting of prospective investments. Reviewing the holistic investment process is central to elucidating the position of a single stage, such as evaluating management teams.

The investment decision is contingent upon the investee firms' business stage. Joshi and Subramanya (2015) detailed that in India, foreign VC firms refrain from early-stage company investments because of the risk propensity. Paik and Woo (2014) demonstrated a slightly different pattern for local U.S. VCs. Leveraging more than two decades of data from the Thomson Financial Venture Economics database, the authors demonstrated that VCs invest more in early-stage firms during economic booms. Since early-stage firms are overall riskier investments than later-stage investments, these data suggest VC's take more risk during economic prosperity. Economic booms position early-stage firms for venture capital investment.

Investment stages. VCs progress through several stages or steps throughout the lifespan of a deal. Tyebjee and Bruno (1984) characterized the five sequential steps in the venture capital investment process: deal origination (finding the deal), deal screening (weeding out the viable proposals), deal evaluation (in-depth assessment or due diligence of viable proposals), deal structuring (negotiating the term-sheet), and post-investment

activities (monitoring and governance). Similarly, Ramsinghani (2014) classified sourcing and screening, due diligence, investment terms negotiation, post investment monitoring, and exits as the main stages in the investment process. In general, the VCs align on the basic investment steps.

Human capital in venture capital firms directly impacts its capacity to screen investments. de Treville, Petty, and Wager (2014) noted almost 10% of attractive deals were not considered because the venture capital firm had human capital resource constraints. Koskinen, Rebello, and Wang (2014) suggested VCs neglect screening a deal if the entrepreneur has high bargaining power, which leads to unduly high investment demands and eventual premature deal termination. This implies experienced VCs may precipitously reject deals linked to entrepreneurs with high bargaining power.

Investment decision uncertainty intensifies when the VC does not have or does not know how to obtain the necessary information about the portfolio company. Achleitner, Braun, Lutz, and Reiner (2014) posited that VC profits were higher in M&A exits when the acquirer was from a different industry than the portfolio company. Although experienced VCs successfully reported high profits regardless of the buyer's industry (Achleitner et al., 2014). This implies experienced VCs were superior at assessing the various buyers and mitigating adverse selection.

The VCs investment experience levels benefit deal evaluation. Brazilian researchers noted that when VCs improved their screening skills, their investment percentage doubled and the frequency of re-screenings decreased 50% (de Carvalho, Netto, & Sampaio, 2014). Hopp and Lukas (2014) echoed the Brazilians, asserting that

VCs leverage their skills to spend less time screening, evaluating, and monitoring their investments than inexperienced VCs. Additionally, VCs consolidate the collective skills of their syndicates to save time in the screening phase (de Carvalho et al., 2014). Fazekas and Becsky-Nagy (2015) illustrated that VCs willingly fund high risk start up and early-stage technology companies when they negotiate higher involvement in management and operations of the firm. Similarly, Joshi and Subrahmanya (2015) contended that information asymmetry is higher when the VC is foreign because distance increases barriers to VC monitoring and oversight. Therefore, increased oversight reduces information asymmetry.

Life sciences investment criteria. Soenksen and Yazdi (2017) conducted a global qualitative case study with 68 investors to formulate a stage-gate model unique to the life sciences industry. Although the model represented several distinct stages and tasks specific to the LS industry, the overall framework was consistent with the core investment steps proposed by other scholars. The weighted pre-evaluation tool included items such as clinical and epidemiology, technology and concept, market assessment, intellectual property, regulatory strategy, funding, scope, business plan, risks and mitigation, and overall "gut feeling." Lehoux, Miller, Daudelin, and Urbach (2016) noted VCs describe assessing management based on their "gut feeling." Management did not receive additional weighting or elaboration aside from team experience.

Some studies have included management team criterion. Afful-Dadzie and Afful-Dadzie (2016) addressed the management team criterion weighting gap in their theoretical fuzzy technique for order preference by similarity to ideal solution (TOPSIS)

venture capital decision-making model. While, the decision criteria included dimensions ranging from management's personality and experience (Afful-Dadzie et al., 2016), the overall model will require iteration, validation and practical applicability considerations before mainstream adoption. Similarly, Gordon (2014) published an eight stage-gate model in venture philanthropy, a growing socially conscious venture capital, which outlined management evaluation. The specific criteria for management were integrity, strengths and weaknesses, leadership capability, and pragmatism (Gordon, 2014). Nevertheless, there is little consensus about how VCs should quantify difficult to measure qualities such as integrity or leadership in the evaluation process.

Lehoux, Miller, Daudelin, and Urbach (2016) interviewed VCs in Canada over 5 years to understand how VC's assess health technology companies, ranging from deal valuation, protecting and ensuring the company's success, and ensuring maximum exit profitably. In the deal valuation stage, VCs rely on a combination of mental logic and intuition or "gut feel" to assess the management team (Lehoux, et al., 2016). Some evaluation techniques, such as verbal protocol analysis, outright disregard management evaluation (Monika & Sharma, 2015). Motta, Garcia, and Quintella (2015) compared five invested and five rejected companies in Brazil to devise a protocol for prioritizing venture capital investments. While the rejected companies did not meet most VC's selection criteria, such as technology (patents and peer-reviewed publishing) and market dynamics (Motta et al., 2015), the absence of management evaluation criteria was conspicuous.

Although some authors (Afful-Dadzie et al., 2016; Gordon, 2014; Lehoux et al., 2016) included management criteria in the investor evaluation criteria for LS firms, the VCs reliance on intuition suggests their management evaluation process is conjectural. As recommended in the BPM framework, VCs have an opportunity to identify and design a transparent management assessment protocol to minimize their dependence on intuition. A standardized evaluation model will allow VCs to judiciously measure, analyze, and optimize future LS investments in a forward-looking manner.

Management characteristics. Researchers have inculcated the importance of management in the venture capital investment process for several decades. Kryzanowski and Giraldeau (1977) asserted that management criteria was the critical factor for 67% to 80% Canadian and American VCs. Incompetent management also causes VCs to reject proposals. Johnson (1979) observed that in over 600 VCs, unsatisfactory management competencies and unattractive return potential were the most common reasons for proposal denial. More recently, data from an Italian angel investment group suggested business angels excluded deals with tenuous management teams during the screening phase (Croce, Tenca, & Ughetto, 2017). Although the authors did not present an industry sub-analysis, the medical/biotech sector represented 33% of investments and 45% of investments dollar amounts in the Italian angel investment group (Croce et al., 2017), suggesting business angels invest less frequently yet more substantially in the sector.

Gompers, Gornall, Kaplan, and Strebulaev (2016) advanced scholarship by surveying 885 VC firms, who pronounced that technology was secondary to the management team during the screening phase. Specifically, 95% of VCs rated

management (e.g., ability, experience, and teamwork) as central to their investment decision compared to the business model (74%) or the market (68%) (Gompers et al., 2016). Importantly, VCs working with health care/biotechnology firms considered management's industry experience of utmost importance (Gompers et al., 2016). In sum, since the 1970s, perceptions about LS management teams continue to impede VC's investments.

Business angels (BA) and crowdfunders are two other investor groups which consider management team qualifications. BA's are private, wealthy individuals who invest in seed and early-stage companies for capital gains, altruism and personal interest in the venture (Hsu, Haynie, Simmons, & McKelvie, 2014). BAs underscore the importance of the management team on investment success and often form immediate impressions or "gut feel" (Huang & Pearce, 2015), similar to VCs. BAs value the management teams' education, industry experience (Becker-Blease & Sohl, 2015) business preparedness (Maxwell & Lévesque, 2014; Rostamzadeh, Ismail, & Zavadskas, 2014), equanimity (Parhankangas & Ehrlich, 2014) and passion (Hsu et al., 2014). Harrison, Mason, and Smith (2015) noted that experienced BAs made investment decisions expeditiously compared to more novice BAs. Considering many VC investments include parallel BA investments, these authors suggest management team characteristics are an equally important consideration for both groups of investors.

Investment sources are evolving to include a global investor base (Salomon, 2016). Crowdfunding is a means for entrepreneurial companies to request funding or donations, predominantly internet-based, from several small investors (Belleflamme &

Lambert, 2014) in exchange for future products or equity (Mollick, 2014). Ahlers, Cumming, Günther, and Schweizer (2015) discovered equity crowdfunding investors favor management teams with formal business education. Conversely, Lukkarinen, Teich, Wallenius, and Wallenius' (2016) contended that crowdfunders are on average less informed and not as accomplished as VCs and BAs and therefore do not have the same high expectations of management teams. The differences between VCs, BAs, and crowdfunders suggest the motivation and investment objectives affect the emphasis placed on management teams.

Integrity. Evaluating an entrepreneur's integrity is open to interpretation. A VC might test a prospective manager's integrity by acting in an unethical manner. In a study of 65 midwestern U.S. VCs, Drover, Wood, and Fassin (2014) demonstrated that most entrepreneurs rejected financing from unscrupulous VCs. However, during periods of financial duress, some entrepreneurs considered alliances with unscrupulous VCs (Drover et al., 2014), a sign of vulture financing. In spite of exclusivity agreements, financial duress may motivate some management teams to prospect other venture capital firms (Casamatta & Haritchabalet, 2014). In general, entrepreneurs are more willing to forego an investment deal over compromising their integrity.

Sales and operational skills. Managerial competence is salient to firm outcomes. Entrepreneurial competence is inversely related to VC monitoring (Mishra & Zachary, 2015). When management demonstrates strong capability, investors feel less pressure to supervise business operations. Investors value managerial teams' sales and operations skills (Morrissette & Hines, 2015) because those skills increase the likelihood of

achieving business objectives (Bernstein, Korteweg, & Laws, 2017). Similarly, Lovas (2015) concluded that investors desire managers with strong business acumen. Bernstein et al., (2017), Morrissette & Hines (2015), and Lovas' (2015) empirical studies affirm the significance of sales and operations skills.

Experience. Whether a business thrives or fails is contingent upon its management's experiential foundation (Dhochak & Sharma, 2016). In a study of 346 US entrepreneurs, Miskin and Rose (2015) observed that business experience predicted business survival for at least two years. In turn, business survival correlates with higher ownership, self-efficacy, and domain expertise (Miskin & Rose, 2015). Notably, Eastern European VCs appraise managements' proficiency through the content and style of their presentations (Zinecker & Bolf, 2015). Chan and Park (2015) demonstrated that high visual aid usage, including selecting blue over red colors, was associated with favorable VCs funding decisions. Other VCs observe and judge the management teams' verbal skills, business experience and actions, to estimate investment risk (Joshi & Subrahmanya, 2015).

Education. Previous authors established that education and industry experience are important for management. Examining data from 117 financing rounds in 84 biopharmaceutical firms, Patzelt (2010) explained that CEOs with business education receive more VC financing when the management team is larger. CEOs with significant industry experience receive more VC investment with when they have smaller management teams (Pazelt, 2010). Behrens, Patzelt, Schweizer, and Bürger (2012) specified biopharmaceutical firm managers educated in business, law, medicine, and

biosciences acquire more VC financing only when the firm is younger. These authors indicate VCs draw conclusions contingent upon the configuration of the management teams' education and size, and firm age.

Team heterogeneity. Miloud, Aspelund, and Cabrol (2012) determined that VCs preferred to invest in prospective firms with all key management positions filled, preferably with several founding members. The personalities of management team members are also relevant to VC impressions (Carlos Nunes, Gomes Santana Félix, & Pacheco Pires, 2014). Although diverse management teams have a higher likelihood of personality struggles (Cai, Liu, & Yu,2013), VCs prefer to invest in heterogenous teams (Sahayam, Cho, Kim, & Mousa, 2016; Vogel, Puhan, Shehu, Kiger, & Beese, 2014). In aggregate, more diverse (e.g., education, gender, culture) and cross functionally experienced management teams possibly have lower chances of groupthink behaviors.

Conflict management skills. The potential for conflict between VCs and management is high. The spectrum of activities, from the proposal stage, negotiating term-sheets, and yielding control to VCs, increases the likelihood of conflict (Mohammad, Minai, & Lucky, 2014). Khanin and Turel (2015) reported that management regret making deals with VCs when conflict occurs, so they modify their future funding strategy by approaching other financiers. VCs could evaluate management's conflict management skills during the screening processes, however, post-investment, both sides should remain vigilant about clear communication.

Self-efficacy. Several authors researched the implications of an entrepreneur's degree of self-efficacy. Baron, Franklin, and Hmieleski (2016) posited that managers

who demonstrate resilience and confidence in their abilities were happier and reported lower stress levels. While Baron et al.'s conclusions reflected the beliefs of predominately Caucasian males, Zou, Chen, Lam, and Liu (2016) explored a similar study with Chinese entrepreneurs. Self-efficacious entrepreneurs were more self-confident and cooperative with their VCs (Zou et al., 2016). In contrast, Robinson and Marino (2015) observed that some degree of hubris is inherent in entrepreneurs who start businesses. VCs should consider the combination of humility and confidence they desire in their management teams and acknowledge that most entrepreneurs are self-assured.

Trust. Honesty (Nokolova, Möllering, &Reihlen, 2015), goodwill, and compassion (Cox, Kerschbamer ,& Neururer, 2016) are trust producing behaviors. Although trust is important in business relationships, measuring trust is less straightforward (Batkaikhan, 2017). Bottazzi, Da Rin, and Hellmann (2016) addressed trust by employing a Likert scale, asking VCs to rank their levels of trust for people in various European countries. A 1% increase in trustworthiness increased the likelihood of investment by 7%, with the highest trustworthiness for Nordic citizens and the least for Italy and Portugal (Bottazzi et al., 2016).

When entrepreneurs have Machiavellian-like tendencies, VCs eventually learn the truth. Pollack and Bosse (2014) claimed investors do not immediately terminate a deal when they uncover investee falsification. Rather, the financial losses from terminating a deal impacts the VC's willingness to forgive the dishonesty (Pollack & Bosse, 2014). Middelhoff, Mauer, and Brettel (2014) advanced the literature on how investors built trust with entrepreneurs. In the post-investment phase, a VC's kindness and empathy

levels impact the relationship (Middelhoff et al., 2014) and possibly firm outcomes. Future studies should address the relationship between firm performance and the VC's benevolence towards the management team. If VCs and management teams must co-exist in a reciprocal relationship, they must build tolerance for each other's shortcomings.

An entrepreneur's facial appearance could impact trust perceptions. Ewing, Caulfield, Read, and Rhodes (2015) argued that judging facial appearance for trustworthiness is an intrinsic reaction for most humans. Five-year-old children begin to discriminate untrustworthy faces from trustworthy faces (Ewing et al., 2015). Ormiston, Wong, and Haselhuhn (2017) suggested oblong or thin faced males were considered more capable and honest than others. Brooks, Huang, Kearney, and Murray (2014) chronicled the effect of physical appearance, where investors were partial to attractive male presenters. Although the evidence that facial appearance impacts investment decisions requires further substantiation, the potential for bias is apparent.

Gender. Ceterus paribus, Bigelow, Lundmark, McLean Parks, and Wuebker (2014) demonstrated using student participants, that IPO firms with female CEOs received four-fold fewer recommendations for investments than males. Moreover, male participants did not prefer females for CEO positions, nor did they consider any benefits of female inclusion in the management team (Bigelow et al., 2014). Extending the gender bias research to VCs, Tinkler, Bunker Whittington, Ku, and Davies (2015) showed that VC penalized female leaders lacking qualifications with more significantly reduced venture capital investments than males, although the effect was slightly mitigated if the females and the VC were socially connected. In contrast, Thébaud (2015)

contended VCs perceived females in both the US and UK who engaged in solving business problems as capable entrepreneurs. VCs could reflect on their investment histories for evidence of gender bias.

Female VCs also experience systematic gender bias. Gompers, Mukharlyamov, Weisburst, and Xuan (2016) analyzed gender effects in US venture capital firms. First, 5.4% and 4.6% of total investments and IPOs included a female VC, respectively. Second, 59% of females expressed gender bias in their venture capital careers. Third, female VC's investment outcomes were 15% lower than their male contemporaries, possibly as consequence of less inclusion and collegial support. Collectively, the evidence suggests gender bias for both female VCs and female entrepreneurs is insidious.

Culture. Cultural differences may impact the investment process. Nahata, Hazarika, and Tandon (2014) explored 9,813 VC investments in 30 developed and emerging economies, indicating cultural distance increases VC due diligence due to higher information asymmetries. Increased due diligence led to more VC led exits (Nahata et al., 2014). Moore, Payne, Bell, and Davis (2015) advised that European companies seeking venture capital financing should minimize perceptions of cultural differences. Bengtsson and Hsu (2015) conducted a regression analysis to report a positive relationship between cultural similarity and VC investment. Sharing similar cultural background to a VC in the US increased the probability of investment by 21%; however, those investments were less successful (Bengtsson & Hsu, 2015). Cultural similarities may introduce bias in investment decisions.

Like Bengtsson and Hsu (2015), Gompers, Mukharlyamov, and Xuan (2016) concluded that cultural affinity within venture capital syndicates leads to less successful exits. When VCs syndicated with ethnically similar VCs, the likelihood of exiting the deal profitably decreased 32% (Gompers et al., 2016). For East Asian VCs (60% decrease) and Jewish VCs (25% decrease), the culturally homogenous penalty was even more pronounced. Cultural homogeneity within VC firms and the VC-entrepreneur relationship may increase vulnerabilities towards groupthink, which could impact exit outcomes. Future research could investigate the reasons for decreased performance, such as blurred friendship-business boundaries, reduced professionalism, or groupthink.

Evaluating a LS management teams' drug development capabilities amidst a plethora of criterion is a formidable task for VCs. VCs must collect and evaluate a wide depth and breadth of information about the management team in addition to other investment criteria. While VCs frequent rely on their "gut feeling" or intuition, unconscious bias, such as gender preferences, cultural similarities, alma mater, and entrepreneur attractiveness can influence their decisions to the detriment of future returns. Moreover, because gut feel is neither transparent or documented, the VC cannot reasonably measure or predict an investment's outcome. A BPM framework can assist VCs to disentangle intuition from rigorous selection process. VCs can reduce ambiguity by redesigning their evaluation processes such as specific criteria used to assess management teams and the assessment protocols. Improving the criteria and protocols will help VCs identify success factors for a profitable exit and to make better investment decisions in the future.

Life Sciences

Life science firms make a significant contribution to the development of innovative medicines. Life science companies develop commercially viable technologies for human health, such as medical devices, pharmaceuticals, and biologics (Maak & Wylie, 2016). Authors frequently imply biotechnology when discussing LS companies (Carrick, 2016). Biotechnology and biopharmaceuticals are a subset of the LS industry which involves research in several disciplines (e.g., genetics, molecular biology, cell biology, and immunotherapy) to design and develop therapeutics for human diseases (Bratic et al., 2014; Huggett, 2014).

Life science firms (including pharmaceutical and biotechnology) and financiers form specialized knowledge or clusters in a few regions. The localization of venture capital and other investment firms are essential for advancing research and developing biotechnology ventures in these clusters (Florida & Mellander, 2016; Kim, 2015). Canada produces reputable scientific talent who reside in select biotechnology clusters, predominately Vancouver, Toronto, and Montreal (Canadian Venture Capital Association, 2017). Boston, San Francisco, Seattle, Cambridge, and San Diego represent thriving biotechnology clusters in the U.S., with a critical mass of universities, government research laboratories, venture capital firms, and entrepreneurial firms (Francisco, 2014; Francisco, 2015). Venture capital firm and LS firm proximity, linkages, and cooperation in these clusters translate technical know-how into new biotechnology enterprises.

Drug Development

Progressing a drug from discovery, regulatory approval, and commercialization is an extensive and arduous process. Regulatory agencies require new molecular entities to undergo pre-clinical pharmacokinetic and pharmacodynamic studies in animals before human studies (Pestonjamasp, 2016). Following satisfactory preclinical studies, companies conduct human clinical trials (phases I, II, III), which progress from proof-of-concept early phase trials through to safety and efficacy registrational trials (Bratic et al., 2014). The entire process takes 10 to 15 years to execute (Bratic et al., 2014), including regulatory review waiting periods.

Manufacturers must account for regulatory agency review timelines. Pestonjamasp (2014) observed the U.S. FDA review timelines shortened since 2008, although still require over one year for new drug application (NDA) reviews. U.S. FDA initiatives such as the Breakthrough Therapy designation for serious diseases reduced the NDA review period to 60 days (Darrow, Avorn, & Kesselheim, 2014). Similarly, the European Medicines Agency (EMA) and Health Canada accelerates application reviews, 150 days and 180 days, respectively, for qualifying treatments (Alqahtani, Seoane-Vazquez, Rodriguez-Monguio, & Eguale, 2015; Lexchin, 2015). Alqahtani et al. (2015) contended that the differences between regulatory agency timelines and requirements increase complexities for drug manufacturers. Recent regulatory agency initiatives could be a harbinger for shortened approval timelines in the future.

Costs. Drug development capital costs are formidable and increasing. DiMasi, Grabowski, and Hansen (2016) specified that the capitalized R&D costs for the entire

drug development process is $2870 million USD. While clinical trials consume most of the R&D budget (DiMasi et al., 2017), Rao (2017) argued that increased clinical trial spending does not mitigate risk or de-risk the drug development process. Despite the surmounting costs and high risk, Pitts (2015) contended that ongoing health innovations (e.g., drug development) are critical for reducing health care expenditures and improving human health conditions. Gautam (2015) suggested companies could reduce drug discovery and development costs up to 75% by leveraging scientific and operational capabilities in emerging markets such a Korea, China, and India. Although companies can gain cost savings from outsourcing part of their R&D activities to emerging markets, LS management teams must weigh all the risks and benefits.

Valuation. An investigational new drug's future earnings potential is a chief concern for management and investors. There is little consensus on methods and input parameters in LS valuation, however, discounted cash flow and real options are sometimes applied (Bogdan & Villiger, 2010). Pestonjamasp (2015) contended net present value (NPV) is the main calculation tool used to quantify expected returns, expenditures, and risk parameters. NPV involves determining an investment's present value based on future cash flows (Pestonjamasp, 2015). Bratic et al. (2014) described several risks in NPV calculations, such as errors in risk parameters, overestimating market potential, and underestimating the competition. Iacovides (2016) illustrated an alternative biotechnology valuation model for VCs, where the VC's ownership and investment amounts increase as drug development progresses from phase I to phase III.

While a shift from NPV to other valuation models is imminent, NPVs long-term utility and adoption remains unclear.

Understanding an asset's market potential is imperative during early phases of drug development. Gehr and Garner (2016) suggested that management should identify the commercial potential of a pharmaceutical asset early. Bratic et al. (2014) observed valuators typically include market size, market share, competition, and growth potential in a company's valuation. Giovinazzo (2015) added that early-stage biotechnology companies should incorporate end-user (e.g., physicians, patients, payors) feedback early in the drug development process. Mullard (2014) highlighted that while many experts' forecasts fall short of actual sales performance, in aggregate, the pharmaceutical industry underestimates the value of its blockbuster treatments. Early in the company's lifecycle, LS management teams should build their forecasting capabilities and continue to build relationships with major stakeholders.

Intellectual property. A VCs decision to finance one company versus another may affect which innovations companies introduce in the market. Lehoux et al. (2016) articulated that VCs in Canada are instrumental in medical technology and health care innovations because of their financial investments, oversight, and leadership in early-stage businesses. Likewise, Tian and Wang (2014) found experienced VCs were more inclined to accept failure and led portfolio firms (technology and biotechnology) to file more patents and had more frequent publication citations than other VC-backed firms.

Patents may serve as a proxy for innovation. Hottenrott, Hall, and Czarnitzki (2016) examined patent filing and investments in R&D stage firms from several

industries in the Flemings region from 2000 to 2009. Overall, patents had more investment implications for smaller firms (Hottenrott et al., 2016). In a UK high technology company, Smith and Cordina (2015) reported a direct relationship between the company's patenting activity and VC investment amounts. Other researchers have also reported VCs direct relationship to technology or biotechnology firms' patenting activity (de Rassenfosse & Fischer, 2016; Haeussler, Harhoff, & Mueller, 2014). In sum, while most researchers agree on a relationship between VC and patenting activity, causality is uncertain.

Some VCs might not encourage patent generation after the initial investment. Hoenen, Kolympiris, Schoenmakers, and Kalaitzandonakes (2014) posited that the value of a patent in a biotechnology company depends on the financing round or development stage. Specifically, while patents attracted an additional USD 557,333 in the first round, subsequent patents did not generate future venture capital financing (Hoenen et al.). Likewise, Block, De Vries, Schumann, and Sandner (2014) examined over 50000 venture capital financing rounds from 1998 to 2007 to discover VCs invested more in firms with trademarks predominately in the first financing round because trademark applications positively signal management's foresight and business strategy. These data suggest some VCs view patents as a screening signal.

Hoenig and Henkel (2015) surveyed technology (e.g., biotechnology and cleantech) focused German and US VCs to find an alternative result. VCs considered a firm's network and management experience as more important indicators of quality than patents during the screening stage (Hoenig & Henkel, 2015). Correspondingly,

Knockaert, Huyghe, and Clarysse (2014) clarified European VCs with technical experience would value patents more than a VC with general business experience. Knockaert et al. suggest industry specific technical experience may augment the VC's comprehension and value of the patent. Overall, VCs do not appear to value patents homogenously.

Capabilities. The increasing drug development complexity, from molecule discovery to commercialization requires management teams with skill-set breadth and depth. Gunn, Masterson, Lorton Jr. and Baronet (2016) reported that a biopharmaceutical firm's intellectual property, science, regulatory expertise and fundraising abilities are the most important capabilities for innovation and competitiveness. Schuhmacher, Gassmann, and Hinder (2016) determined that research collaborations, strategic alliances, and open innovation with academia or other biopharmaceutical firms are becoming the norm for building technological capabilities (e.g., drug targets, animal models, or disease expertise). Early-stage LS management teams must balance fostering collaborative networks while maintaining a competitive advantage unique to their firm.

Management skills. Management skill requirements change precipitously as drug development advances from laboratory testing, to human clinical trials, and commercialization. McLaughlin (2015) suggested humility, problem-solving attitudes and an unwavering focus on patients distinguish the best LS management teams. Gehr and Garner (2016) stated that to attract investment, scientific entrepreneurs should master the business of drug development, from discovery to patenting through to commercialization.

Financial acumen. VCs will scrutinize a management team's financial acumen. Jambulingam, Schellhorn, and Sharma (2016) posited that there is a direct correlation between management skills and financial performance of a firm. Meyers (2014) highlighted that business and entrepreneurship training programs are slowly increasing for biomedical professionals. Miron-Shatz, Shatz, Becker, Patel, and Eysenbach (2014) suggested VC involvement in medical conferences could help scientists learn fundraising and business skills. Life science management teams comprising mainly of scientists and researchers could be deficient in their financial management skills. However, they can develop their business skills with support from VCs and training programs.

Regulatory expertise. Strong management teams demonstrate knowledge of regulatory agency (e.g., FDA, EMA and Health Canada) rules, requirements, and nuances. Schueler and Ostler (2016) reported that VCs assess the management teams' regulatory requirement knowledge and navigation savviness during their due diligence process. Sacks et al. (2014) noted that suboptimal dosing, poor study design, and efficacy concerns were reasons for FDA rejections. Woloshin, Schwartz, Frankel, and Faerber (2014) recommended companies could circumvent NDA rejections by seeking FDA special protocol assessment, certifying more robust study designs and better primary endpoints. Life science management teams should swiftly close any knowledge gaps on regulatory requirements and demonstrate their regulatory know-how to improve investor confidence.

Risk is intrinsic to venture capital deals. Chassot, Hampl, and Wüstenhagen (2014) reported VCs evade investments with high regulatory risk. Additionally, U.S.

venture capital investments from 1990 to 2008 revealed VCs mitigate risk in the clean energy sector (high regulatory risk) by syndicating and investing in later stage companies (Petkova, Wadhwa, Xin, & Jain, 2014). These authors suggest VCs may choose lower equity stakes in some industries to hedge their regulatory risk.

VCs must dissect and analyze which factors constitute a capable or high potential LS management team. The drug development process is expensive, lengthy, complex, and highly regulated. Life science management teams are typically entrepreneurial, scientific researchers whose main expertise are in LS disciplines. Life science management teams build networks, alliances, locate suppliers, raise financing, learn regulatory requirements, intellectual property, and hire talent for different departments. Mastering the drug development process (e.g., clinical trials, regulatory requirements, and payors), building a business, managing investment funds, and commercializing a product requires a cross functional team with various skill sets, leadership competencies, time, and trial and error. Additionally, LS management teams must keep abreast of advances in scientific research and other innovations. The VC evaluation process should account for the complexity of the drug development process and the broad expertise requirements.

Venture Capital Value Proposition

VCs invest in portfolio companies in exchange for equity and governance (Gompers & Lerner, 2001) though often with significant differences or preferences between VC firms (Hochberg, Lindsey, & Westerfield, 2015). Pre-investment, VCs who are satisfied that they will have sufficient governance and monitoring of the prospective

firm are more likely to invest (Drover, Wood, & Payne, 2014). Although investees must give some control to VCs in exchange for capital, VCs offer other resources, namely, certification, mentoring, and networks.

Monitoring. VCs deliberate the monitoring and governance process as early as screening the phase. Farag, Mallin, and Ow-Yong (2014) suggested monitoring activities increase with higher investments and led to better portfolio firm performance. Similarly, Proksch et al. (2017) suggested venture capital companies are highly engaged in supporting ventures with financial and human capital issues as well as to establish strong governance mechanisms to reduce information asymmetries between founders and investors. A combination of strong VC governance mechanisms and quality management are requirements for firm outcomes.

Certification. A venture capital investment may send a quality signal to the broader investment community about the entrepreneurial firm. Guerini and Quas (2016) empirically demonstrated an increase in the probability of receiving additional venture capital investments after receipt of government venture capital in Europe. Ogura (2016) concurred that the VC's presence provided a certification signal, thereby lowering the risk profile of IPO companies. Conversely, Miloud (2016) reasoned that adverse selection artificially intensifies the certification benefits towards inexperienced portfolio companies who seek venture capital more than seasoned entrepreneurs. More seasoned entrepreneurs use their experience to attract other forms of investment. Overall, the VC's certification value-add may not be ubiquitous.

Mentoring. The VC may transfer general business and industry-specific knowledge to portfolio companies. Venture capital affiliation offers mentorship for both experienced and inexperienced investees (Plummer, Allison, & Connelly, 2016). Pierrakis and Saridakis (2017) reported that while some UK government VCs were proficient at screening prospective deals, they lacked coaching skills to support patenting activity post-investment. Meglio, Mocciaro Li Destri, and Capasso (2017) contended that the best VCs practice robust coaching processes and procedures accumulated from their past experiences (especially industry experience). Importantly, the coaching skillset may enhance portfolio firm outcomes (Meglio et al., 2017). Singh, Aggarwal, and Cojuharenco (2015) reported that VCs with amateur IT knowledge demonstrated more hubris and confidence than VCs with modest IT proficiency. These authors suggest that VC's with limited industry and domain expertise may disguise their shortcomings with overconfident behaviors. Scholars have not elucidated the education and experience requirements for VCs investing in LS companies.

Some countries allow banks to offer debt equity such as venture capital. Ye (2015) reiterated that regulations limit countries like Denmark, Sweden, Canada, and the United States banks on the amount of debt equity financings they can offer. Ye argued during investment scenarios with unusually high information asymmetry and heavy R&D expenses, investors (including European banks) can negotiate milestone payment plans instead of upfront lump sum payments. The author neglected to account for the other value-added benefits and oversight VCs provide, which are not easy for banks to mimic.

Finally, Wong (2014) suggested governments adopt tax credits policies (e.g., risk premiums) to compensate VCs for the high risk inherent in start-up equity deals.

Network. Many entrepreneurs covet access to a wider network (e.g., entrepreneurs, financiers, experts, lawyers, and investment bankers) to increase their chances of success, even at the expense of valuation (Falik, Lahti, & Keinonen, 2016). VCs grant investees access to their networks. Forming syndicates multiplies VC networks (Bellavitis, Filatotchev, & Souitaris, 2017). Bellavitis, Filatotchev, and Kamuriwo (2014) demonstrated that while all networks are important, VC-backed companies benefit more from external networks than contacts from the same industry. Concurrently, Cox Pahnke, McDonald, Wang, and Hallen (2015) cautioned these network linkages, direct or indirect, can inadvertently disclose pertinent information to competitors. In a retrospective analysis of medical device product launches, innovativeness and the number of associations were inversely related (Cox Pahnke et al., 2015), suggesting more connections could decrease new product creations. Taken together, network composition and network reach have implications for its utility and added risks for both the VC and the VC-backed firm.

Venture capital investments are embedded with risks. In addition to capital, VCs may provide certification, network, and mentoring value-add to their portfolio firms to increase their chances of success and mitigate risk. An ideal venture capital deal should afford mutual benefits and positive-sum outcomes for both parties.

The review of the literature illustrates the VC investment process and the drug development process. Drug development is about building a health care enterprise to

treat human health conditions. The chosen conceptual framework, BPM, is based on the premise is that if a VC continuously improves his evaluation processes, then he increases his chances of investing in a successful firm. As such, improving evaluations of a LS management teams' capability for developing a drug can help the VC select winning investments. To improve evaluations of LS management teams, VCs should inventory their own drug development expertise and apply their know-how during the evaluation process and post-investment activities. Increasing investments will help VCs enhance their LS investment skills. With greater experience, VCs can identify best practices, management capabilities and patterns which correspond to success. Some VCs may help improve a LS management teams' limitations, such as business management, financial literacy, and networks. After a review of the literature, the need for new research related to improving VCs evaluation processes of LS management teams' drug development capabilities proved necessary.

Transition

In Section 1, I presented (a) the background of the problem, (b) the problem and purpose statements, (c) the research question,and (d) the research methodology and design. I presented information on the conceptual theory that underpins my study: business process management. In Section 2, I detail the role of the researcher, the case study method and qualitative research design, population and sampling used in the study, ethical research, data collection, data analysis, research validity and reliability. In Section 3, I present the findings and the significance of this study as it relates to professional business practice and social change.

Section 2: The Project

In Section 2, I outline how I conducted this study on VC process improvement strategies for evaluating LS management teams. I restate the purpose statement and elucidate (a) the role of the researcher, (b) study participant selection, (c) the research methodology and design, (d) study population and sampling, (e) ethical research considerations, (f) data collection, (g) data analysis techniques, and (h) reliability and validity considerations.

Purpose Statement

The purpose of this qualitative multicase study was to explore effective strategies VC partners use to improve their evaluation processes of LS management teams' drug development capabilities. The target population included American and Canadian venture capital firm partners who successfully improved their evaluation processes of at least one Canadian LS management teams' drug development capabilities in the past 10 years. The implications for positive social change include improving investment decisions and stakeholder returns, which may enhance investment in LS firms for enabling development of innovative therapies to treat illnesses in areas of unmet medical needs for improving patients' lives.

Role of the Researcher

I was the data collection instrument in this study. In qualitative studies, the credibility, dependability, and transferability of the data rely on the integrity of the researcher (Noble & Smith). Researchers influence the study's integrity with their past

experiences, research skills, and communication skills (Berger, 2015). My role as the researcher included personally interacting with the research participants to (a) solicit participation, (b) schedule interviews, (c) conduct interviews, (d) member check, and (e) other activities, as required, during the research process. Notably, before conducting this study, I had no relationships or interaction with the participants.

Although I had no direct prior experience with the participants or venture capital, I had extensive work experience in the LS industry. My experience in both biotechnology firms and large pharmaceutical firms spans several areas of drug development, namely drug discovery, clinical trial management (Phases I to IV), marketing, market access, medical affairs, and sales training. Launching new pharmaceutical products (including preapproval and postapproval activities) in clinical research and medical affairs shaped my impression of factors for commercial success.

Researchers are responsible for abiding by a code of ethics and to protect study participants. The Belmont report outlined the basic ethical principles for research in human subjects including respect for persons, beneficence, and justice (U.S. Department of Health, Education & Welfare, 1979). I followed the ethical guidelines described by the Walden University Internal Review Board (IRB), obtained informed consent, and kept participant identity and geographical locations confidential and anonymous with identification codes.

Researchers must obtain informed consent to ensure participants are fully informed about any risks and benefits of study participation (U.S. Department of Health, Education & Welfare, 1979). I obtained informed consent from participants and ensured

they understood the risks and benefits of participating in this research study. To remain transparent, my intent was to disclose any potential connections, conflicts of interests, or other conditions that might lead to misperceptions among participants.

I did not lead participants to believe that involvement in this research project would lead to new investments or reveal insider information. Study participants are often concerned about the loss of privacy during the research process (Bonevski et al., 2014). My intent was to make efforts to conduct the interviews in private spaces and to protect the participants' confidentiality and anonymity at all times.

As the researcher, I was the data collection instrument. Consequently, my previous experience in the LS industry had the potential to introduce bias into the study. Sutton and Austin (2015) suggested a degree of bias is inevitable in qualitative studies because researchers analyze data through the lens of their previous experiences and pre-existing beliefs. The researcher's proximity to the subject matter and participants may affect the data collection and interpretation (Berger, 2015). Identifying biases and assumptions helps the researcher achieve neutrality during the research process (Austin & Sutton, 2014; Darawsheh & Stanley, 2014).

Researchers can mitigate bias in several ways. First, researchers must remain objective and neutral when communicating with the participants. Second, researchers must ensure interview questions align with the research question(s). The researcher has a responsibility to ensure she is interpreting and analyzing raw data in the intended context (Moravcsik, 2014). When appropriate, researchers may ask additional clarifying and probing questions about their processes or experiences. Third, transcripts and use of

qualitative data analysis software for coding and thematic analysis will help mitigate bias. Member checking ensures transcripts are accurate and verifiable with the intended meaning (Harvey, 2015; Onwuegbuzie & Byers, 2014). Fourth, researchers should conduct member checking to verify if their interpretations of participant responses are correct. Fifth, a field journal can help decrease bias and personal lens influences (Yin, 2014). Researchers should keep a field journal (research diary) to record notes and account for thought processes during the study.

My intent was to use an interview protocol (Appendix A) to conduct the interviews. The researcher can enhance interview protocol reliability by ensuring the interview questions align with the research questions (Castillo-Montoya, 2016). Semistructured interviews permit the researcher to probe participants' responses, which leads to a dynamic, deep inquiry of phenomenon based on the participants' responses (Brinkmann, 2014; McIntosh & Morse, 2015; Mojtahed, Nunes, Martins, & Peng, 2014). I derived the semistructured interview questions based on the research question and conceptual framework, BPM. An interview protocol serves as a procedural guide, including the start-to-finish script for the entire interview process (Jacob & Furgerson, 2012). The interview protocol assisted me to reiterate the research objectives, standardize the interview process, reduce variability, and mitigate bias.

Participants

Participant eligibility criteria define the study population. To address the overarching research question, I recruited successful VC's who previously evaluated LS management teams' drug development capabilities as part of their investment process.

Study participants must have experience with the phenomenon and be willing to provide information for addressing the research question (Cleary, Horsfall, & Hayter, 2014; Robinson, 2014; Yin, 2014). The study inclusion criteria were 10 VC partners and managing directors from venture capital firms located across the United States and Canada who have expertise in evaluating LS management teams. The National Association of Securities Dealers Automated Quotations (NASDAQ) and the New York Stock Exchange (NYSE) website contained listing of all LS IPO firms within the past ten years. The IPO listing represents a successful investment exit (Ogura, 2017; Sahaym, Cho, Kim, & Mousa, 2016). Investment success, as evidenced by reaching an IPO or an M&A, is a relevant aspect of the research question.

The study exclusion criteria included VC partners or managing directors solely financed by corporate or government venture capital firms. Successful exits are not the primary motivations of corporate venture capital and government venture capital firms (Brander, Du, & Hellmann, 2014; Chemmanur, Loutskina, & Tian, 2014). Although venture capital firm employees, such as analysts, play important roles in the selection process, they are not the final investment decision makers (Feld & Mendelson, 2014; Ramsinghani, 2014). Consequently, I excluded analysts or research associates employed in the venture capital firms. These inclusion and exclusion criteria demonstrate alignment with the overarching research question because this participant profile has successfully evaluated LS management teams' drug development capabilities.

Gaining access to elite research participants such as VCs was challenging. Accessing any participants' knowledge and experience requires the researcher to build a

respectful, open, and trusting partnership (Kondowe & Booyens, 2014). Verbal, written, and electronic invitations are acceptable ways to contact the participant and solicit participation in the process (Yin, 2014). My strategy for finding eligible VCs was to a) compile a list of Canadian biotechnology firms who reached an exit in the past 10 years; b) search the Canadian portfolio firms' website (e.g., press releases or annual reports) to verify if a venture capital firm invested in the company; and c) visit the venture capital firm's website. As all participants were unknown to me, I e-mailed and telephoned prospective VC participants using contact information from their company website or LinkedIn. The e-mail content included an invitation to participate and the attached IRB approved informed consent form.

If the prospective participant did not respond to the e-mail inquiry within two business days, I sent a follow-up e-mail and telephoned the participant. Telephone solicitation assists researchers in achieving recruitment goals (Foss, Kjærgaard, Stensballe, & Greisen, 2016). My intent was to remove the participant from consideration if there was no response in 5 days following the final e-mail contact or voice message. All 10 interviews were completed within 3 weeks following IRB approval and took between 22 and 75 minutes with a mean interview time of 60 minutes.

My intent was to build a working relationship with the VCs from the onset. Outlining the researcher's roles and responsibilities, the research objectives (Robinson, 2014), and establishing transparency help build a trusting working relationship (Byrne, Brugha, Clarke, Lavelle, & McGarvey (2015). In my introductory e-mail, I established trust and openness by introducing myself, the research objectives, the interview timelines,

the interview questions, and the IRB approved informed consent form. We exchanged contact information and availability. Accommodating study participants' schedules and meeting location preferences increases willingness to participate and builds goodwill (Newington & Metcalfe, 2014). Researchers should conduct telephone interviews at a time convenient for the participants and should not solicit more time than necessary.

Research Method and Design

The study involved exploring successful strategies used by some VCs to improve their evaluation processes of LS management teams' drug development capabilities. I employed a qualitative research method and case study design to conduct the study. The following subsections include an explanation of the selected research method and research design.

Research Method

In this study, I used a qualitative research method. Qualitative research is a comprehensive exploration of a social phenomenon (Park & Park, 2016) from the participant's perspective (Hammarberg, Kirkman, & de Lacey, 2016). The main aim of qualitative research is to use what, how, or why questions to generate descriptive (i.e., nonstatistical) insights into a problem (McCusker & Gunaydin, 2015). Objective observation, thick-rich data collection from in-depth interviews, and reflection and analysis of texts and documents help the researcher understand the fundamental drivers and motivations behind actions (Kozleski, 2017).

Quantitative research is a positivist approach to testing relationships between variables and measuring hypothesis (Choy, 2014). Researchers use statistical analysis to

analyze and interpret information collected from a sample to draw conclusions about a wider population (Barnham, 2015). Sample size, randomization, stratification, p-values, and confidence intervals affect the significance of the results (Simpson & Lord, 2015). In sum, quantitative methodologists interpret factual data. Consequently, a quantitative research method was inappropriate for exploring the meaning and social context of VC evaluation processes.

Mixed method research integrates qualitative and quantitative research methods for an inquiry into a phenomenon (Maxwell, 2016). Researchers may employ the two methods in parallel or sequentially in a research study (van Griensven, Moore, & Hall, 2014). Merging qualitative and quantitative methods in one study could mitigate limitations of each method and provide richer insight into the phenomenon (Turner, Cardinal, & Burton, 2017). The additional time and complexity deemed mixed methods research unsuitable for addressing the research question.

The research question determines the research methodology. Exploring strategies VCs used to evaluate LS management teams requires an inductive and constructivist perspective. VCs decisions evolve from their unique values, beliefs, past experiences and firms' objectives (Dhochak & Sharma, 2016). The in-depth individualistic inquiry characteristic of qualitative research allows for deep insights into human behavior (Isaacs, 2014). Consequently, I chose a qualitative research method.

Research Design

I used a multicase study design to collect information from a purposeful sample of 10 VCs located in the United States and Canada. Case study designs permit the

researcher to interact with participants in their environments (Tetnowski, 2015). A multicase study approach allows the researcher to compare, contrast, and consolidate participants' responses to similar lines of questioning (Leonard, 2014) and generate themes (Hyett, Kenny, & Dickson-Swift, 2014). My selection for investigating and determining themes from several VCs perspectives was the multiple case study design.

Other research designs for exploring a research question include ethnography, phenomenology, grounded theory and narrative studies. Ethnographic researchers focus on collecting information about a phenomenon through observation or examination of people over an extended period (Segelström & Holmlid, 2015). The ethnographic design allows the researcher to observe participants in their environment but does not permit her to offer suggestions or behavior modifications (Ross, Rogers, & Duff, 2016). I required VCs to articulate their past investment experiences and observing them in their present setting would not address the research question.

In a narrative approach, researchers listen to participant stories about their lives or events and organizes it into a chronological order (Rooney, Lawlor, & Rohan, 2016). The emphasis of my study was to explore VC strategies used to evaluate management teams and listening to broad stories about VCs' lives, or their investments could derail the research study. Phenomenologists seek to understand a phenomenon based on the meaning and reflections participants attach to their lived experiences (Sohn, Thomas, Greenberg, & Pollio, 2017). Grounded theorists develop a theoretical framework from several iterations of data collection (Lowe, Milligan, Watanabe, & Brearley, 2015). None of these approaches were appropriate for the present study.

Knowing when to stop data collection is a challenge for qualitative researchers. Data saturation occurs when additional data collection contributes no new themes or ideas to the research study (Gentles, Charles, Ploeg, & McKibbon, 2015). The data collection methods (e.g., interviews), sample size, and sample selection determine when data saturation is reached (Fusch & Ness, 2015). VCs who assessed a LS firm for investment which have successfully reached an IPO or M&A exit are a niche group. A study will require fewer participants if the research question addresses a niche group and the researcher engages in strong in-depth dialogue during the data collection process (Malterud, Siersma, & Guassora, 2016).

In-depth qualitative research inquiry into even a single case can yield valuable insights (Boddy, 2016). Further, two or three case studies could be sufficient for exploring a phenomenon within a homogenous population (Yin, 2014). The sample for this study included 10 VCs from venture capital firms in the United States and Canada. My intent was to code and analyze the interview data using software. Interviewing several participants from more than one venture capital firm to gain an understanding of how VCs improve their evaluation processes of LS management teams made using a case study design appropriate. The multiple case study design provided sufficient data saturation to help develop a detailed account of the investment improvement phenomenon. When no new major themes emerged from the interview data, I concluded the data was saturated.

Population and Sampling

Researchers must select an appropriate and representative sample from the population (Robinson, 2014). The research question for this study is what strategies successful VC partners used to improve their evaluation processes of LS management teams' drug development capabilities. The study population to answer this question included data from 10 VCs from 10 separate companies who successfully invested in a LS firm in the last 10 years. The participants of this study were residents of the United States or Canada. The participants had professional experience evaluating LS management teams' drug development capabilities, demonstrating alignment with the research question.

I selected the participants using purposeful sampling. In a purposeful sampling strategy, participants are selected because they have experience with the phenomenon and can provide in-depth information about a phenomenon (Duan, Bhaumik, Palinkas, & Hoagwood, 2015; Palinkas et al., 2016). Homogeneous populations can also reduce variation and simplify data analysis (Duan, Bhaumik, Palinkas, & Hoagwood, 2015). Two or three case studies could be sufficient for detailed investigation of a phenomenon within a homogenous population (Yin, 2014). Galvin (2015) asserted that if a theme is present in 25% of the overall subject population, then there is at least a 76% chance the theme will emerge in an interview of five participants. I interviewed 10 participants and achieved data saturation after five interviews to yield the major themes.

Data saturation affects the transparency and credibility of qualitative research. Data saturation occurs when participants provide repetitive responses to interview

questions or when no new themes or codes emerge (Gentles et al., 2015). Five participants in a case study are sufficient to provide thick, rich data in a homogenous population (Molenberghs et al., 2014; Yin, 2014). Engaging in in-depth inquiry with a niche group of 10 VCs who invested in LS firms which reached an IPO or M&A exit was sufficient for data saturation. If I did not achieve data saturation by interviewing at least five VCs from venture capital firms in the United States and Canada, my intent was to continue interviewing additional VCs until data saturation.

Participant selection criteria must be appropriate to the study. Appropriate case study participants possess expertise, experience, knowledge, and a willingness to share their ideas (Bardus, Blake, Lloyd, & Suggs, 2014; Brooks & Normore, 2015; Thompson, Petty, & Scholes, 2014). Participants must be (a) a partner or managing director level VC within a U.S. or Canadian venture capital firm, (b) available and willing for interviewing via telephone, and (c) 18 years or older. Canadian biotechnology or major pharmaceuticals IPO listings are available on the NASDAQ and NYSE websites. I reviewed the Canadian biotechnology IPO firms' websites to investigate if a venture capital firm financed them. If the venture capital firm invested in the IPO firm, typically the venture capital company website listed the VC's contact information. Additionally, I scanned the CVCA and NVCA websites for a listing of VC firms that invest in LS companies.

I requested study participants to respond to semistructured interviews questions via telephone. The open-ended question format permits the researcher to probe participant responses, adding flexibility to the format (McIntosh & Morse, 2015). The

semistructured interview questions improve reliability, help direct the conversation, and encourages further dialogue (Jamshed, 2014). Telephone interviews are often more comfortable and convenient for participants (Saura & Balsas, 2014). When a researcher develops rapport and communicates respect for the participant, a telephone interview format is amenable to thick-rich data collection (Drabble, Trocki, Salcedo, Walker, & Korcha, 2016; Yin, 2014).

Ethical Research

Researchers involving human subjects in their study must ensure the research protocol, the informed consent form, and any other documents provided to the participants are approved by an IRB or institutional review board (Blackwood et al., 2015). I obtained ethics approval from Walden University's IRB (IRB approval number 11-03-17-0639637) before conducting any study related procedures. My intent was to safeguard the well being and safety of my interviewees at all times during the study.

After receiving Walden University IRB approval to conduct this study, I communicated with study participants as follows:

1. I e-mailed the VC to request participation, described the purpose of this study, reminded the VC about voluntary participation, and informed the VC about his right to end the interview at any time.
2. I advised the VC he is free to refrain from answering any questions he feels uncomfortable about.
3. I explained to each VC the identity protection and confidentiality method I will use prior to conducting the interview.

4. I requested the VC to review the Informed Consent Form to ensure his understanding of this study purpose and my role in this study.

5. I conducted interviews after IRB approval and after the participants' provided Informed Consent (see Appendix B) by replying to an email with "I consent".

6. On the day of the interview, I followed the interview protocol (see Appendix A). The interview protocol outlined steps for ensuring standardized execution of the interviews.

The Informed Consent Form is a vital document to protect and inform human participants about the research study. Transparency and clarity are important elements of the informed consent process (Atz, Sade, & Williams, 2014). The informed consent process requires the researcher to explain the nature of the study to the participant, answer any questions, and allow the participant time to reflect before signing (Gainotti et al., 2016). A predominant ethical consideration is protecting the privacy and confidentiality of study participants (Mealer & Jones, 2014). Participants had an opportunity to ask me questions about the study via telephone or e-mail. The informed consent form for the present study included the purpose of the study, study procedures, the voluntary nature of participation, risks and benefits, a privacy statement, contact information, and sample interview questions.

Researchers should make efforts to be sensitive to participants and their requests. To build rapport with the participants of the research study, I conducted the interview during a mutually convenient time via telephone. Researchers should not coerce participants nor offer incentives for involvement. Participants had the opportunity to

withdraw without penalty at any time during the study. If a participant withdraws consent after the interview, my intent is to expeditiously shred and destroy data provided by the participant.

Specific measures to ensure the ethical protection of participants included using participant deidentification codes instead of names and appropriate labeling of hard-copy and electronic data. I deidentified participant names, organization names and specific investment history during the data collection, analysis, and reporting stages with codes. My intent is to protect source documents (including paper and USB drives) for 5 years in a locked safe, after which I will permanently destroy the files.

Data Collection Instruments

I served as the data collection instrument for this study. My intent was to prepare the semistructured interview questions, conduct the interviews, transcribe the interviews, and analyze and report the data. Semistructured interviews are organized around a set of predetermined questions which permit other questions to emerge from the discussion (Palinkas et al., 2016). Using open ended questions (see Appendix A) with research participants, I collected and recorded information about how VCs have improved their evaluation processes of LS management teams' drug development capabilities.

Rigor is an important consideration in qualitative research. Researchers can potentially introduce bias into qualitative research from their personal characteristics (e.g., gender, culture, or education) and their past experiences (Chenail, 2011). Using a software program to code and analyze the data helped minimize bias. Telephone interviews may provoke more clarification questions from interviewees (Irvine, Drew, &

Sainsbury, 2013). I spoke clearly and clarified any questions when asked. Further, I conducted the telephone interviews from my home office to ensure privacy.

Researchers must triangulate several sources to enhance the reliability and validity of the data. Data triangulation is a process where several data sources are checked for similarities, discrepancies, and for verification of events or statements (Carter, Bryant-Lukosius, DiCenso, Blythe, & Neville, 2014). I reviewed company websites (venture capital and LS firms), financial reports, and press releases to triangulate data. Member checking is a process used for ensuring the accuracy of the collected data or the researcher's interpretation of the data (Harvey, 2015). Postinterview, participants reviewed my interpretive summaries for verification and confirmation of accuracy.

Data Collection Technique

The research question for this study is what strategies do successful venture capital partners use to improve their evaluation processes of LS managements teams' drug development capabilities. I used several data sources to address the research question. The sources included open-ended interviews, company documents, and press releases. Before the interview, my intent was to contact each participant to schedule the telephone interview, discuss the informed consent form, address any questions, request a signed and dated informed consent form, and verify consent to record the interview.

Following the preinterview contact, I conducted the interview on the prearranged date. Researcher's write protocols to explicitly document procedures, thus ensuring consistency, integrity, and accountability (Goto, Muragaki, & Aruga, 2016). Significant protocol deviations may impact data collection and interpretation (Moher et al., 2015).

The Interview Protocol (see Appendix A) outlines the study conduct procedures from the beginning to the end of the interview. The steps included greeting the participant, reviewing interview procedures (including audio recording), conducting the interview, reminding the participant about member checking, and closing the interview.

I conducted all interviews via telephone, which ranged from 35 to 75 minutes. Telephone interviews allow participants flexibility to participate from their own social space (Redlich-Amirav & Higginbottom, 2014), such as their home or office. Face-to-face interviews may elicit social desirability bias, a situation where interviewees provide responses to appease the interviewer (Szolnoki & Hoffmann, 2013). In-person interviews would be financially onerous for me because the VCs resided in a broad geographical area. Skype video conferencing is an alternative for research interviews and brings an opportunity to observe the participant's facial cues (Janghorban, Roudsari, & Taghipour, 2014). While Skype is an increasingly popular choice in interview techniques, video conferencing could be more prone to technical difficulties, and some participants might not have access to a webcam. To maintain participant engagement and comfort, researchers should minimize study conduct difficulties (e.g., technical difficulties). Additionally, variations in interview mode (e.g., using both Skype and telephone modalities) could increase variability of responses, therefore, my intent was to solely use telephone interviews.

Company annual reports (e.g., Form 10k and Form 10Q) and company websites are important data sources. Yin (2014) asserted that a case study should have a minimum of two sources of evidence for data collection. Publicly available documentation such as

annual reports and websites are unobtrusive and corroborate information collected during the interviews (De Massis & Kotlar, 2014). Requests for internal documents could increase participant apprehensiveness, discomfort, and privacy concerns (Henderson, 2016). While I did not review any proprietary checklists from the VCs for evaluating management teams during their due diligence process, the details of the checklists were discussed during the interviews. Researchers should not anticipate permission to view confidential and highly sensitive internal records. If granted access, my intent was to treat company documents as private and confidential data.

Post interview, I transcribed the interviews from the audio recordings into a Microsoft word document. My intent was to summarize and interpret each interview transcript. Member checking validates the response and interpretation accuracy (Birt, Scott, Cavers, Campbell, & Walter, 2016; Harvey, 2015; Onwuegbuzie & Byers, 2014). Study participants reviewed my transcript interpretations, to ensure accuracy and consistency of their verbal responses. All participants were available for further data clarification as needed.

Data Organization Technique

Source document maintenance is vital in research studies. Maintaining source documents which are legible, complete, and attributable can help an independent observer reconstruct the study and to confirm the data (Bargaje, 2011). Good documentation practices also include recording every participant contact on a log (Weisskopf, Bucklar, & Blaser, 2014). I kept a research diary, a master list of VCs, VC contact information, and venture capital firm locations in a file on a password protected

USB drive. I assigned each VC a participant identification (ID) number, which will be a combination of an alphabetical and numerical file name. Each participant file containedd e-mail correspondence, interviews' recordings, and a record of any contact.

An iPhone 7 smartphone and the TapeACall Pro™ app served as the recording instrument the for the interviews. Subsequently, I uploaded the audio files to a USB drive as the master storage device. NVivo 11® will served as the software for coding and analyzing the raw data. My intent is to store the USB key in a locked cabinet containing all study data for five years following Walden University CAO approval.

Data Analysis

Triangulation in case study research mitigates bias and increases the validity of a study. According to Denzin (1970), there are four types of triangulation: data triangulation, investigator triangulation, methodological triangulation, and theory triangulation. I used methodological triangulation in this study. In trigonometry, triangulation is the process of identifying one's position by measuring the person's angles to two other known positions (Joslin & Muller, 2016). Triangulation in qualitative research is using two or more sources to achieve an in-depth understanding of a phenomenon (Denzin, 2012). The combination of multiple sources adds rigor, breadth complexity, richness, and depth (Denzin, 1970).

Data analysis is an involved and tactile component of qualitative research. Qualitative data analysis is organizing data into manageable parts and noting patterns and repetitions (Yin, 2014). Open-ended questions, company documents, and press releases gathered during data collection and their subsequent analysis helped answer the research

question. The original transcripts served as the basis for data analysis, and I assessed the entire transcript. Qualitative data analysis can include inductive and deductive approaches (Graneheima, Lindgrena, & Lundman, 2017). Inductive data analysis is categorizing raw data into themes through repeated comparisons for a more granular understanding of a phenomenon (Graneheima et al., 2017). Deductive data analysis is the process of fitting the raw transcript data into the model's or theory's dimensions (Graneheima et al., 2017).

Qualitative researchers distill and interpret themes from raw, unstructured data. Coding involves highlighting and subdividing textual data into salient categories and labeling these with code words (St.Pierre & Jackson, 2014). Transcripts can have several succinct codes. The codes are organized or grouped into interconnected broader themes and sub themes (Brinkmann, 2014). I carefully read the transcripts several times and labelled sections of phrases.

My intent was to use deductive coding to group the transcripts based on the interview questions (e.g., I reviewed Question 1 answers, Question 2 answers, and so on). Within each question grouping, my inductive analysis helped to code sections. Combining codes into similar groups and labelling these groups as themes helped me make connections and to link these themes to answer the research question.

Researchers increasingly use computer software in qualitative data analysis. NVivo 11 Plus® is a computer software which enables researchers to systematically organize, and analyze several forms of raw textual data such as interviews, focus groups, websites, and other documents (Castleberry, 2014; Woods, Paulus, & Atkins, 2015).

Importantly, NVivo 11 Plus® assists the researcher's analysis process but does not conduct data analysis for her (Zamawe, 2015). NVivo 11 Plus® users can highlight sections of text and assign it to a priori "nodes" (Sotiriadou, Brouwers, & Le, 2014). The themes can include categories and sub-categories (Sotiriadou et al., 2014). I inputted my interview transcripts, and other data sources into my a priori and ad hoc nodes in NVivo 11 Plus®. Finally, my intent was to seek themes that aligned with the BPM conceptual framework.

Transcription quality can impact data analysis. Researchers may hire an external transcription service to transcribe the interviews. Transcriptionists must comprehend the recording content to maintain dependability (Stuckey, 2014). Even when researchers hire external transcriptionists, the researcher must review the audio recordings with the transcribed document to ensure accuracy. To save resources researchers sometimes transcribe interviews themselves. After uploading the audio files into NVivo 11 Plus®, I transcribed the interviews directly in the software.

Reliability and Validity

Reliability

Reliability and dependability are a fundamental cornerstone of the qualitative research paradigm. Trustworthiness helps evaluate rigor in qualitative research (Elo et al., 2014). Triangulation, member checking (transcript review), and a study protocol increases data reliability in case study research (Cronin, 2014). Triangulation is corroborating more than one source to strengthen evidence whereas a protocol helps assure consistency and reproducibility (Cronin, 2014). Member checking helps to

validate qualitative research by reengaging the participants to verify the researcher's interpretations with their intended meaning and word choice (Harvey, 2015; Onwuegbuzie & Byers, 2014). Sending data interpretations and conclusions back to the participants for review is instrumental in enhancing reliability (Elo et al., 2014).

My plan for increasing the reliability and dependability of this case study included using (a) multiple data collection sources (e.g., company documents, press releases, and conducting semistructured interviews), (b) conducting the study as outlined in the research protocol (see Appendix A), (c) conducting member checking, and (d) continuously inspecting the raw data and interview notes to verify the data. Following a protocol will ensure procedural reliability and will decrease variations. Researchers can achieve data consistency by documenting the process of inquiry (Baskarada, 2014; Cope, 2014). I took notes, allocated sufficient time for the interview, and recorded the interviews. Sufficient time with participants can help build trust and engagement (Cope, 2014). After completing the interviews, participants reviewed my interpretations of the transcripts.

Validity

Credibility, transferability, and confirmability are used to determine the validity in a qualitative study (Noble & Smith, 2015). Member-checking and triangulation are strategies to ensure data truthfulness, confirmability, and credibility (Noble & Smith, 2015). I selected a purposeful sample of VCs from the United States and Canada. Member checking is a review process for ensuring the accuracy of the collected data or the researcher's interpretation of the data (Harvey, 2015). Data triangulation is a process

where several data sources are checked for similarities, discrepancies, and for verification of events or statements (Carter et al., 2014). My intent was to member-check, triangulate the data, and include selected participant quotes to demonstrate study credibility and confirmability.

I do not expect to transfer or generalize the findings of this study to other contexts. Qualitative researchers conduct inquiry into a selected population about a phenomenon (Leung, 2015). Hence, the results of a qualitative study may not apply to other settings or groups. The research question is specific to venture capital partners' process improvement when evaluating LS management teams' drug development capabilities, which is a niche group. Other researchers must determine themselves if a qualitative study's findings may apply to their circumstances (Marshall & Rossman, 2016).

A researcher must establish confirmability. Qualitative researchers may include participant quotes which represent a theme to demonstrate confirmability (Cope, 2014). Quotes provide evidence that the study results are shaped by the participants and help illustrate reasons for producing specific themes. I demonstrated confirmability by reviewing peer-reviewed literature and data triangulation to support the study results.

Researchers must collect sufficient data to answer the research question and delineate criterion for data saturation. Data saturation occurs when participants provide redundant responses to interview questions or when no new themes or ideas emerge (Gentles et al., 2015). Purposeful sampling permits the researcher to sample a more homogenous sample to achieve data saturation with fewer participants (Fusch & Ness,

2015). Researchers should justify their chosen sample to ensure study validity (Yin, 2014). My intent was to engage in in-depth inquiry with a niche group of VCs who assessed LS management teams and have successfully exited a deal via an IPO or M&A. Although my expectation was to achieve data saturation by interviewing five VCs from venture capital firms in the United States and Canada, I conducted 10 interviews. I adhered to the study protocol (see Appendix A), interviewed until I reached data saturation, triangulated data sources, member checked, and meticulously analyzed the data for themes.

Transition and Summary

In Section 2, I described the research method and design, participants and population sampling, data collection and analysis techniques, and the study's reliability and validity. Data collected through interviewing and other sources supportedunderstanding and knowledge of VC evaluation processes of LS management teams' drug development capabilities. The identified themes have the potential to illuminate important information for VCs, LS management teams, scientific research constituents, and the investment community. I intend for this qualitative study's findings to be an impetus for further research into VC evaluation processes for LS management teams and other industries. In Section 3, I present the major themes identified from the semi-structured interviews and coding process.

Section 3: Application to Professional Practice and Implications for Change

Introduction

The purpose of this qualitative multicase study was to explore strategies successful VCs use to improve their evaluation processes of LS management teams' drug development capabilities. I collected data from 10 VCs using semi-structured interviews and triangulated the information with annual reports and articles. The emergent themes from the participants' responses and documents reviewed revealed insights into strategies some VCs use to improve their evaluation processes of LS management teams' drug development capabilities. The following four themes emerged from the participants' responses (a) begin with the exit in mind, (b) collapse learning timelines, (c) conduct systematic due diligence, and (d) cultivate and critique one's drug development expertise.

Presentation of the Findings

Four themes emerged from the data analysis. I organized the transcript data for analysis from 10 participant interviews. The purpose of these interviews was to address the central research question: What strategies do successful VCs use to improve their evaluation processes of LS management teams' drug development capabilities? The funding stages were seed, early, expansion, and mezzanine.

The population consisted of 10 participants from the United States and Canada. Six VCs resided in the United States and four VCs resided in Canada. I contacted 44 VCs in the both countries to request participation in the study. The participant locations were skewed towards the Eastern Time Zone with six from the east coast and four participants were from the Pacific Standard Time Zone. No participants resided in the

Mountain Standard Time Zone. Nine VCs were male and one VC was female. Although I invited other female VCs, they either were not interested in the study or did not have sufficient time to dedicate. This variance may have influenced the findings of the study, however, because of the small number of participants and the qualitative nature of inquiry, specific subanalysis between the participant subpopulations was unsuitable.

To protect participant confidentiality, I provided a broad overview of the participant sample. The number of partners/managing directors differed among the represented firms. One firm had two managing directors, and the remaining firms ranged from five to 11 partners or managing directors. Some firms were solely dedicated to health care or LS investments and others had a combination of investments in LS, information technology, security, and clean energy. Participant QR09 invested in over 200 companies during his career. Participant AB01 assessed approximately 1100 LS deals in his career. Fund sizes ranged from 50 million to over 500 million USD and were LS-specific funds except in a few instances. All participants achieved at minimum a Bachelor of Science degree, three held a Master of Business Administration degree, and five participants held a Master of Science degree. Two participants held either a Doctor of Philosophy or Doctor of Medicine degree. One participant achieved a Juris Doctor degree. Participants' experience evaluating LS management teams spanned from 4 to 30 years.

I assigned each participant an ID code. Following the telephone interviews, which ranged from 22 to 67 minutes (see Table 2), I transcribed and coded the data to derive themes. To preserve participant anonymity, I aggregated the data into themes to

identify the strategies successful VCs use to improve their evaluation processes of LS management teams' drug development capabilities. I triangulated the interview data with archival data such as company websites, and online articles. Writing reflexive journal entries helped minimize researcher bias. The following subsection outlines the emergent themes. All themes tied to the BPM conceptual framework.

Table 2

Participant Interview Duration

Participant ID	Interview duration (minutes)
AB01	67
CD02	22
EF03	45
GH04	55
IJ05	35
KL06	53
MN07	33
OP08	65
QR09	57
ST10	24

Life Science Management Team

The management team is the nucleus of the company. The participants articulated several attributes they require their LS CEO and management teams to possess. Participant IJ05 summarized the sentiment with, "It doesn't matter how much we love an asset. If we cannot put in place the right management team, we will not make the investment." Others reported the time to exit moderated the emphasis placed on the management team. Gerasymenko and Arthurs (2014) revealed that VCs particularly emphasized the importance of the management team if the projected time-to-IPO is long as opposed to a quick exit. I grouped the participant's responses into three main categories: character traits, management skills, and drug development specific skills.

Character traits. The participants mentioned several desirable character traits. Most participants cited an entrepreneur's coachability and flexibility as highly significant. Bryan, Tilcsik, and Zhu (2017) found that entrepreneurial teams with subject matter expertise were more resistant to outsider advice than less experienced teams. Considering many LS CEOs previously held clinician roles, Blanchard (2017) asserted that coachability, vulnerability, and self-awareness were pivotal attributes for physicians transitioning into leadership positions. Participant QR09 stated:

> As long as the management team is open to the assistance that they need and recognizes what they know and don't know, I think we'll do what we can to help. We will help them find the right resources to match up with the product and the technology they are working on.

One participant cautioned entrepreneurs to avoid asking for assistance with trivial issues to make the best use of the VCs expertise. Participant GH04 explained, "We've seen some CEOs ask almost too many questions where it shows a lack of confidence. For example, some individuals asked me, "Here are three designs of my business card, which do you think is the best?" All participants cited some variation of the terms honesty, transparency, integrity, humility, and ethical as important character traits. Cormier, Lapointe-Antunes, and Magnan (2016) conveyed that CEO hubris was an antecedent to financial malfeasance even in the presence of strong boards. Participant AB01 emphasized, "Though we are just the money or maybe even smart money, a VC cares that the entrepreneur honors that." A CEOs character may also lead to future deals. Participant QR09 added, "Believe it or not, I have had investments in companies that were total failures, and I wouldn't hesitate to invest in the CEO again because they were transparent, honest, and effective."

Management skills. A leading management skill which the VCs required from the LS management team and the CEO was a competitive mindset. The participants searched for management teams with the foresight to build an economic moat around their assets and platform offering. Chollet, Géraudel, Khedhaouria, and Mothe (2016) advised that a CEOs curiosity and openness is directly related to the level of competitive knowledge she seeks. Participant AB01 specified:

> Because often times when you ask an entrepreneur who is your competition? What are other people doing? It is very rare to get a complete and honest

> assessment. And that's really telling for you as an investor. If an entrepreneur says we have no competition, the conversation is over.

Another frequently cited skill was the CEOs ability to build a senior leadership team with complementary skills. The best CEOs surrounded themselves with other talented executives, investors, and advisors. Strong management teams expanded their spheres of influence to increase the likelihood of success. Chatterjee and Pollock (2017) proposed that narcissistic leaders construct senior management teams with less experienced members who lack confidence or fear challenging authority. Participant IJ05 suggested:

> There are certain skills regardless of the investment stage that if existing managers do not have them, I don't think those are skills they can acquire in a short period of time. So we would rather think about either replacing those individuals or complement the teams with new folks that have the right skills.

Other management skills the participants mentioned were communication, maintaining high standards, short and long-range planning, and visionary thinking. In general, participants did not elaborate on metrics or how they measured skills in prospective management teams. Participant GH04 summarized, "There are some things we can easily measure, but especially when it comes to management teams, there is so much that we have no idea how to measure."

Drug development skills. Skills specific to drug development which the participants noted were scientific expertise, financial acumen, well-informed about the drug development process (e.g., regulatory, reimbursement, manufacturing,

commercialization, patenting, and clinical trials), sector knowledge, and fundraising savviness. As previously cited, Gompers et al. (2016) found VCs working with health care/biotechnology firms rated the management team's industry experience as most important. While the participants preferred the management teams with previous drug development experience, strong scientific knowledge with a willingness to learn the other aspects was received positively. Participant KL06 surmised:

> No one person has every skill. So you want a CEO who is a good integrator of all of the different kinds of skills, who is able to create and tell a story to investors and pharmaceutical companies, who has some relationships in investment banking, and hopefully some experience in drug development.

Remarkably, only one participant stated a preference for management teams who are committed to treating patients and with a vision to improve society.

Theme 1: Begin with the Exit in Mind

The first emergent theme involved beginning with the exit in mind. Successful VCs connected every decision to the exit potential, including the valuation, timelines, and exit route. Correspondingly, Gerasymenko and Arthurs (2015) discovered that VCs made early forecasts about the exit type and time-to-exit from their investments. As participant MN07 noted, "The minute I meet an entrepreneur I start to think about the exit. The best investors will always have that top of mind." When participants assessed the market dynamics for an asset, they initially consider the number of years before they must harvest, because the number of years remaining in the fund determines the LS

company stage they could reasonably consider investing in. For instance, VCs with a fund due for harvesting in 2 years would not invest in a seed-stage LS company. However, a VC managing a fund with 8 to 10 years remaining until harvest may consider investing in a seed-stage LS company. Bock and Schmidt (2015) suggested that first time VC funds maintained their shares longer post IPO lockup period than other funds with satisfactory performance. The participants analyzed variables such as the investment funds required for drug development, the market dynamics, asset differentiation, and whether the current management team could potentially lead the company to an acquisition or an IPO. VCs also devised potential scenarios and calculated the probability of occurrence. Participant QR09 noted, "We expect companies to miss milestones. That is a reality of developing a product in a new company that the milestones are often missed. We expect a plan in place for what to do in case milestones are missed."

Eight of the interviewees (78%) mentioned the fiduciary responsibility to the limited partners. Participant AB01 offered, "Your job as a VC is as a steward of other people's money. Your job is to return the most that you can in the specific period that your fund operates." Participant GH04 asks the question, "If I take my LPs money and I put it in the hands of this person, will they be able to multiply it?" Recently, Jia and Wang (2017) found increased capital commitment from the general partner was correlated with improved exit success. The participants further evaluated potential deals based on the alignment with the fund strategy. For instance, some portfolios required a percentage of regional investments. Additionally, some participants focused on LS

companies who were developing treatments in certain therapy areas, such as oncology or rare diseases. Some researchers warned that narrow investment strategies may hinder investment returns. Buchner, Mohamed, and Schwienbacher (2017) informed that skilled VCs who invested in diversified industries and different stages of companies earned higher returns than non-diversified portfolios.

Every participant (100%) had substantially more M&A exits in their LS investments than IPO exits. This finding supports Moustakbal (2014), who reported that venture-backed Canadian biotechnology firms had an increased probability of an acquisition than IPO. Participant KL06 suggested:

> The best IPO candidate is often the best M&A candidate. They have options. They can go many ways. They can say no the first time if it's not the right offer and raise more money in the public exchange and wait a bit.

Participants discussed the complexities accompanying an IPO in LS companies, such as the ideal timing based on available clinical trial data, investors required for mezzanine financing rounds, governance, accounting standards to withstand public scrutiny, and the ideal management team and board to go public. Participant IJ 05 advised, "Plan for the right management team at the right time." Although no participant discussed management gender diversity, Quintana-García and Benavides-Velasco (2016) demonstrated that investors did not perceive that the presence of female senior managers enhanced IPO success for biotechnology firms in the United States,

The participants also perceived that the risk and investment amount increased

directly with later stage trials. Acquiring nascent biotechnology companies is an R&D and growth strategy for large biopharmaceutical companies. Gilead Sciences Inc. acquired biotechnology companies such as Kite Pharma, Nimbus Apollo, and Pharmasset, all of whom had assets in early development, and no marketed products (Micklus & Muntner, 2017; Rosenmayr-Templeton, 2017). Participant OP08 revealed:

> The risk is higher in Phase 3 trials. So what you'd like to do is get out of that business before your money is at risk in a Phase 3 trial. What I think works best was in terms of making money and never producing a single therapy out of the whole deal was getting to a place where you can sell the company. Sell the company to GSK or Merck in the development stages and let them pay for the later stage trials.

To illustrate, after acquiring YM Biosciences's (lead product candidate momelotinib) for $510 000 000 in 2012, Gilead Sciences terminated the development of momelotinib for the treatment of myelofibrosis in 2016 following the failure of two Phase 3 studies (Gilead Sciences Inc, 2017). Gilead eventually listed the investment as an impairment charge in their 2017 SEC Form 10-K filing.

BPM is about improving entire sequences of events, activities and decisions that help an organization reach its goals. The VCs main objective is to deliver positive returns to their LP investors. Therefore, VCs keeping potential acquisition or IPO central to their investment decisions (including evaluating LS management teams) serves as a harbinger for subsequent actions that are aligned to their firm's objectives. Participant

GH04 summarized cogently:

> We try to map it out. If we board this ship, we will be on board for 3 years or 8 years or somewhere in-between. Being aware that if I'm heading north, do I stop at Vancouver, Seattle, or Northern California? How much gas do I need to get there? What will my exit look like?

Theme 2: Collapse Learning Timelines

Participants also emphasized that they could collapse their learning timelines by learning from their own experiences combined with a keen alertness to the experiences of other investors. This finding supports Harrison, Mason, and Smith's (2015) assertion that learning from one's experiences (e.g., failures) and from other investors in the syndicate helps investors streamline the due diligence process. Participant MN07 explained, "I'm more thorough than I used to be. I talk to more people." Increased communication and information sharing increases the collective knowledge bank and helps mitigate risk. Hora and Klassen (2013) demonstrated that firms leverage learning from others' mistakes, especially when they have similar operations. Experience correlates with better portfolio returns because investors are less affected by overconfidence behaviors (Koestner, Loos, Meyer, & Hackethal, 2017). Participant QR09 quipped, "Having lived through failures and in some cases late failures of these kinds of technologies, it is too much money that has to be spent on drug development to go down the path of something that can't be reproduced." Swank and Visser (2015) cautioned people to consider the

reputation of the information source and the verifiability of information before implementation.

Five participants (50%) discussed instances of nepotism in the LS management teams that were discovered either pre-or postinvestment and led to future process changes. One participant suspected nepotism when a staff member's salary was misaligned with a seemingly nebulous job title. Participant GH04 reminisced:

> The CEOs spouse earned $350,000 per year for a soft job titled Chief Culture Officer. What does that mean? I mean, I'd love to be a Chief Culture Officer for $350,000, put my feet up and paint my toe nails all day. And say, hey, is the culture ok today? Good. Let's go home now. Let's make sure culture is good tomorrow.

Participant AB01 discovered a CEO withholding information about his marriage to a generously compensated staff member before signing the term sheet. He mused, "We were lucky though to pick up on that, and that was the reason we did not invest." The possibility of misalignment led to investor wariness. Similarly, Parise, Leone, and Sommavilla (2016) observed that the existence of family or personal relationship ties in a management team deters external investors. Participant AB01 further added, "We felt that if the guy couldn't be honest about that [the personal relationship], what else was he going to be dishonest with when it was our money on the line?" Participant IJ05 expressed his disapproval about discovering nepotism post investment:

> We didn't realize we missed this. The two were in a personal relationship, and that impacted the performance of the company so we thought that we should include the question from now on when we are assessing teams. It's a very sensitive issue obviously, but we should look at that. And technically, if we have for example a husband and wife, people who are in a relationship in senior management of a LS company, we tend to be a little more cautious.

Participant GH04 acknowledged that CEOs prefer to hire people they know and have relationships with. He added, "The question remains, how does the entrepreneur remain accountable? Is he willing to fire this person if something goes wrong?" While soliciting peers for information was often useful, the three participants explicitly mentioned the importance of critical, analytical, and independent thinking skills. A trust but verify approach. Participant AB01 elaborated:

> The management team came highly recommended by another group that we held in high esteem. We said, "oh that's great, you have done the diligence, that's fine." Then we found out later that they didn't do the diligence and that their processes were significantly less vigorous than ours.

Behavioural science researchers suggest cognitive and emotional biases can supplant logical investment behavior (Pompian, 2016). For instance, Joel, Plaks, and MacDonald (2017) elucidated that individuals fear missed romantic opportunities significantly more than the possibility of rejection. Six participants (60%) revealed that examining and sometimes lamenting over lost investment opportunities (especially those

which were subsequently successful) encouraged them to fine tune their radars for future deals. In his effort to learn from others, Participant AB01 discerned, "Did we miss any? Were there good deals that we missed on when we should have invested, and we just didn't see what others saw. And they had great success. Just rather out of knowledge, not envy." Several scholars (Lad & Tailor, 2016; Pompian, 2016) advised confirmation bias occurs when investors actively seek information that confirms their claims while minimizing opposing evidence. The data shows that successful VCs counteract confirmation bias tendencies and stress test their assumptions. Likewise, the BPM discipline is about enhancing actions which produce business outcomes to support a business strategy. VCs who assiduously and routinely review their processes after new investment experiences are better positioned to support their firms' objectives.

Theme 3: Conduct Systematic Due Diligence

All participants underscored the importance of performing rigorous background checks on prospective LS management teams before investments. Participant GH04 conveyed:

> My peers almost compare this to dating. Everyone is always on their best behavior. Their clothes are the finest. They talk about the beautiful music they listen to, the great books they've read. And then you of course two years down the road you ask…how did I end up in this relationship?"

Cumming and Zambelli (2017) deduced that an exhaustive due diligence process conducted internally by fund managers is associated with better portfolio firm performance. The participants mentioned several forms of due diligence, as confirmed in

recent studies (Cole & Lysiak, 2017; Cumming & Zambelli, 2017). Background checks included reference checks, criminal records, third-party vetting, internet searches, LinkedIn, conversations with the management teams' colleagues, peers, past and current investors, credit scores, and previous business dealings. The length of the due diligence process ranged from 2 weeks to 1 year. Participant KL06 stated, "We track people for a very long time. It is very rare for us to invest in an unknown company where they make their pitch, and we invest two months later. It is very rare." Similarly, participant GH04 expressed, "there is a company we just passed on for a 20 million USD investment. I think we must have spent collectively at least 250 hours between five of us looking at different aspects."

Venture capital investment increases interest from other investors. Ogura (2016) confirmed how venture capital presence served as a certification signal for other investors. Participant AB01 added, "By and large, the best sources of investment opportunities, particularly in LS come from other investment professionals, whether it is fellow investors, VCs, corporate strategic investors, or the lawyers that sponsor them."

Eight participants (80%) used some variant of a checklist during the due diligence process. One firm developed a 20-page due diligence checklist that included items such as market evaluation, the asset, the company, and the management team. Soenksen and Yazdi (2017) developed a LS due diligence checklist which included items such as clinical and epidemiology data, technology and concept, market assessment, intellectual property, regulatory strategy, financing, business plan, risks and mitigation, and overall "gut feel". Checklists forced the VCs to follow a systematic vetting process and to

streamline their processes. Participant IJ05 offered, "We have a general template or makeshift system which we qualify every opportunity according to. And obviously, the management team has the highest ranking in that particular template." VCs always conducted some form of due diligence even if they entered the syndicate in later funding rounds. Participant MN07 explained:

> Sometimes we co-lead deals so we share the due diligence workload. Sometimes we'll come later in the game and we would review parts of the due diligence that were done by the other investors. But we will always do some due diligence. Even if we're late in the game, the management piece will be done whatever the investment. That's the most important part.

Six participants (60%) requested prospective management teams to take psychometric tests. Participant QR09 reflected, "One of the things we've learned over the years is as with anything, you're dealing with human frailty, emotions, biases, whether they are intentional or not." The participants used the psychometric tests to determine behavioral patterns and to assess the psychological compatibility with the LS management teams. For instance, Gemmell (2017) argued entrepreneurs with an active experiential learning orientation were more successful than reflective entrepreneurs. Arráiz, Bruhn, and Stucchi (2016) determined that secondary psychometric testing lowered credit risk for entrepreneurs with a known credit history. Participant MN07 summarized:

> When it's time to seek [sic] for an investment, people are always on their best behaviour. It is really when the times get tougher that real behaviors start to emerge. Sometimes under a lot of stress or pressure, the negative behavior will emerge, so we have to be careful.

A BPM model informs an entire organization how a procedure is completed and how is it completed correctly every time. VCs who follow systematic due diligence processes serve their firms by eliminating redundancies, minimizing errors, and minimizing bias to ensure they make sound investment decisions.

Theme 4: Cultivate and Critique One's Drug Development Expertise

The business of developing and commercializing a drug is a highly technical, costly, and complex process. The most successful VCs cultivated their know-how about the intricacies of drug development such as the development of the pre-clinical and clinical data package, drug reimbursement, expanding their networks in the LS clusters, and positioning the portfolio company for a successful exit. Participant QR09 summarized:

> It's a continuous improvement process. I spoke with our board chairman last night. I told him if people are of the belief that if it isn't broke, don't fix it, they probably do not belong in our organization. And so, everything we do is open to reinterpretation to improvement, to process improvement. We have to, because none of these businesses are stagnant (at least they shouldn't be) and so we have

to work to continually refine and make the processes more relevant, more germane to decision making.

The outcome that a VCs investing competence improves over time based on their commitment to continuous improvement contradicts other published studies. Nanda et al. (2017) argued that a while a VCs initial success predicts his long-term investment success, overall, VCs were no better at discriminating investments than chance. Further, more experienced VCs modified their investment strategies to later stage deals and to syndicated investments (Nanda et al., 2017). This finding implies if a VC has successes early in his career, future deals will further reinforce his early success. Marquez, Nanda, and Yavuz (2014) contended that high potential entrepreneurs seek out successful VCs based on their past performance. The returns arising from venture capital funds are affected by numerous internal factors such as the fund amount, the fund lifespan, the managing VCs and associates, the quality of the portfolio company, and external factors such as the fund sector and the economy. Consequently, researchers may encounter endogeneity problems when determining whether a VCs expertise is causally related or only correlated to investment success. A theoretical solution to this problem is to conduct a longitudinal prospective study following a statistically robust sample of VCs who invest in LS companies. Invariably, researchers would likely encounter difficulty finding VCs who agree to the aforementioned study.

All participants emphasized that there is no substitute or checklist to replace experience in evaluating LS management teams. Participant KL06 spends a considerable amount of time with several CEOs and keeps close contact. He further added:

> In some cases, we know the person may not have scored the highest but there is a good reason to keep him in the running. All of these things (e.g., checklists) are tools which are not perfect. They should be used with caution. It's a mix of using tools, references, with seeing them in action before and after the investment, you keep on evaluating them and see how they perform.

Participant GH04 attended monthly meetings with different subject matter experts who updated him on market trends and other implications. VCs fine tune their "gut feel" or intuition with every subsequent deal. Over time, Participant MN07 became "Finely attuned to feeling any semblance of resistance and friction." The VCs learned to ask the right questions, see beyond façades, remained fiercely curious, and emotionally balanced. Participant CD02 reflected, "We look for truth seekers. There are biases for founders to want to move mountains, traverse valleys to prove their thesis is correct. Are founders directed towards traversing the optimal path to uncover the validity of their assumptions?" As the participants assessed more LS management teams in different market conditions and several therapeutic areas, they were better equipped to add value to the portfolio firm. Participant MN07 articulated:

> I spend most of my time on the phone inquiring about people, projects, technology, and everything. I'm always, we're always, thinking about that.

> There is the investment phase, but there is also the value creation phase. And you always need to be super aware of what is happening in the marketplace.

Scholars have previously demonstrated heterogeneity in levels of VC expertise. For instance, Clingingsmith and Shane (2017) explained that experienced VCs and inexperienced VCs evaluated entrepreneur pitches differently. Ewens and Rhodes-Kropf (2015) asserted that a successful VCs performance is persistent over time, independent of the VC firm. From an opposing perspective, Braun, Jenkinson, and Stoff (2017) showed that underperforming VCs are consistent underperformers. Therefore, underperforming VCs may consider modeling the practices of more successful VCs and course correct.

The BPM model of continuous process improvement aligns with theme four. Cultivating and critiquing one's drug development expertise requires VCs to have awareness of their own expertise and to close knowledge gaps. VCs must ensure their knowledge is both current and predictive of the future. For instance, as the drug development landscape continuously evolves, VCs must learn to "see around corners" and predict which therapies will be relevant in the future. Table 3 illustrates the participant responses which supported each theme. Notably, the responses were only minimally staggered for Themes 2 and 4, and unanimous for Themes 1 and 3.

Table 3

Participant Responses Supporting Emergent Themes

Participant ID	Theme 1	Theme 2	Theme 3	Theme 4
AB01	X	X	X	X
CD02	X		X	
EF03	X		X	
GH04	X	X	X	X
IJ05	X	X	X	X
KL06	X	X	X	X
MN07	X	X	X	X
OP08	X		X	X
QR09	X	X	X	X
ST10	X	X	X	X

Findings Related to Business Process Management

The conceptual framework for this study was BPM. Practitioners build a framework for continuous improvement in their organizations. Specifically, BPM is a

management discipline about deliberately, collaboratively, and systematically improving business processes to accomplish organizational objectives (Hammer, 2015; Jeston & Nelis, 2015). In BPM, all processes must align with the organization's strategic goals, and practitioners must continuously improve their processes. The VCs overarching objective is to ensure they can enter and exit their investments within the fund's lifespan and deliver overall positive returns to their LP investors. Therefore, when VCs evaluate LS management teams, keeping the exit central to decision making (Theme 1) fits into the BPM model. BPM includes process design, modeling, execution, monitoring, and optimization phases in its life cycle. Collapsing the learning timelines (Theme 2), using systematic due diligence processes (Theme 3), and cultivating and critiquing one's drug development expertise (Theme 4) resonates with the BPM model of continuous improvement in line with the organization's objectives.

Applications to Professional Practice

Scholars and practitioners continue to search for the panacea to reduce investor information asymmetry and to reduce inherent decision-making uncertainty. In this study, I explored strategies several VCs used to improve their evaluations processes for LS management teams' drug development capabilities. I interviewed ten VCs across the United States and Canada who successfully evaluated LS management teams' drug development capabilities. The findings contain themes distilled from approximately 9 hours of total interview time, annual reports, and online articles. The participants represented a combined VC investment history of over 100 years and hundreds of

millions in investment dollars in LS. The participants directly evaluated numerous LS companies and management teams for investment consideration.

The study outcome offers strategies that, if implemented, could lead to improved evaluation of LS management teams and better investment outcomes in the sector. Participant GH04 quipped, "It is inexcusable that we operate with a 10% success rate in venture capital. You have Stanford PhDs and really smart people in this business. We all can do better than that." If VC firms (including IVC, CVC, and GVC) and angel investing firms consider these findings, investment in LS companies could increase with enhanced investor confidence. These results provide actionable solutions for LPs (e.g., pension funds, insurance companies, high net worth individuals), who can inquire about a VC's processes during fundraising and make informed decisions when allocating a portion of their portfolio to venture capital. LPs tend to invest when they perceive the VC firm has demonstrated a favorable track record and is trustworthy (Kollmann, Kuckertz, & Middelberg, 2014; Kuckertz, Kollmann, Röhm, & Middelberg, 2015). Entrepreneurs remain cognizant of the needs of investors and other constituents of their business (Batterson & Freeman, 2017). Consequently, these results may afford LS management teams with insights on the challenges VCs encounter and the criteria VCs use when making investment decisions.

Implications for Social Change

The intent of this study was to identify applicable solutions VCs may use to improve their evaluation processes of LS management teams. The results of this study

could affect social change in three main ways. First, with increased investment, LS companies can develop new and innovative treatments to improve the welfare and longevity of patients. Investments from high profile endowment funds serves as a quality signal for other LPs and investors. Bermiss et al. (2015) illustrated how the elite Yale University's endowment fund, an LP, acted as an endorsing beacon for nascent venture capital firms and their respective portfolio companies. Second, pension funds, another important LP investor in venture capital, are vital sources of retirement income for citizens. Most pension funds in the United States, Canada, and Europe allocate a fraction of their portfolio to riskier alternative investments such as venture capital (Andonov, Bauer, & Cremers, 2017; Ramsinghani, 2014). In Canada, pension plans such as the Old Age Security, the Canada and Quebec Pension Plans, and Retirement Pension Plan has increasing investment in the alternative asset class as low interest rates persist (Bédard-Pagé, Demers, Tuer, & Tremblay, 2016; Curtis, Dong, Lightman, & Parbst, 2017). Improved investment processes may lead to better returns for pension funds, thus enhancing citizens economic well-being during their retirement years. Third, therapeutic advances resulting from VC investment impacts employees in many types of organizations such as VC firms, biopharmaceutical companies, hospitals, clinics, pharmacies, and distribution companies, consequently creating employment and helping communities prosper.

Recommendations for Action

The recommendations for action are that venture capital professionals should implement the strategies identified in the themes of the study to improve their evaluation

processes of LS management teams. VC firms should document their due diligence processes, standardize their processes to minimize intra-firm variability, and routinely stress test their assumptions. Further, VC firms should conduct routine process assessments and update their processes to include new lessons learned. In addition to implementing the suggested strategies identified in the themes, VCs should continuously enhance their sector-specific knowledge of new technologies and vigilantly monitor market trends to remain ahead of the competition.

LS management teams should consider the criteria and processes VCs follow when vetting companies for investment. I have a few recommendations for LS management teams. First, LS management teams should accept investments from VCs where a mutual affinity and respect exists. Relationships lacking respect may lead to an antagonistic work environment, opportunistic behavior, and eventual business failure. Second, although LS management teams are high performing experts in their respective fields, they should learn to be coachable and team oriented to benefit from the VC's value proposition in the drug development market. Third, LS management who are predominately scientists or clinicians should pursue training in finance and accounting. I suggest, at minimum, for the CEO and chief scientific officer to take introductory accounting and finance courses and even executive MBAs.

I will present the data from this study to the Canadian Venture Capital Association and the North American Venture Capital Association. Venture capital associations may use the data from the study to develop best practices for VCs during the due diligence process and as training for LS entrepreneurs. I will also disseminate these

findings to other stakeholders such as Canadian accelerators and start-up incubators, LS companies, and the study participants. Finally, my intent is to publish this paper in ProQuest.

Recommendations for Further Research

Research exists on venture capital decision making under conditions of uncertainty, however, to my knowledge, no research on how VCs evaluate management teams in LS firms existed until this study. Exploring the strategies some VC use to improve their evaluation of LS management teams' drug development capabilities led to the emergence of several themes that future researchers might expand upon. First, researchers could perform a study on strategies VCs use to improve their evaluation processes of LS management teams drug development capabilities in different geographical locations such as the United States and Europe. Second, researchers could conduct a similar study in different subpopulations of VCs such as male and female VCs, corporate and government VCs, VCs from different geographies, and experienced vs amateur VCs. Third, scholars could replicate this study using an angel investor population.

Opportunities for future quantitative studies exist. As the present study was an inductive, qualitative research study, in future, I recommend a quantitative study on VC evaluation process of management teams which would include statistical analysis of responses gathered from a robust sample of VCs in several geographies. Expanding the geographical locations may provide a broader understanding of VC evaluation processes and lead to a more generalizable dataset.

This study has some limitations which include the participants' gender, experience levels, and education. Only one female VC participated in the study and therefore I could not explore preliminary differences between male and female VCs. The VCs experience ranged from 4 to 30 years. Therefore, total investment sums and number of deals were not uniform. The responses from the more experienced VCs were richer and nuanced compared to the VCs with less experience. Finally, the different VC educational backgrounds (e.g., science vs business education) may have impacted the responses considering LS is a highly technical and niche sector.

Reflections

The DBA doctoral study process emphasized the rewards and challenges social science researchers encounter to publish rigorous and scientifically reliable results. The process of planning the study and executing the study seemed diametrically opposing tasks at first. My cold calling recruitment tactic for the VCs, notably an upper echelons group, was ill-informed, arduous, and felt like a Sisyphean task. I learned that as in business situations, researchers must learn to effectively manage emotions, draft contingency plans, and practice patience.

Despite a lengthier than anticipated recruitment period, once the interviews proceeded, each VC was affable, insightful, and contemplative. The VCs generosity with their time, offering a mean interview time of 48 minutes, was humbling and encouraging. I entered the data collection phase with a solid understanding of the drug development and the clinical research process. The VCs discussions about the pressures and challenges they encounter to select a capable management team to, in turn, provide strong

returns for their limited partner investors, broadened my aperture into their investment world. Weeding out unscrupulous or disingenuous management teams from management teams at the vanguard of science is not easy under conditions of information uncertainty and time constraints. Despite their differences, the VC-entrepreneur relationship need not be mutually exclusive or zero-sum. Rather, I believe a synergistic and mutually beneficial relationship is possible.

A skill I cultivated was approaching the data collection and analysis process in a tabula rasa state. In my role as a researcher, I directed hyper vigilant attention to the research question and minimized any personal bias or preconceived notions. I asked the interview questions without leading the participants, minimized interrupting the participant, and included probing questions to confirm my understanding of the responses and to minimize ambiguity. The member checking process confirmed my interpretation of the answers before starting the data analysis process. Distilling, aggregating, and disaggregating salient themes from a large volume of interview text, reports, and press releases required a systematic approach.

I developed a newfound respect for the research process and for researchers after conducting this study. While conducting an exhaustive literature review was invaluable, the act of synthesizing and creating novel research towards business practice exponentially advanced my understanding of venture capital in life sciences. Finally, the DBA in venture capital finance has reinvigorated my interest in alternative investments,

the capital markets, academic writing, the research process, and fundamental analysis of companies.

Conclusion

Venture capitalists invest in LS companies under conditions of information asymmetry and high risk. If VCs improved their evaluation processes of LS management teams' drug development capabilities, they could potentially invest with more confidence and provide their LPs with higher returns. Because LS companies rely on venture capital investment to advance their R&D programs, LS management teams should consider the VC commentaries outlined in this study. Although further research is needed, this study fills an important gap for VCs who invest in the LS sector and for other stakeholders such as LS management teams and LPs. Despite considerable research in venture capital investment decision making, relatively scant information was previously available about how VCs evaluate LS management teams.

I collected data from interviews with venture capital partners and managing directors from firms in the United States and Canada who succeeded in improving their evaluation processes of LS management teams' drug development capabilities, reviewed annual reports and press releases for data triangulation. I intentionally selected the Canadian LS industry because of declining investment rates in the past decade. Member-checking and data triangulation enhanced the validity of the research. The four themes that emerged from this study were (a) begin with the exit in mind, (b) collapse learning timelines, (c) conduct systematic due diligence, and (d) cultivate and critique one's drug

development expertise. I compared the themes with the published literature and linked the themes with the conceptual framework, business process management.

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Appendix: Interview Protocol and Questions

The purpose of the interview protocol is to ensure consistency and quality in the interview process across all participants.

Protocol

1. Greet and thank participants for agreeing to participate in the interview.
2. Introduce myself and the research purpose to the participants.
3. Reiterate the voluntary nature to participate and the flexibility to withdraw at any time.
4. Review privacy protections and re-confirm informed consent with the participant.
5. Remind participant the interview is recorded.
6. Turn on electronic recording device.
7. Commence the interview
8. End the interview and discuss member checking procedures to ensure accuracy.
9. Thank the participants for their engagement.
10. Turn off electronic recording device.

Interview Questions

The interview questions for this study were based on the conceptual framework and the central research question.

1. How do you determine a LS management teams' capability for developing a drug through to commercialization (e.g., discovery, pre-clinical, clinical research, and post marketing)?

2. Please describe the process your organization uses to assess the drug development capabilities of a LS management team.

3. What (if any) were the key challenges to implementing the process of assessing LS management teams?

4. How did you address the key challenges to implementing the process for assessing LS management teams?

5. How does your organization assess the effectiveness of your process for evaluating LS management teams?

6. How, if at all, has your organization improved the effectiveness of your process for evaluating LS management teams?

7. What other information would you like to share about evaluating LS management teams' capabilities that I did not ask?